TESTING & ADJUSTING YOUR MVP PUMPING SYSTEM

MAGNUM VENUS PRODUCTS

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Table of Contents

SECTION:	Page
TERMS & CONDITIONS OF SALE	4
SAFETY & WARNINGS	6
INTRODUCTION	15
ESTABLISHING A SPRAY FAN	18
SPRAY TESTING	21
POUR TESTING	30
CHARGEABLE ACCUMULATORS	33
INTERNAL START-UP & SHUT-DOWN	37
APPENDIX	42
REVISION INFORMATION	44

Terms & Conditions of Sale:

GSSC, Inc.'s Terms & Conditions of Sale ("Terms & Conditions") 588284v4

1. ACCEPTANCE: Acceptance of any purchase order from a customer or potential customer ("Buyer") is subject to credit approval by GSSC, Inc. ("Seller"), acceptance of the purchase order by Seller and, when applicable, any manufacturer, vendor, or other third party that provides goods to Seller for resale to Buyer ("Vendor"). If Seller, in its sole discretion, determines that Buyer's credit becomes unsatisfactory or it has reasonable grounds for insecurity, Seller reserves the right, upon notice to Buyer, to demand adequate assurance of due performance from Buyer and/or terminate any purchase order with no liability to Seller. BY REQUESTING A QUOTE FROM SELLER, ACCEPTING AN INVOICE FROM SELLER, OR PRESENTING A PURCHASE ORDER TO SELLER, BUYER CONFIRMS THAT THESE TERMS & CONDITIONS SHALL GOVERN ALL PURCHASES OF PRODUCTS OR MATERIALS PROVIDED TO BUYER BY SELLER ("GOODS"). GOODS SOLD BY SELLER ARE EXPRESSLY SUBJECT TO THE TERMS AND CONDITIONS SET FORTH HEREIN AND ANY DIFFERENT OR ADDITIONAL TERMS OR CONDITIONS SET FORTH IN A PURCHASE ORDER OR SIMILAR COMMUNICATION RECEIVED FROM BUYER ARE OBJECTED TO AND SHALL NOT BE BINDING UPON SELLER UNLESS SPECIFICALLY AGREED TO IN WRITING BY AN AUTHORIZED CORPORATE OFFICER OF SELLER.NO SELLER EMPLOYEE OR AGENT HAS THE AUTHORITY TO MODIFY THESE TERMS & CONDITIONS VERBALLY. SELLER OBJECTS TO AND REJECTS ANY TERMS BETWEEN BUYER AND ANY OTHER PARTY, AND NO SUCH TERMS, INCLUDING BUT NOT LIMITED TO ANY GOVERNMENT REGULATIONS OR "FLOWDOWN" TERMS, SHALL BE A PART OF OR INCORPORATED INTO ANY PURCHASE ORDER FROM BUYER TO SELLER, UNLESS AGREED TO IN WRITING BY AN AUTHORIZED REPRESENTATIVE OF SELLER.

2. PRICES AND TAXES: Buyer agrees to pay the prices quoted by Seller or listed on any related invoice, and is responsible for additional applicable shipping and handling charges, taxes, duties, and charges for import and export licenses and certificates. All prices quoted by Seller are subject to change without notice. Seller will generally collect applicable taxes along with the purchase price unless Buyer submits a valid tax exemption certificate, and indicates which Goods are covered by it. Prices on special-order Goods may be subject to change before shipment. In order to be corrected, any discrepancies in pricing and/or quantities on invoices must be reported by Buyer within thirty (30) days of the invoice date.

3. PAYMENT: Payment terms are 30 days net from the invoice date or upon such other terms approved by Seller in writing. Retainage shall not apply, and Buyer shall not hold back any retainage from Seller, even if retainage is part of any contract between Buyer and any other party. Payment is not contingent on Buyer's ability to collect or obtain funds from any other party. Credit card sales are billed at the time of purchase. Buyer expressly represents it is solvent at the time it places any purchase order with Seller. Seller, in its sole discretion, may determine that Buyer's financial condition requires full or partial payment prior to manufacture or shipment. If Buyer fails to make any payment when due, Seller reserves the right to suspend performance. Buyer agrees to pay a charge on all amounts past due at the rate of 1 ½% per month (18% per year) or the maximum lawful rate, whichever is less. In the event of non-payment, Buyer agrees to pay Seller's reasonable attorney fees and court costs, if any, incurred by Seller to collect payment, and all applicable interest charges. Seller may apply payments to any outstanding invoices unless Buyer provides specific payment direction.

4. TITLE AND RISK OF LOSS OR DAMAGE: As to Goods delivered directly by Seller, title passes upon delivery at the place Buyer receives possession; and, thereafter, all risk of loss or damage shall be on Buyer. All other sales are F.O.B., point of shipment, and Buyer takes title and assumes responsibility for risk of loss or damage at the point of shipment for such sales. Claims for Goods damaged in transit are Buyer's sole responsibility when not delivered directly by Seller.

5. QUOTATIONS: All quotations expire thirty (30) days from the date of the quotation unless otherwise noted on the quotation. This time limit applies even if Buyer uses the quotation to submit a job or project bid to any other party.

6. ASSIGNMENT: The Buyer's rights and responsibilities under any purchase order or these Terms & Conditions shall not be assigned by Buyer without the express written consent of the Seller.

7. RETURN OF GOODS: Permission to return items must be requested and granted in advance. No credit will be given if items are returned prior to requesting and receiving permission. Subject to the foregoing, Seller shall accept returns of Goods for any reason for a period of thirty (30) days following shipment for exchange or refund of the purchase price; provided, that such Goods must be unused and are subject to a 15% restocking charge, which may be increased or decreased, in the Seller's sole discretion, depending on the reason for such return. Any Goods which were special ordered by Buyer are may not be returned, and any such Goods which are returned are subject to a restocking/cancellation fee of 100% of the cost of the Goods. Goods shall be deemed accepted by Buyer (and cannot thereafter be returned), if Buyer fails to object to the Goods within thirty (30) days after the Goods are received by Buyer.

8. CANCELLATION: The Buyer may cancel any purchase order prior to shipment of the Goods by mutual agreement of the parties and upon payment to Seller of reasonable and proper cancellation charges.

9. TERMINATION: Seller may terminate the whole or any part of any purchase order if there is a material breach of these Terms & Conditions. In the event of any such breach, the Seller will provide Buyer with written notice of the nature of the breach and the Seller's intention to terminate for default. In the event Buyer does not cure such failure within ten (10) days of such notice, Seller may, by written notice, terminate the purchase order; provided, that Buyer shall continue its performance to the extent not terminated.

10. CHANGE IN BUYER'S FINANCIAL CONDITION: Seller reserves the right to cancel any order or to require full or partial payment in advance without liability to Seller in the event of: (i) insolvency of the Buyer; (ii) the filing of voluntary petition in bankruptcy by Buyer; (iii) the appointment of a Receiver or Trustee for the Buyer; (iv) the execution by Buyer of an assignment for benefit of creditors; or (v) past due payment on previous shipments to Buyer by Seller. Seller reserves the right to cancel Buyers credit at any time for any reason.

11. INTERPRETATION RESPONSIBILITY; PRODUCT USE AND SAFETY: Seller does not guarantee that the Goods it sells conform to any plans and specifications or intended use. When plans and specifications are involved, Buyer is solely responsible for verifying Seller's interpretations of such plans and specifications, and it is Buyer's sole responsibility to assure that Seller's Goods will be acceptable for any specific job. When Seller offers substitute Goods on any proposal, Buyer is solely responsible for confirming their acceptability.

12. DELIVERY: Shipping dates given in advance of actual shipment are approximate and not guaranteed. All contract dates and timelines begin upon receipt by Seller of a purchase order, Buyer's acceptance of these Terms & Conditions, and the payment of any required down payment.

13. EXCUSABLE DELAYS: Seller shall have no liability if its performance is delayed or prevented by causes beyond its reasonable control, including, without limitation, acts of nature, labor disputes, government priorities, transportation delays, insolvency or other inability to perform by any Vendor, or any other commercial impracticability. In the event of any such delay, the date of delivery or performance shall be extended for a period equal to the time lost by reason of delay. If Goods are held or stored beyond the delivery date for the convenience of Buyer, such Goods shall be so stored at the risk and expense of Buyer.

14. CLAIMS: Claims for any nonconforming Goods must be made by Buyer, in writing, within ten (10) days of Buyer's receipt of such Goods and must state with particularity all material facts concerning the claim then known to Buyer. Failure by Buyer to give notice within such ten (10) day period shall constitute an unqualified acceptance of such Goods by Buyer, and a waiver of any right to reject or revoke acceptance of such Goods.

15. WARRANTIES:
(a) SELLER'S WARRANTIES: Seller warrants that all Goods sold shall mechanically operate as specified and shall be free from faults in respect to materials and workmanship for a period of: (i) for parts, twelve (12) months from the date of invoice, and (ii) for systems, twelve (12) months from start-up, or, if earlier, eighteen (18) months from the date of the bill of lading. Seller also warrants that the Goods shall, upon payment in full by Buyer for the Goods, be free and clear of any security interests or liens. Buyer's exclusive remedy for breach of such warranties shall be limited to repair or replacement costs or termination of any security interests or liens, and Seller shall have no responsibility for reimbursing repair costs incurred by Buyer in connection with Goods without first giving written authorization for such charges. In any claims by the Buyer against the Seller in respect of the Goods, the liability of the Seller shall be limited to the value of the Goods. This warranty applies only to Goods properly used and maintained and does not apply to any Goods which are misused or neglected, or which has been installed, operated, repaired, altered or modified other than in accordance with instructions or written authorization by Seller. This warranty does not apply to any Goods not manufactured by Seller, and Buyer's sole warranty with respect to such Goods shall be that of the Seller's Vendor, if any.
(b) VENDOR'S WARRANTIES: Seller shall assign to Buyer any Vendor warranties and/or remedies provided to Seller by its Vendor.
(c) INTELLECTUAL PROPERTY INFRINGEMENT: SELLER DISCLAIMS ANY AND ALL WARRANTIES AND/OR INDEMNIFICATIONS AGAINST INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS OF ANY NATURE. SELLER SHALL, IF GIVEN PROMPT NOTICE BY BUYER OF ANY CLAIM OF INTELLECTUAL PROPERTY INFRINGEMENT WITH RESPECT TO ANY GOODS SOLD HEREUNDER, REQUEST THE APPLICABLE VENDOR TO GRANT FOR THE BUYER SUCH WARRANTY OR INDEMNITY RIGHTS AS SUCH VENDOR MAY CUSTOMARILY GIVE WITH RESPECT TO SUCH GOODS.
(d) LIMITATIONS: THERE ARE NO OTHER WARRANTIES WRITTEN OR ORAL, EXPRESS, IMPLIED OR BY STATUTE. SELLER SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPAIR OF GOODS OR OTHER COSTS ARE ASSUMED BY SELLER UNLESS AGREED TO, IN ADVANCE, IN WRITING.
16. LIMITATIONS OF LIABILITY: UNLESS APPLICABLE LAW OTHERWISE REQUIRES, SELLER'S AND ANY VENDOR'S TOTAL LIABILITY TO BUYER, BUYER'S CUSTOMERS OR TO ANY OTHER PERSON, RELATING TO ANY PURCHASES GOVERNED BY THESE TERMS & CONDITIONS, FROM THE USE OF THE GOODS FURNISHED OR FROM ANY ADVICE, INFORMATION OR ASSISTANCE PROVIDED BY SELLER (BY ANY METHOD, INCLUDING A WEB SITE), IS LIMITED TO THE PRICE OF THE GOODS GIVING RISE TO THE CLAIM. NEITHER SELLER NOR ITS VENDORS SHALL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, DIRECT, CONSEQUENTIAL OR PENAL DAMAGES, INCLUDING, BUT NOT LIMITED TO BACKCHARGES, LABOR COSTS, COSTS OF REMOVAL, REPLACEMENT, TESTING OR INSTALLATION, LOSS OF EFFICIENCY, LOSS OF PROFITS OR REVENUES, LOSS OF USE OF THE GOODS OR ANY ASSOCIATED GOODS, DAMAGE TO ASSOCIATED GOODS, LATENESS OR DELAYS IN DELIVERY, UNAVAILABILITY OF GOODS, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES OR SERVICES, DOWNTIME, OR CLAIMS FROM BUYER'S CUSTOMERS OR OTHER PARTIES. IF SELLER FURNISHES BUYER WITH ADVICE OR OTHER ASSISTANCE WHICH CONCERNS ANY GOODS SUPPLIED HEREUNDER, OR ANY SYSTEM OR EQUIPMENT IN WHICH ANY SUCH GOODS MAY BE INSTALLED, AND WHICH IS NOT REQUIRED PURSUANT TO THESE TERMS & CONDITIONS, THE FURNISHING OF SUCH ADVICE OR ASSISTANCE WILL NOT SUBJECT SELLER TO ANY LIABILITY, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR OTHER GROUNDS.
17. BUYER'S USE OF GOODS: Many factors beyond Seller's control contribute to the success of the Buyer's finished products, such as raw materials used to manufacture the products. Seller is not liability for the quality or quantity of finished products produced by Buyer with the use of the Goods.
18. EXPORTS: If Goods are sold for export, Seller's standard terms & condition for export sales, if any, shall also apply. Acceptance of export orders is not valid unless confirmed in writing by Seller. Buyer, and not Seller, is responsible for compliance with all United States export control rules and regulations. Buyer shall not name Seller as shipper or exporter of record in connection with the export of any Goods purchased from Seller.
19. INSTALLATION: Installation of the Goods is the responsibility of Buyer, unless otherwise indicated in the quotation or invoice provided to Buyer. Notwithstanding the foregoing, however, Seller will provide installation supervision personnel within thirty (30) days of Buyer's request. If an installation for which the Seller is to participate is delayed by the Buyer more than six (6) months after the date of shipment of the Goods, or if Buyer's facility, materials, or parts are not prepared for installation for such period of time, Seller shall be entitled to invoice the Buyer for the anticipated installation costs, up to $1,250 per day plus expenses, for each of Seller's installations technicians which are on site.
20. ANTI-MONEY LAUNDERING RESTRICTIONS: Seller rejects questionable purchase orders and payments: Except for pre-approved credit arrangements, Seller rejects third-party payments, cashiers' checks, money orders and bank drafts. Seller accepts only checks imprinted with Buyer's name; wire transfers originated in Buyer's account; letters of credit with Buyer as account party; and credit or debit cards in Buyer's name. All payments must be by single instrument in the amount of the invoice, less credits, from banks acceptable to Seller.
21. GOVERNING LAW: These Terms & Conditions and all disputes related to it shall be governed by the laws of the State of Florida, United States of America, without giving effect to its conflict of law rules.
22. JURISDICTION AND VENUE: The parties hereby irrevocably submit to the jurisdiction of the state courts of the State of Florida and to the jurisdiction of the United States District Court for the Middle District of Florida, for the purpose of any suit, action, or other proceeding related to, arising out of or based upon these Terms & Conditions or in any way related to, arising out of or involving sale of Goods hereunder; waive and agree not to assert by way of motion, as a defense, or otherwise, in any such suit, action, or proceeding, any claim that it is not subject personally to the jurisdiction of the above-named courts, that its property is exempt or immune from attachment or execution, that the suit, action, or proceeding is brought in any inconvenient forum, that the venue of the suit, action, or proceeding is improper, or that these Terms & Conditions or the subject matter hereof may not be enforced in or by such court; and waive and agree not to seek any review by any court of any other jurisdiction which may be called upon to grant an enforcement of the judgment of any such Florida state or federal court. The parties hereby consent to service of process by registered mail at the address to which notice is to be given. The exclusive venue for any proceeding under these Terms & Conditions shall be solely in any state court in Pinellas County, Florida, or the Federal District Court for the Middle District of Florida, Tampa Division, sitting in Tampa, Florida. Buyer acknowledges that the prices for Goods offered hereunder are in part dependent on Buyer's consent to jurisdiction in Florida and exclusive venue in Pinellas County, Florida or the Federal District Court for the Middle District of Florida, Tampa Division, sitting in Tampa, Florida, and without Buyer's consent to this jurisdiction and venue provision the prices for the Goods may be higher.
23. GENERAL: Any representation, affirmation of fact and course of dealing, promise or condition in connection therewith or usage of trade not contained herein, shall not be binding on either party. If any provision hereof shall be unenforceable, invalid or void for any reason, such provision shall be automatically voided and shall not be part of these Terms & Conditions and the enforceability or validity of the remaining provisions of these Terms & Conditions shall not be affected thereby.

TO THE EXTENT NOT CONTRARY TO APPLICABLE LAW, THE FOLLOWING SHALL APPLY:
24. Buyer waives any available homestead exemption as well as any and all requirements or rights with regard to notice, demand, presentment.

IMPORTANT NOTICE: *THIS INSTRUMENT PERMITS SELLER TO OBTAIN AND USE YOUR INDIVIDUAL CREDIT HISTORY FOR CREDIT EVALUATION PURPOSES.*

SAFETY & WARNING INFORMATION

OPERATING YOUR POLYESTER SYSTEM SAFELY

1. Introduction

Any tool, if used improperly, can be dangerous. Safety is ultimately the responsibility of those using the tool. In like manner, safe operation of polyester processes is the responsibility of those who use such processes and those who operate the equipment. This manual outlines procedures to be followed in conducting polyester operations safety. This system has been specifically designed for use of Polyester Resin, Gel-Coat, and Methyl Ethyl Ketone Peroxides (MEKP) applications. Other formulations or blends considered for use in this equipment is strictly prohibited without the expressed consent by Magnum Venus Products Inc. Magnum Venus Products cannot eliminate every danger nor foresee every circumstance that might cause an injury during equipment operation. Some risks, such as the high pressure liquid stream that exits the spray tip, are inherent to the nature of the machine operation and are necessary to the process in order to manufacture the end-product. For this reason, ALL personnel involved in polyester operations should read and understand the Safety Manual. It is very important for the safety of employees involved in the operation that equipment operators, maintenance and supervisory personnel understand the requirements for safe operation. Each user should examine his own operation, develop his own safety program and be assured that his equipment operators follow correct procedures. Magnum Venus Products hopes that this manual is helpful to the user and recommends that the precautions in this manual be included in any such program. Magnum Venus Products recommends this Safety Manual remain on your equipment at all times for your personnel safety. In addition to the manual, Magnum Venus Products recommends that the user consult the regulations established under the Occupational Safety & Health Act (OSHA), particularly the following sections:

1910.94 Pertaining to Ventilation.

1910.106 Pertaining to flammable liquids

1910.107 Pertaining to spray finishing operations, particularly Paragraph (m) Organic Peroxides and Dual Component Coatings.

Other standards and recognized authorities to consult are the National Fire Protection Association (NFPA) bulletins as follows:

NFPA No.33 Chapter 14, Organic Peroxides and Dual Component Materials

NFPA No.63 Dust Explosion Prevention

NFPA No.70 National Electrical Code

NFPA No.77 Static Electricity

NFPA No.91 Blower and Exhaust System

NFPA No.654 Plastics Industry Dust Hazards

Type of Fire Extinguishing equipment recommended: Fire Extinguisher – code ABC, rating number 4a60bc.

Extinguishing Media – Foam, Carbon Dioxide, Dry Chemical, Water Fog.

Copies of the above bulletins are available, at a nominal charge from:

National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210

Research Report No.11 of the American Insurance Association deal with “Fire, Explosion and Health Hazards of Organic Peroxides”. It is published by:

American Insurance Association
85 John Street
New York, NY 10038

Local codes and authorities also have standards to be followed in the operation of your spraying equipment. Your insurance carrier will be helpful in answering questions that arise in your development of safe procedures.

1.2 Personal Safety Equipment

Magnum Venus Products recommends the following Personal Safety Equipment for conducting safe operations of the Polyester Systems:

Magnum Venus Products recommends that the user consult the state and local regulations established for all Safety equipment listed.

2.0 Material Safety

2.1 Hazards Associated with Laminating Operations

The major hazards which should be guarded against in polyester laminating operations are those associated with:

1. The flammability and explosion dangers of the catalyst normally used – Methyl Ethyl Ketone Peroxide (MEKP).

2. The flammability dangers of clean-up solvents sometimes used (Magnum Venus Products recommends that clean-up solvents be non-flammable), and of resin diluents used, such as styrene.

3. The flammability dangers of catalyst diluents, if used. (Magnum Venus Products recommends that catalyst not be diluted.

4. The flammability dangers of the uncured liquid resins used.

5. The combustibility dangers of the cured laminate, accumulations of over spray, and laminate sandings.

6. The toxicity dangers of all the chemicals used in laminating operations with respect to ingestion, inhalation and skin and eye hazards.

2.2 Catalyst (Methyl Ethyl Ketone Peroxide)

MEKP is among the more hazardous materials found in commercial channels. The safe handling of the “unstable (reactive)” chemicals presents a definite challenge to the plastics industry. The highly reactive property which makes MEKP valuable to the plastics industry in producing the curing reaction of polyester resins also produces the hazards which require great care and caution in its storage, transportation, handling, processing and disposal. MEKP is a single chemical. Various polymeric forms may exist which are more or less hazardous with respect to each other. These differences may arise not only from different molecular structures (all are, nevertheless, called “MEKP”) and from possible trace impurities left from the manufacture of the chemicals, but may also arise by contamination of MEKP with other materials in its storage or use. Even a small amount of contamination with acetone, for instance, may produce an extremely shock-sensitive and explosive compound.

Contamination with promoters or materials containing promoters, such as laminate sandings, or with any readily oxidizing material, such as brass or iron, will cause exothermic “redox” reactions which can become explosive in nature. Heat applied to MEKP, or heat build-up from contamination reactions can cause it to reach what is called its Self-Accelerating Decomposition Temperature (SADT).

Researchers have reported measuring pressure rates-of-rise well in excess of 100,000 psi per second when certain MEKP’s reach their SADT. (For comparison, the highest pressure rate-of-rise listed in NFPA Bulletin NO.68, “Explosion Venting”, is 12,000 psi per second for an explosion of 12% acetylene and air. The maximum value listed for a hydrogen explosion is 10,000 psi per second. Some forms of MEKP, if allowed to reach their SADT, will burst even an open topped container. This suggests that it is not possible to design a relief valve to vent this order of magnitude of pressure rate-of-rise. The user should be aware that any closed container, be it a pressure vessel, surge chamber, or pressure accumulator, could explode under certain conditions. There is no engineering substitute for care by the user in handling organic peroxide catalysts. If, at any time, the pressure relieve valve on top of the catalyst tank should vent, the area should be evacuated at once and the fire department called. The venting could be the first indication of a heat, and therefore, pressure build-up that could eventually lead to an explosion. Moreover, if a catalyst tank is sufficiently full when the pressure relief valve vents, some catalyst may spray out, which could cause eye injury. For this reason, and many others, anyone whose job puts them in an area where this vented spray might go, should always wear full eye protection even when laminating operations are not taking place.

Safety in handling MEKP depends to a great extent on employee education, proper safety instructions and safe use of the chemicals and equipment. Workers should be thoroughly informed of the hazards that may result from improper handling of MEKP, especially in regards to contamination, heat, friction and impact. They should be thoroughly instructed regarding the proper action to be taken in the storage, use and disposal of MEKP and other hazardous materials used in the laminating operation. In addition, users should make every effort to:

A. Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.

B. Keep MEKP away from heat, sparks and open flames.

C. Prevent contamination of MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum and non-stainless steels.

D. Never add MEKP to anything that is hot, since explosive decomposition may result.

E. Avoid contact with skin, eyes and clothing. Protective equipment should be worn at all times. During clean-up of spilled MEKP, personal safety equipment, gloves and eye protection must be worn. Firefighting equipment should be at hand and ready.

F. Avoid spillage, which can heat up to the point of self-ignition.

G. Repair any leaks discovered in the catalyst system immediately, and clean up the leaked catalyst at once in accordance with the catalyst manufacturer's instructions.

H. Use only original equipment or equivalent parts from Magnum Venus Products in the catalyst system (i.e.: hoses, fitting, etc.) because a dangerous chemical reaction may result between substituted parts and MEKP.

I. Catalyst accumulated from the purging of hoses or the measurement of fluid output deliveries should never be returned to the supply tank, such catalyst should be diluted with copious quantities of clean water and disposed of in accordance with the catalyst manufacturer's instructions.

The extent to which the user is successful in accomplishing these ends and any additional recommendations by the catalyst manufacturer determines largely the safety that will be present in his operation.

2.3 Clean-Up Solvents and Resin Diluents

WARNING

A hazardous situation may be present in your pressurized fluid system! Hydrocarbon Solvents can cause an explosion when used with aluminum or galvanized components in a closed (pressurized) fluid system (pump, heaters, filters, valves, spray guns, tanks, etc.). The explosion could cause serious injury, death and/or substantial property damage. Cleaning agents, coatings, paints, etc. may contain Halogenated Hydrocarbon Solvents. Some Magnum Venus Products spray equipment includes aluminum or galvanized components and will be affected by Halogenated Hydrocarbon Solvents.

A. There are three key elements to the Halogenated Hydrocarbon (HHC) solvent hazard.

a. The presence of HHC solvents. 1,1,1 – Trichloroethane and Methylene Chloride are the most common of these solvents. However, other HHC solvents are suspect if used; either as part of paint or adhesives formulation, or for clean-up flushing. b. Aluminum or Galvanized Parts. Most handling equipment contains these elements. In contact with these metals, HHC solvents could generate a corrosive reaction of a catalytic nature.

b. Equipment capable of withstanding pressure. When HHC solvent contacts aluminum or galvanized parts inside a closed container such as a pump, spray gun, or fluid handling system, the chemical reaction can, over time, result in a build-up of heat and pressure, which can reach explosive proportions.

When all three elements are present, the result can be an extremely violent explosion. The reaction can be sustained with very little aluminum or galvanized metal; any amount of aluminum is too much.

A. The reaction is unpredictable. Prior use of an HHC solvent without incident (corrosion or explosion) does NOT mean that such use is safe. These solvents can be dangerous alone (as a clean-up or flushing agent) or when used as a component or a coating material. There is no known inhibitor that is effective under all circumstances. Furthermore, the mixing of HHC solvents with other materials or solvents, such as MEKP, alcohol, and toluene, may render the inhibitors ineffective.

B. The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. Also, the possible presence of water in reclaimed solvents could feed the reaction.

C. Anodized or other oxide coatings cannot be relied upon to prevent the explosive reaction. Such coatings can be worn, cracked, scratched, or too thin to prevent contact. There is no known way to make oxide coatings or to employ aluminum alloys, which will safely prevent the chemical reaction under all circumstances.

D. Several solvent suppliers have recently begun promoting HHC solvents for use in coating systems. The increasing use of HHC solvents is increasing the risk. Because of their exemption from many State Implementation Plans as Volatile Organic Compounds

(VOC's), their low flammability hazard, and their not being classified as toxic or carcinogenic substances, HHC solvents are very desirable in many respects.

WARNING: **Do not use Halogenated Hydrocarbon solvents in pressurized fluid systems having aluminum or galvanized wetted parts.**

NOTE: **Magnum Venus Products is aware of NO stabilizers available to prevent Halogenated Hydrocarbon solvents from reaction under all conditions with aluminum components in closed fluid system.** ***TAKE IMMEDIATE ACTION…*** **Halogenated Hydrocarbon solvents are dangerous when used with aluminum components in a closed fluid system.**

A. Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon Solvents.

B. Magnum Venus Products recommends that you contact your solvent supplier regarding the best non-flammable clean-up solvent with the heat toxicity for your application.

C. If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.

D. Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.

E. You should allow only enough solvent for one day's use in your laminating area.

F. "NO SMOKING" signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.

G. Adequate ventilation (as covered in OSHA Section 1910.94 and NFPA No.91) is important wherever solvents are stored or used, to minimize, confine and exhaust the solvent vapors.

H. Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

2.4 Catalyst Diluents

Magnum Venus Products spray-up and gel-coat systems currently produced are designed so that catalyst diluents are not required. Magnum Venus Products, therefore, recommends that diluents not be used. This avoids the possible contamination which could lead to an explosion due to the handling and mixing of MEKP and diluents. In addition, it eliminates any problems from the diluents being contaminated through rust particles in drums, poor quality control on the part of the diluents suppliers, or any other reason. If, however, diluents are absolutely required, contact your catalyst supplier and follow his instructions explicitly. Preferable, the supplier should premix the catalyst to prevent possible “on the job” contamination while mixing.

WARNING

If diluents are not used, it should be remembered that catalyst spillage, gun, hose and packing leaks are potentially more hazardous, since each drop contains a higher concentration of catalyst, and therefore will react quicker with over spray and the leak.

2.5 Cured Laminate, Overspray and Laminate Sandings Accumulation

A. Remove all accumulations of overspray, FRP sandings, etc. from the building as they occur. If this waste is allowed to build up, spillage of catalyst is more likely to start a fire; in addition, the fire would burn hotter and longer.

B. Floor coverings, if used, should be non-combustible.

C. Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, over-sprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent this spillage and leakage, you should:

1. Maintain your Magnum Venus Products System. Check the gun several times daily for catalyst and resin packing or valve leaks. REPAIR ALL LEAKS IMMEDIATELY.

2. Never leave the gun hanging over, or lying inside the mold. A catalyst leak in this situation would certainly damage the part, possibly the mold, and may cause a fire.

3. Inspect resin and catalyst hoses daily for wear or stress at the entry and exits of the boom sections and at the hose and fittings. Replace if wear or weakness is evident or suspected.

4. Arrange the hoses and fiberglass roving guides so that the fiberglass strands DO NOT rub against any of the hoses at any point. If allowed to rub, the hose will be cut through, causing a hazardous leakage of material which could increase the danger of fire. Also, the material may spew onto personnel in the area.

2.7 Toxicity of Chemicals

A. Magnum Venus Products recommends that you consult OSHA Sections 1910.94, 1910.106, 1910.107 and NFPA No.33, Chapter 14, and NFPA No.91.

B. Contact your chemical supplier(s) and determine the toxicity of the various chemicals used as well as the best methods to prevent injury, irritation and danger to personnel.

C. Also determine the best methods of first aid treatment for each chemical used in your plant.

2.8 Treatment of Chemical Injuries

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury. Precautions include:

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or is swallowed.

2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.

3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

WARNING

Contact your doctor immediately in the event of any injury and give him the information you have collected. If your information includes first aid instructions, administer first aid immediately while you are contacting your doctor.

Fast treatment of the outer skin and eyes that contact such chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment, however, may be incorrect for some chemicals; that is why you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

NOTE: **Refer to your System User Manual for complete and detailed operating instructions and service information.**

3.0 Equipment Safety

WARNING

Magnum Venus Products suggests that personal safety equipment such as EYE GOGGLES, GLOVES, EAR PROTECTION, and RESPIRATORS be worn when servicing or operating this equipment. Ear protection should be worn when operating a fiberglass chopper to protect against hearing loss since noise levels can be as high as 116 dB (decibels). This equipment should only be operated or serviced by technically trained personnel!

WARNING

Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON. (TREAT THE GUN AS IF IT WERE A LOADED PISTOL.)

3.1 Emergency Stop Procedures

The following steps should be followed in order to stop the machinery in an emergency situation

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the “OFF” or closed position. To do this, simply rotate the lever on the ball valve 90 degrees. Doing this will cause all the system air to bleed out of the system in a matter of a few seconds, making the system incapable of operating

NOTE: Step 2 is a precautionary step and should be followed whenever the above mentioned ball valve is activated to the stop mode. Failure to do so, can damage the regulators and components on reactivating to the “ON” position.

2. Turn all system regulators to the “OFF” position (counter-clockwise) position

NOTE: Verify that the Catalyst relief line, located on the catalyst manifold, and the resin return line, located on the resin filter, are secured relieving catalyst and resin fluid pressure.

3. Catalyst pressure in the catalyst pump can be eliminated by rotating the ball valve on the catalyst manifold 90 degrees to the “open” or “on” position.

Note: The “open” or “on” position is when the ball valve handle is parallel (in line) with the ball valve body. The “closed” or “off” position is when the ball valve handle is perpendicular (across) the ball valve body.

4. Resin pressure in the resin pump can be eliminated by rotating the ball valve on the resin filter 90 degrees to the “open” or “on” position. Place a container under the ball valve to catch any resin that is ejected out of the valve.

3.2 Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance. Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases. Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see **National Fire Protection Association** (NFPA) 77, titled “Recommended Practice on Static Electrical”. Refer especially to section 7-7 titled “Spray Application of Flammable and Combustible Materials”. Check with local codes and authorities for other specific standards that might apply to your application. NEVER USE HARD MATERIALS SUCH AS WIRE, PINS, ETC., TO CLEAR A PLUGGED GUN. HARD MATERIALS CAN CAUSE PERMANENT DAMAGE. DAB WITH A BRISTLE BRUSH, BLOW BACKWARDS WITH AIR UNTIL CLEAR WHILE WEARING A PROTECTIVE EYE SHIELD. REPEAT AS MANY TIMES AS NECESSARY. DO NOT PERFORM ANY MAINTENANCE OR REPAIRS UNTIL YOU HAVE FOLLOWED THE PRECAUTIONS STATED ABOVE. IF YOU, AS AN EQUIPMENT OPERATOR OR SUPERVISOR, DO NOT FEEL THAT YOU HAVE BEEN ADEQUATELY TRAINED OR INSTRUCTED AND THAT YOU LACK THE TECHNICAL KNOWLEDGE TO OPERATE OR PERFORM MAINTENANCE ON A PIECE OF MAGNUM VENUS PRODUCTS EQUIPMENT, PLEASE CALL MAGNUM VENUS PRODUCTS BEFORE OPERATING OR PERFORMING MAINTENANCE ON THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS REGARDING THE ABOVE PRECAUTIONS OR ANY SERVICE OR OPERATION PRECEDURES, CALL YOUR MAGNUM VENUS PRODUCTS DISTRIBUTOR OR MAGNUM VENUS PRODUCTS.

NOTICE: All statements, information and data given herein are believed to be accurate and reliable but are presented without guaranty, warranty or responsibility of any kind express or implied. The user should not assume that all safety measures are indicated or that other measures are not required.

DANGER: Contaminated catalyst may cause Fire or Explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free of dirt, grease or resin. Clean catalyst system components with clean water only.

DANGER: Eye, skin and respiration hazard. The Catalyst, MEKP, may cause blindness, skin irritation or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.

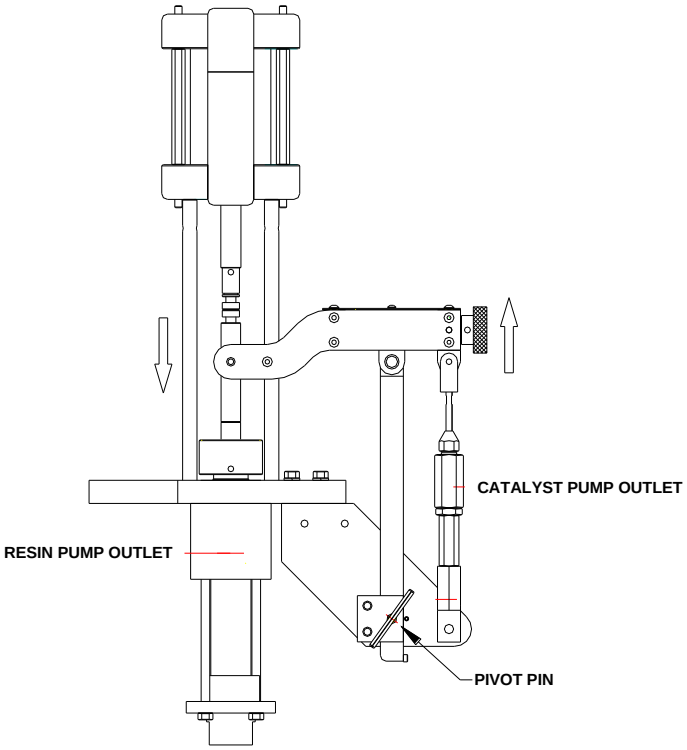
WARNING: Please refer to your catalyst manufacturer’s safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Introduction:

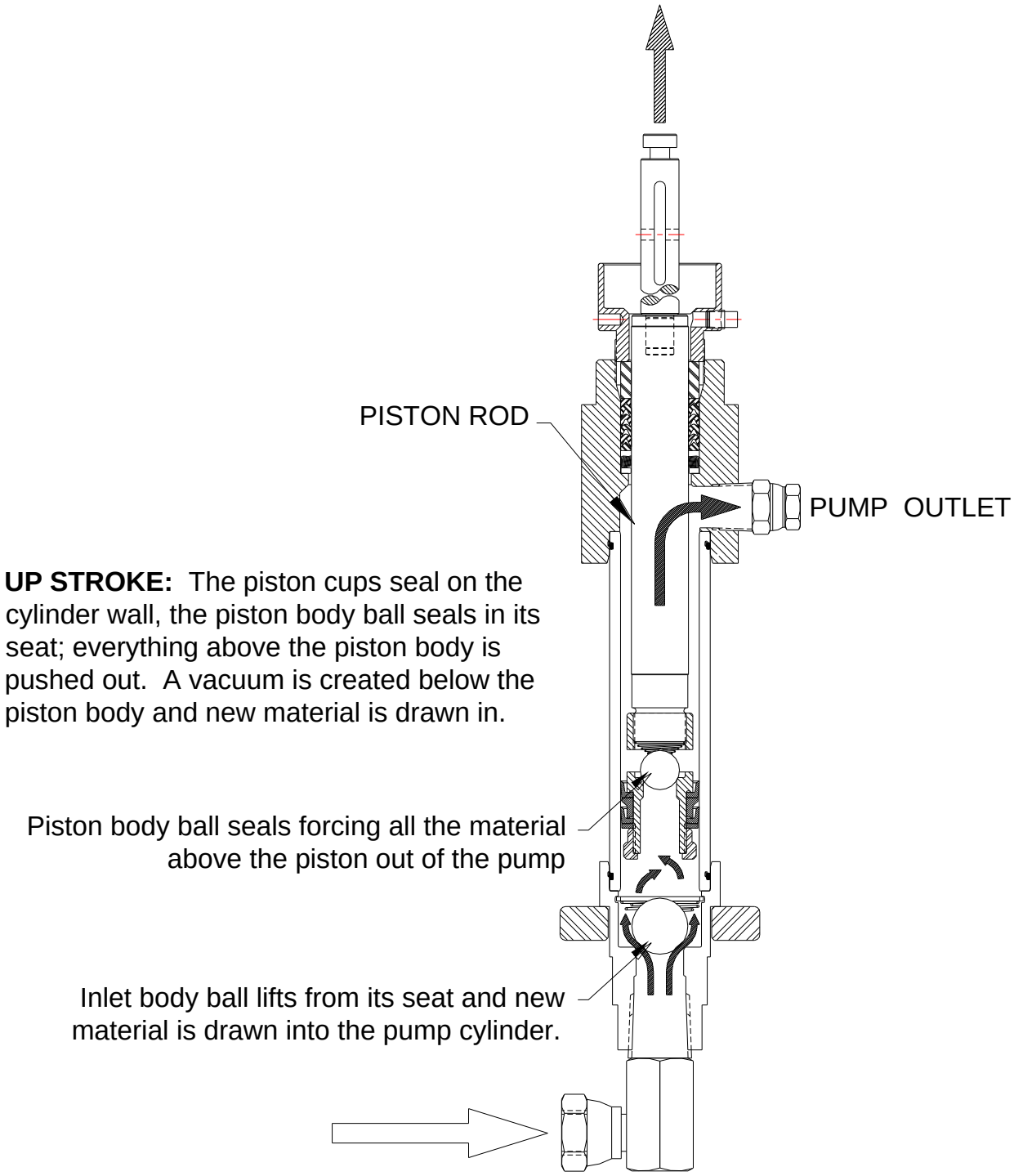
MVP has a variety of pumps in a wide range of configurations. Most of the pumping systems are based on a “double acting piston pump”. Double acting piston pumps are a two ball style pump which delivers material on both the up and down stroke. They are driven by an air motor of which there are a variety of sizes. There are three basic resin pump sizes; Gel coat – lower output systems, gel coat application, Chopper / Standard – mid range output, most commonly used for chopper and wet out systems and High Volume – high volume chopper systems and special or automatic equipment.

Each of these pumps has a corresponding catalyst / initiator pump which is attached by a drive linkage. The catalyst / initiator pumps work on the same principles as the resin pump but are driven through a linkage attached to the resin pump. The catalyst pump and resin pump have a fixed ratio to each other, in that they move together pumping a given amount of resin. This leads us to one of the major principles, since the catalyst pump is attached to and driven by the resin pump, you can never get more of one component just less of the other. The catalyst pump can not run on its own and pump more catalyst; you can only have a problem with the resin pump and deliver less resin, and the same is true for the catalyst.

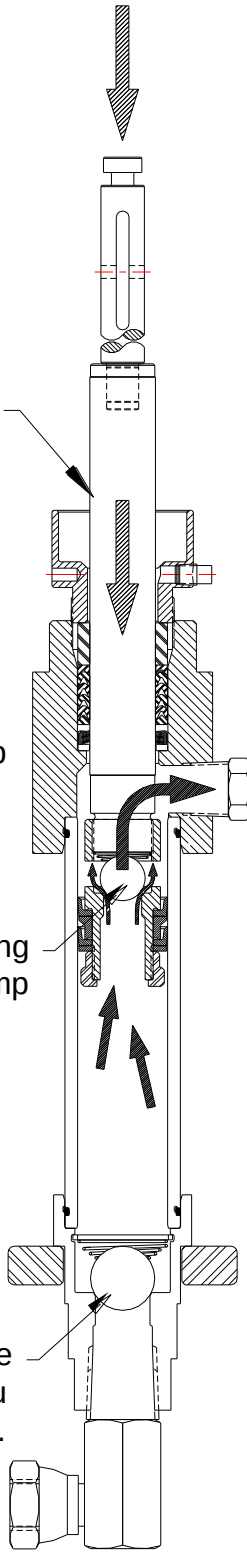
Note: With the UPS (Ultra Proportioning System) when the resin pump is in the up position the catalyst pump is in the down position, which means when the resin pump is going up the catalyst pump is going down.



Pump Upstroke



Pump Down Stroke



DOWN STROKE: The down stroke is the displacement stroke, meaning the material in the cylinder is displaced by the piston rod and forced out the pump. The inlet body ball seats sealing the cylinder which force the material up and out the pump. The piston body ball lifts off its seat and allows material to flow through the piston body and out the pump.

Establishing a Spray Fan:

If you know what is happening on both the upstroke and down stroke of the pump you will know where to look when you have a problem. Adjusting your pumping system will be easier with some understanding of pump ratios and fluid pressure.

Adjusting & Establishing a Fan Pattern

Magnum Venus Products spray equipment provides one of the most efficient methods of quickly applying material to a surface or mold. To make the most of our low-pressure pumping systems and airless, internal mix guns, the operator must understand how to adjust the system for maximum efficiency**.**

Note: Because conditions and material vary widely, we cannot give you specific instructions. We do offer guidelines and tests so that you can tune your Magnum Venus Products equipment to meet your needs.

The basic idea is to use just enough pressure to the power head to establish the spray fan, and no more.

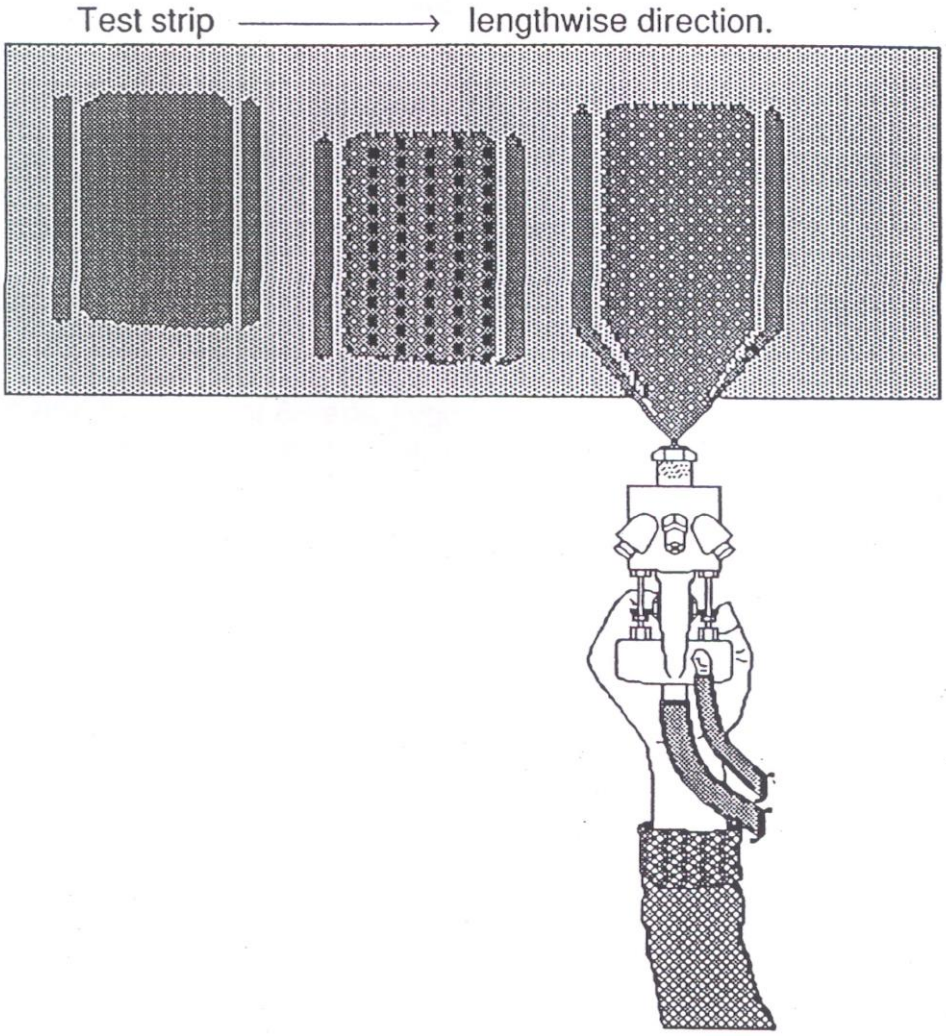
1. Lay out a strip of material for the test. For testing the material can be paper or cardboard.

2. Adjust the main pressure regulator until the operating pressure is 20psi.

Definition: Operating Pressure is the air pressure used to operate the resin/catalyst pump. The gauge and regulator are usually labeled "Main Pressure" or "Pump Pressure".

3. Do a short test spray on the material.

Note: To save material and make identification easier, spray perpendicular (across the material strip) tests.



4. Flush the gun into an appropriate container after every test shot.

Note: It is unlikely that 20psi will be adequate pressure to establish a fan pattern.

5. If the first test shot had an established fan pattern, back off 5psi and shoot another pattern. Keep backing the pressure off until the unit no longer produces a fan. Then increase the operating pressure until there is just enough to form a soft-looking spray fan.

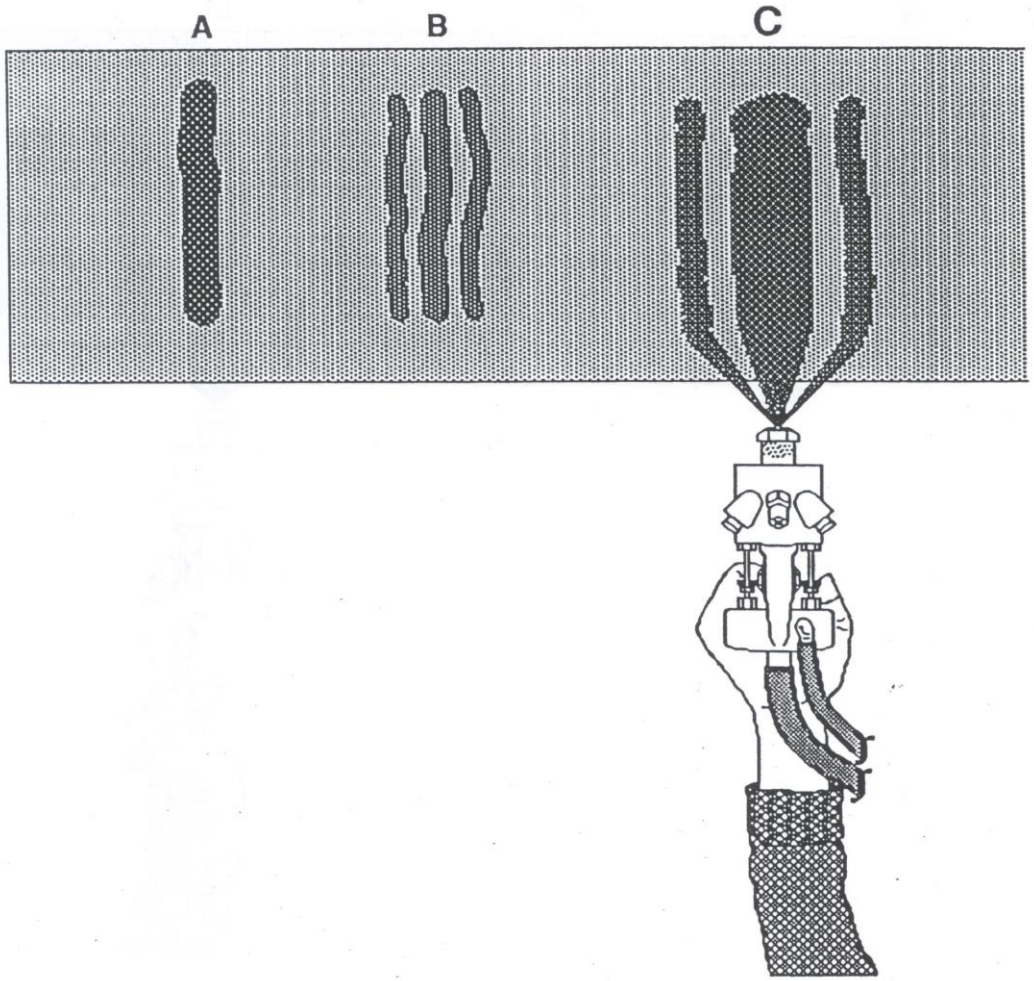
6. If the pressure was not adequate to form a well-defined fan pattern, increase the main pressure by 5psi and do another short test spray. Repeat step 6 until a well-defined spray pattern has been obtained, then follow step 5.

Note: Photocopy page Appendix A to make written notes about the operating pressure and material temperatures that finally produced a well-defined spray fan pattern.

Adjusting Procedure - What to look for in the test shots:

A. One narrow stream: The operating pressure is very low for the material you are using.

Solutions:
Increase the operating pressure.
Increase the material's temperature
Use a smaller Nozzle size.

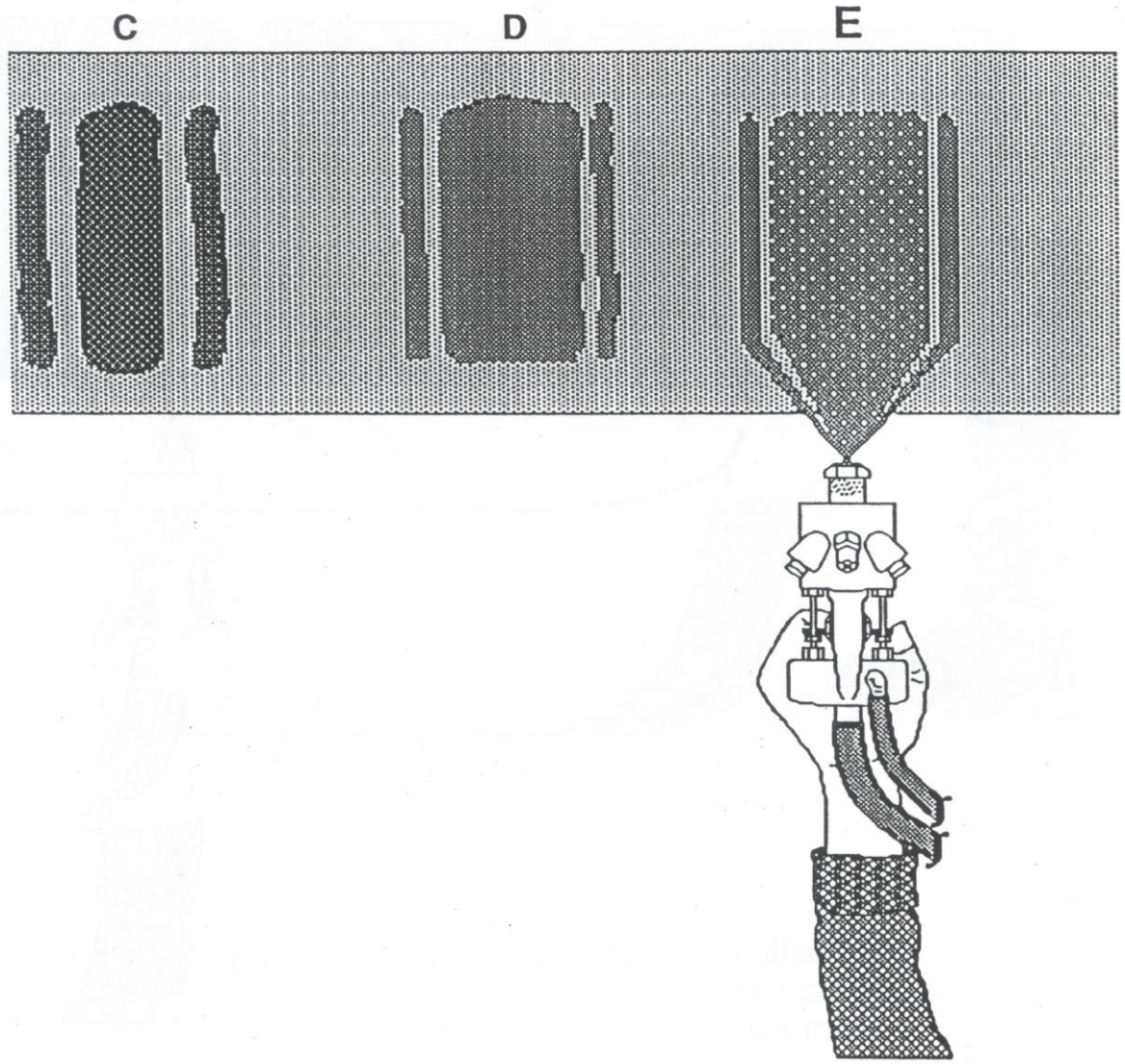


B. Three heavy fingers: Horns are beginning to develop, but the operating pressure is still very low.

Solutions:
Increase operating pressure.
Increase material's temperature.
Use smaller nozzle size.

C. Middle of the stream is wider: but not the full width it should be for the nozzle.

Solutions:
Increase operating pressure.
Increase material's temperature.



D. The pattern is at or near full width: There are well-defined fingers; however there is little or no white frothing (air bubbles) in the center of the sprayed material. Result "D" is a usable pattern for an experienced operator.

Solutions:
Slightly increase operating pressure.
Slightly increase material's temperature.

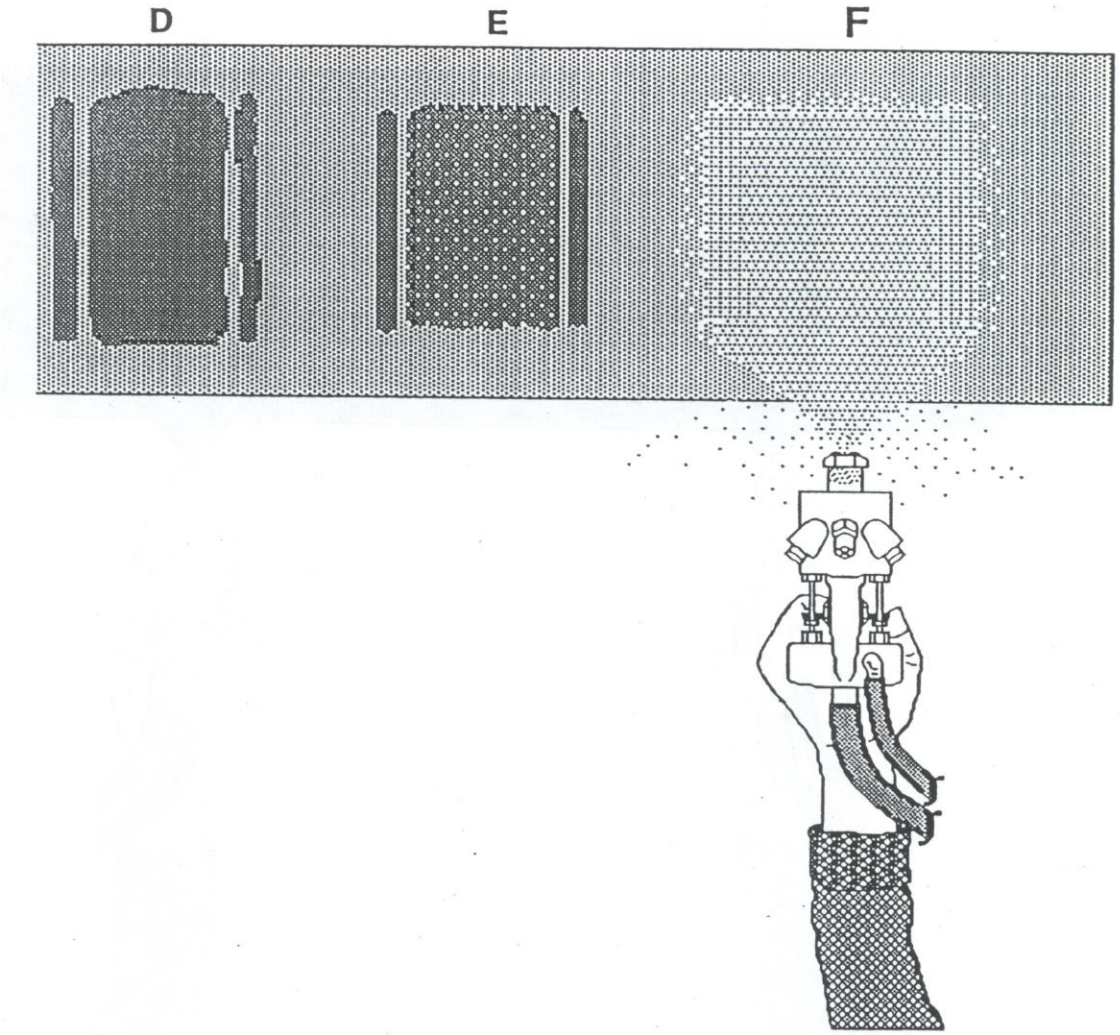
E. The pattern is full width: The fingers are well-defined. A small amount of frothing appears in the sprayed material; however it should disappear in less than 2 minutes.

Note: This is considered the best general set of conditions for the fan pattern. Make written notes of the <u>main pressure</u> and the material temperature readings (Appendix A).

F. The pattern is too wide: and the fingers are poorly defined. Heavy misting is seen and smelled, and there is significant overspray (material laid down beyond the main pattern). The heavy white frothing does not disappear within 2 minutes.

Note: This is the most common mistake in running Magnum Venus Products equipment.

Solution:
Back off the pressure until the fan pattern fails, then add 5 psi or so to get the fan pattern back.



Spray Testing:

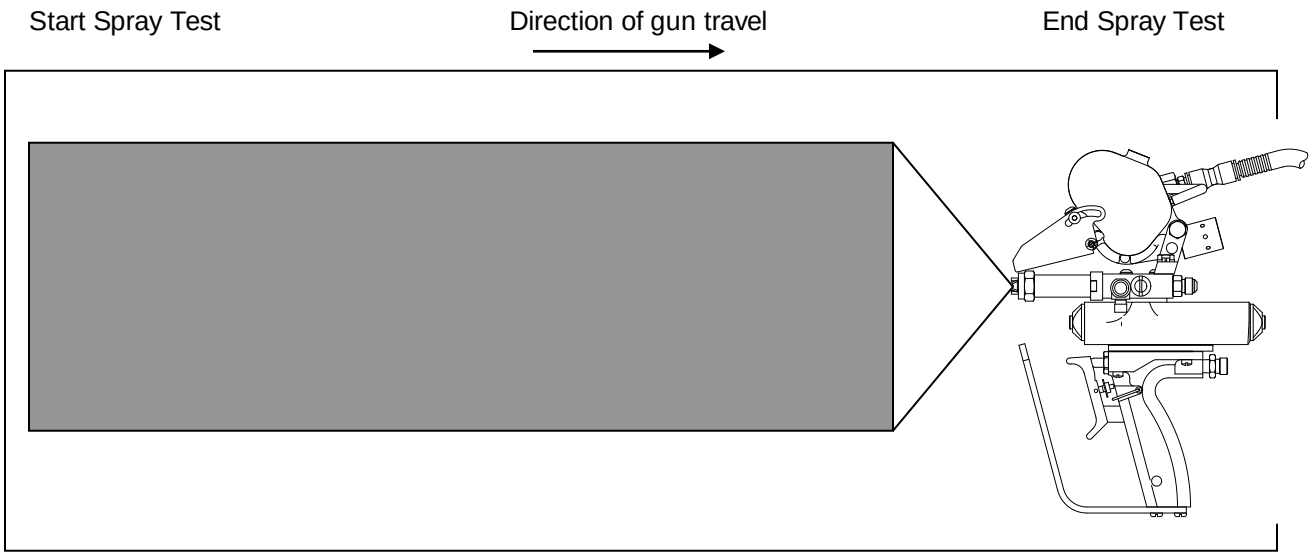
Spray tests are used to fine-tune the adjustments on your Magnum Venus Products dispensing equipment and to check the condition of your hardware and materials. Turn the chopper air pressure to zero, do the spray test without chop.

Note: Using a Color-Reactive material (materials that change color when they are catalyzed) make this testing easier and more accurate. MVP recommends using a dyed catalyst or a color-reactive material.

1. Lay a sheet of test material on a flat surface.

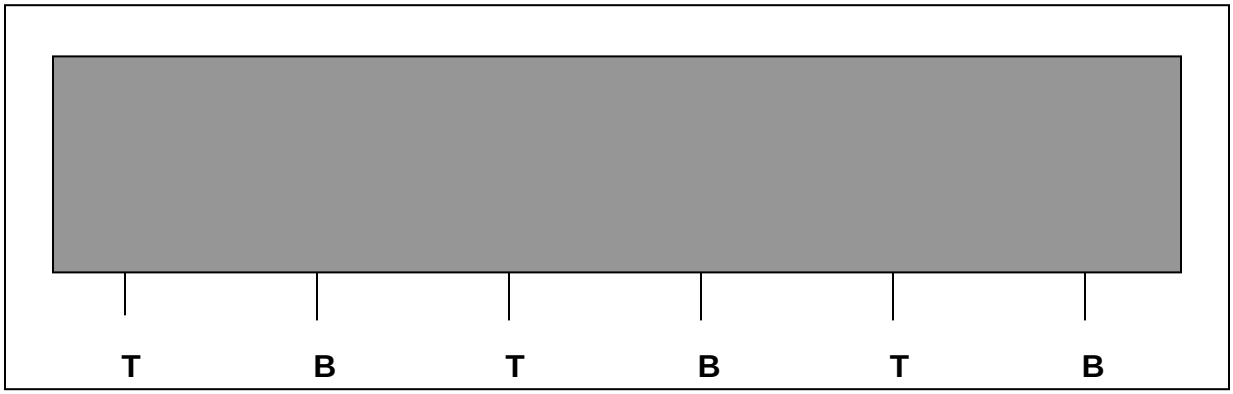
Note: The temperature of the surface can affect the reaction time of many chemicals. The coldness of a concrete floor can cause changes in cure times.

2. Pull the trigger and start spraying material along the test strip.



Spraying the test Sheet

3. When you hear the pump reverse direction, have an assistant mark the spot on the test strip and indicate whether the pump was at the top “T” or the bottom “B” of the stroke.



Marking the pump position
Fig. 3

4. Continue spraying for four or five complete pump cycles with an assistant marking the test strip every time the pump gets to the top or bottom of the stroke. Your completed test strip should look something like figure 3 (above).

5. Use a tongue depressor to test several areas on the strip: top of stroke, bottom of stroke, and the up- and down-stroke in several places. Repeat testing for material hardening several times to find out if some areas are hardening faster or slower than other areas.

Note: Color-reactive materials (materials that change color when they harden) make this testing very easy and accurate. Magnum Venus Products recommends using color-reactive materials whenever possible.

6. Make written notes directly on the test strip to show what happened. Pay particular attention to areas that harden faster or slower than other areas because that indicates a problem.

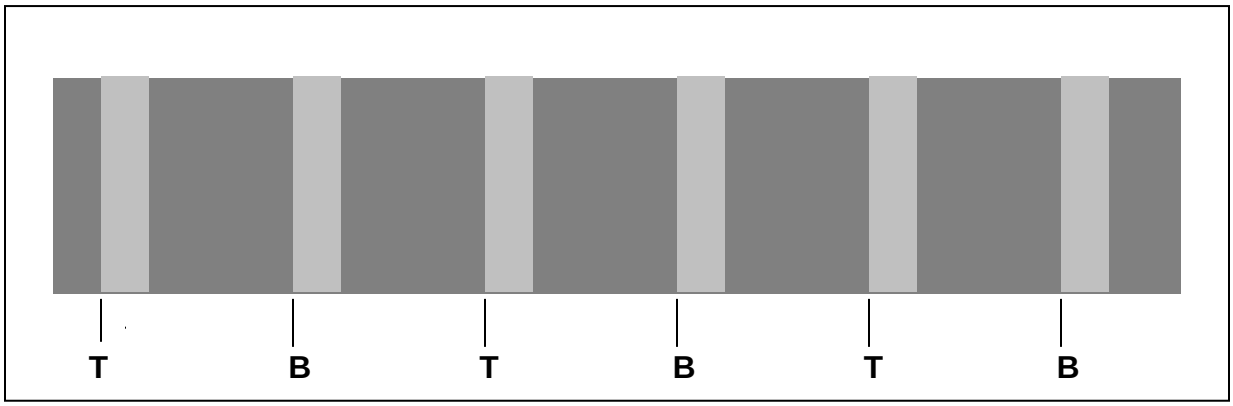
TEST RESULTS - What Do They Mean?

If all areas of the test spray harden at the same time, there is no problem and you may go on to part production.

If there are areas with little or no hardening (or extremely fast hardening) check the following descriptions for the one that best matches your results and follow the suggested procedure to fix the problem: A rule of thumb is when you have slow or no cure it is a catalyst pump problem and if you have a hot spot or fast cure the problem is the resin pump. Fast cure can be the product of higher temperatures if it is over the whole part and consistent.

The tests performed below can also be adapted to pour applications by pouring a saw tooth shaped bead of material. Where the top of the saw tooth is the top of the stroke and the valley is the bottom of the stroke.

Note: With the UPS (Ultra Proportioning System) when the resin pump is in the up position the catalyst pump is in the down position, which means when the resin pump is going up the catalyst pump is going down.



Improper cure at the top and bottom of the stroke indicates an accumulation issue either catalyst or resin.

Result 1:
Material delivered at the top and bottom of the stroke is not curing or curing more slowly than the material delivered in the middle of the up- and down-stroke, see figure above.

Indicates: Low/no catalyst at top (T) and bottom (B) of the pump stroke.

Probable Cause: There is no or improper accumulation effect in the catalyst system. Normally this is only a problem at high pressures.

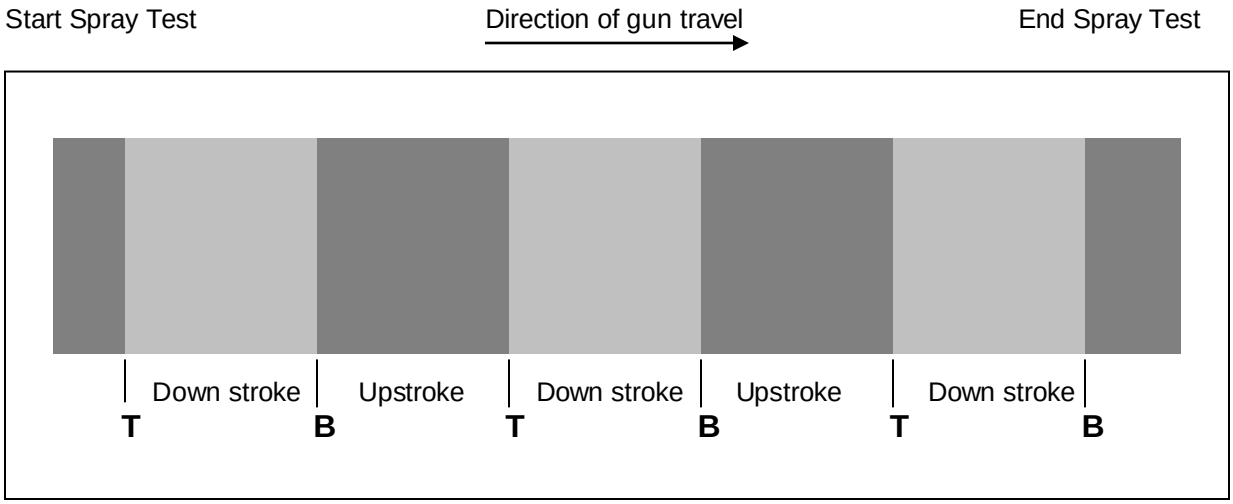
Solution: Check to be sure you are using the proper catalyst hose, with or without core. Install a catalyst accumulator if needed. Check for a restriction in the catalyst system. (For chargeable accumulator systems see section below)

Result 2:
Material delivered at the top and bottom of the stroke is hot (curing very rapidly). Also thin areas of material might be noticeable compared to the volume delivered in the middle of the stroke, see figure above.

Indicates: Low resin at the top (T) and bottom (B) of the pump stroke.

Probable Cause: There is no or improper accumulation effect in the resin system.

Solution: Resin accumulator full of hard material or has a blockage. Clean resin filter and reinstall. Incorrect accumulator installed. Pump pressure is too high, lower resin pressure. (For chargeable accumulator systems see section below)



Result 3:
Material delivered on the catalyst pump up-stroke (from the bottom of the stroke to the top) is not curing or slow cure (see figure above).

Indicates: No catalyst is being delivered on the up-stroke.

Probable Cause: Worn or damaged catalyst piston seal
Damaged catalyst pump cylinder.
Worn or damaged piston body ball.
Damaged piston body ball seat.

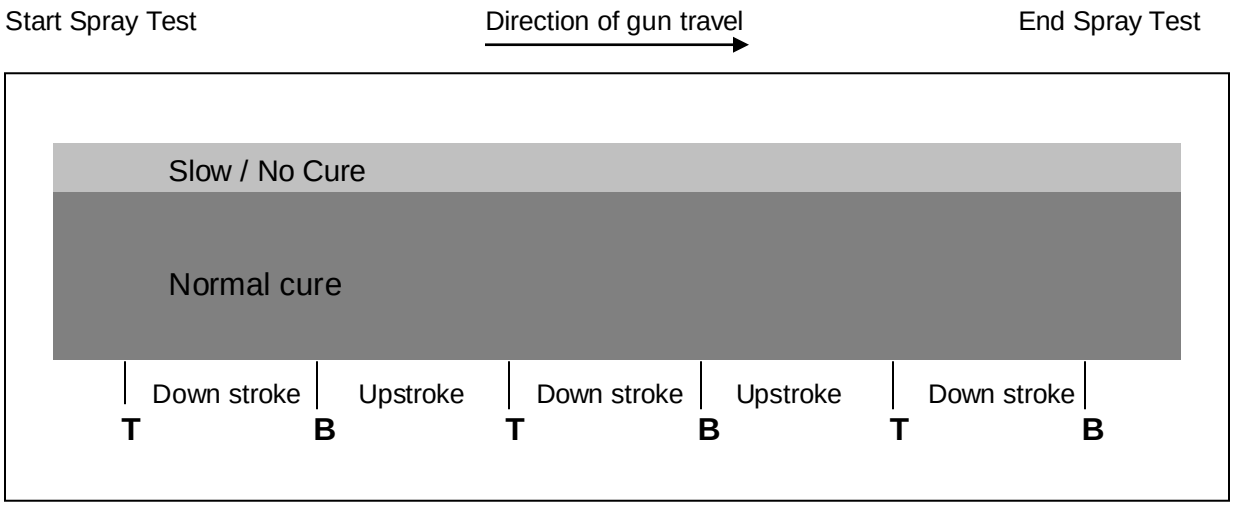
Solution: Replace worn and damaged parts, see Service and Repair Manual.

Result 4:
Material delivered on the catalyst pump down-stroke (from the top of the stroke to the bottom) is not curing or slow cure (see figure above).

Indicates: No catalyst is being delivered on the down-stroke.

Probable Cause: Worn or damaged inlet body.
Worn or damaged inlet body ball.

Solution: Replace worn and damaged parts, see Service and Repair Manual.



Result 5:
Material is delivered with streaks running the length of the test spray. Some strips cure normally, some not at all, other cure at faster or slower rates (see figure above). <u>This is not a pumping problem, it is a mixing problem.</u>

Indicates: a mixing problem and the fan is delivering streams of poorly catalyzed resin and/or pure catalyst.

Probable Cause: the Turbulent Mixer is worn, clogged or damaged in some way. A scratched or damaged Mix Chamber can also cause this problem.

Solution: shut down the system and inspect the Turbulent Mixer and Mix Chamber. Repair or replace as needed.

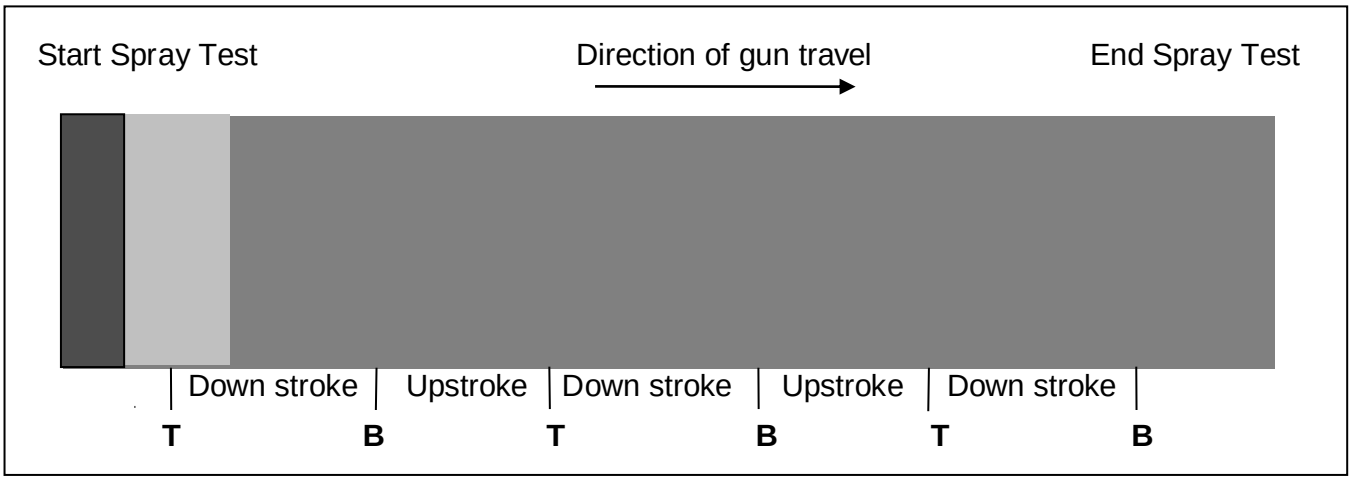
For needle style guns:

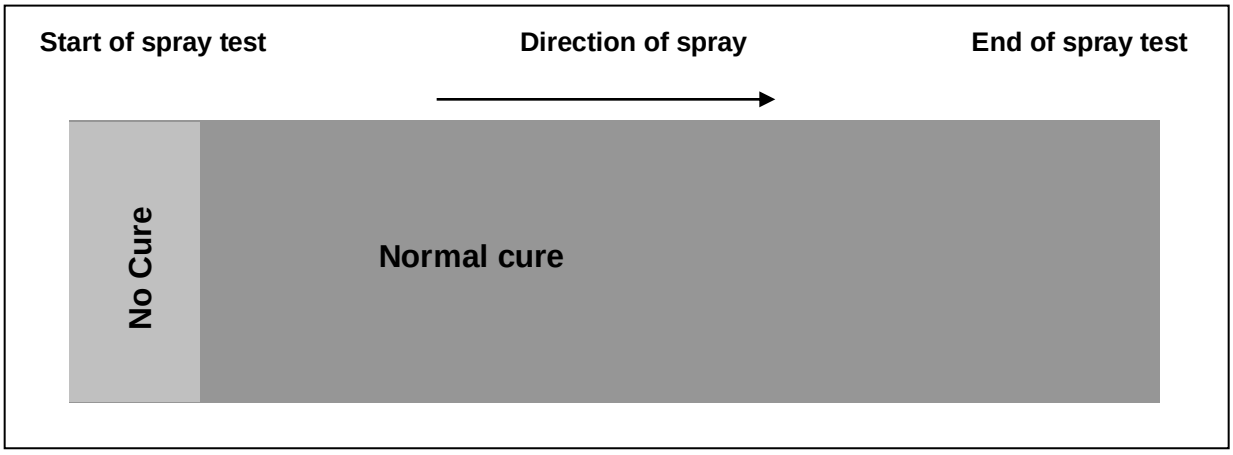
Result 6:
Material delivered at the beginning of the test strip is hot (low in resin), followed immediately by material that is cold (low in catalyst), followed by material that is properly mixed and cures. (see below)

Indicates: system is unbalanced at the beginning of the spray. Low resin is delivered upon pulling the trigger of the gun followed by low catalyst delivery. After a moment or two, the system balances and properly mixed material is delivered.

Probable Cause: The catalyst needle on the gun opens before the resin needle.

Solution: Adjust the catalyst and resin needles to the proper settings.





Result 7:
Material delivered at the beginning of the test spray is cold (low catalyst), followed by material that is properly mixed and cures. (See above)

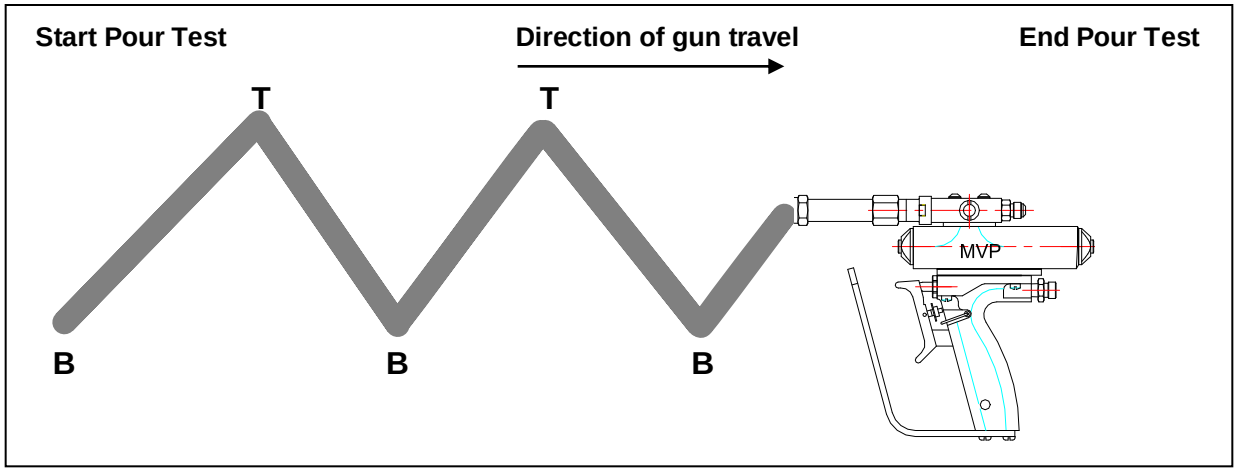
Indicates: The system is unbalanced at the beginning of the spray. No catalyst at the beginning of the spray, followed by normal mix and spray.

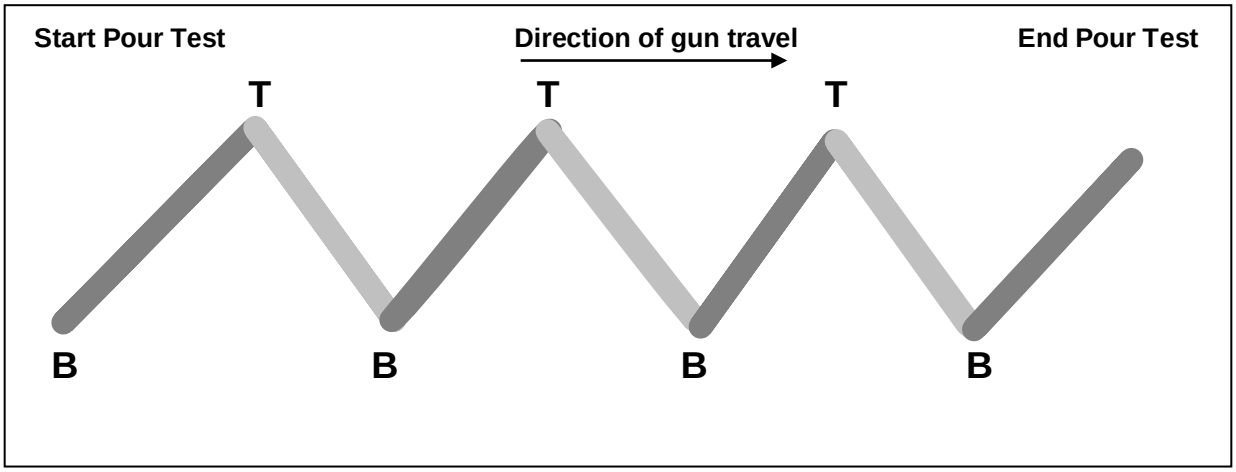
Probable Cause: The resin needle is opening too soon before the catalyst needle. This means a shot of pure uncatalyzed resin will be delivered until the catalyst needle is opened.

Solution: Adjust the catalyst and resin needles to the proper settings.

Pour Testing:

The same process and results that are used for testing the spray can be used for testing a pour system. By pouring a bead of material in an up and down" zig zag" pattern then observing the results.



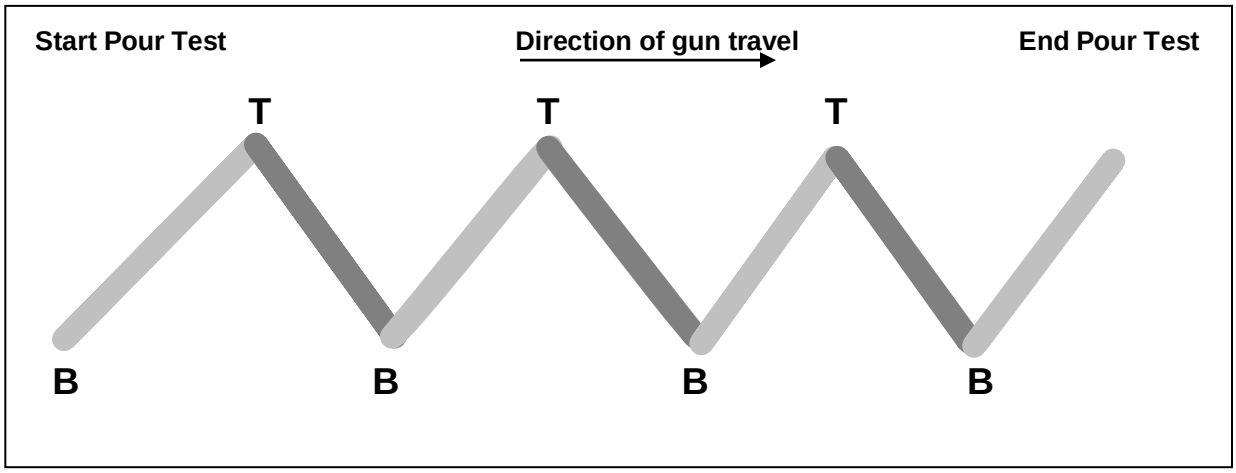


Result 8:
Material delivered on the catalyst pump down-stroke (from the top of the stroke to the bottom) is not curing or slow cure (see figure above).

Indicates: No catalyst is being delivered on the down-stroke.

Probable Cause: Worn or damaged inlet body.
Worn or damaged inlet body ball.
Worn or damaged inlet body O-ring.

Solution: Replace worn and damaged parts, see Service and Repair Manual.

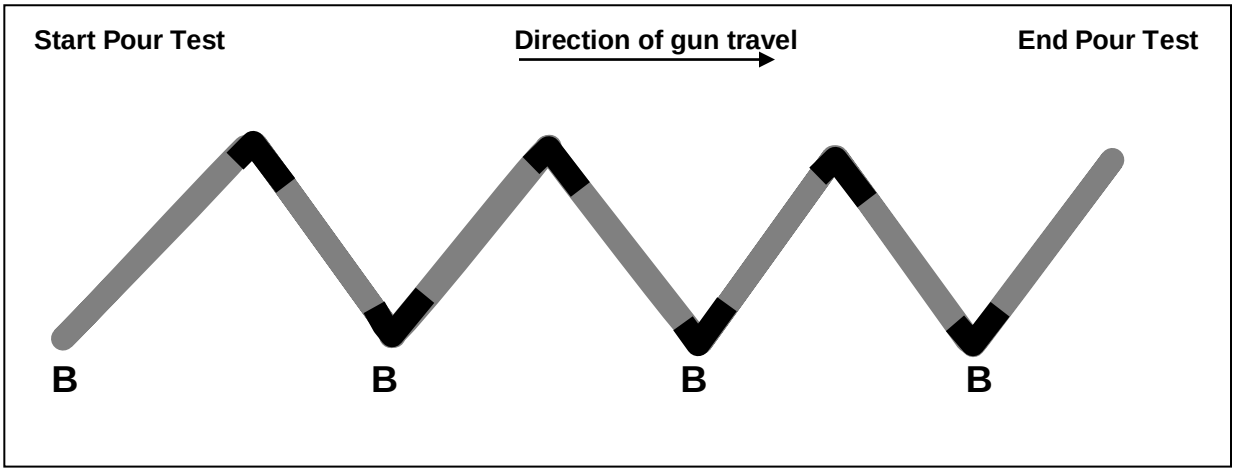


Result 9:
Material delivered on the catalyst pump up-stroke (from the bottom of the stroke to the top) is not curing or slow cure (see figure above).

Indicates: No catalyst is being delivered on the up-stroke.

Probable Cause: Worn or damaged catalyst piston seal
Damaged catalyst pump cylinder.
Worn or damaged piston body ball.
Damaged piston body ball seat.

Solution: Replace worn and damaged parts, see Service and Repair Manual.



Result 10:
Material delivered at the top and bottom of the stroke is not curing or curing more slowly than the material delivered in the middle of the up- and down-stroke, see figure above.

Indicates: Low/no catalyst at top (T) and bottom (B) of the pump stroke.

Probable Cause: There is no or improper accumulator effect in the catalyst system. Normally this is only a problem at high pressures.

Solution: Check to be sure you are using the proper catalyst hose, with or without core. Install a catalyst accumulator if needed. Check for a restriction in the catalyst system. See chapter 5 for accumulator charging procedures

Result 11:
Material delivered at the top and bottom of the stroke is hot (curing very rapidly). Also thin areas of material might be noticeable compared to the volume delivered in the middle of the stroke, see figure above.

Indicates: Low resin at the top (T) and bottom (B) of the pump stroke.

Probable Cause: There is no or improper accumulator effect in the resin system.

Solution: Resin accumulator full of hard material or has a blockage. Clean resin accumulator, filter and reinstall. Incorrect accumulator installed. Pump pressure is too high, lower resin pressure. See chapter 5 for accumulator charging procedures

Chargeable Accumulators:

Many applications will not require charging the accumulators; in those applications the accumulator can be used as a surge chamber. These are low pressure spray or pour applications where fluid pressures are medium to low.

In some cases only a line pressure charge on the resin accumulator will be necessary. These will be applications where a medium fluid pressure is being used, most likely a spray or a medium viscosity pour application. The line charge procedure uses the charging hose attached to the air manifold.

For high fluid pressure applications charging the accumulators to 280psi to 300psi may be required. These are applications using filled resins or spray putties. This will require a charging pump or similar device a high pressure tank and regulators can also be used.

If you do a test and find it necessary to charge the resin accumulator or both accumulators repeat the test after performing the charging procedure to confirm an even cure.

Charging Procedures: Line Charge

1. Shut off air to the resin pump by either turning regulator to zero or turning the pump control valve to the off position.

2. Lock the gun in the on position over an appropriate container, or open the ball valve at the bottom of the resin filter if one is installed.

Note: For catalyst charging lock the gun in the open position over an appropriate container, or open the recirculation/dump valve on the manifold.

3. Relieve any existing charge by inserting a blunt object (allen wrench) into the top of the charging valve.

4. Push the quick coupling on charging hose onto the charging valve on top of the resin accumulator. Hold the in place for approximately 5 seconds.

Note: During charging of the accumulator, if air is heard exiting the front of the gun or appropriate valve, this indicates that the polyball in the accumulator is not seating properly. Repair the accumulator as needed.

5. Remove the charging hose from the resin accumulator. Check the top of the accumulator for air leaks by applying a light fluid (water) to the top of the accumulator valve body. If air leaks remove and repair charging valve.

6. Close the gun and flush into appropriate container or close the resin return valve.

7. Normally in line charge applications the catalyst accumulator will not need to be charged. If needed follow the above procedures on the catalyst system.

Charging Procedures: Using Hand pump

8. Shut off air to the resin pump by either turning regulator to zero or turning the pump control valve to off position.

9. Lock the gun in the on position over an appropriate container, or open the ball valve at the bottom of the resin filter if one is installed.

Note: For catalyst charging lock the gun in the open position over an appropriate container, or open the recirculation/dump valve on the manifold.

10. Relieve any existing charge by inserting a blunt object (allen wrench) into the top of the charging valve.

11. Attach charging pump to the resin accumulator by connecting the black charging hose to the charging valve on top of the resin accumulator.

Note: Do not over tighten charging pump hose.

12. Pull the charging pump handle all the way out, connect air hose to male quick disconnect on charging pump.

Note: not pulling out the handle of the charging pump before attaching the air line can cause damage to the charging pump or bodily injury.

13. Pump charging pump handle with steady even strokes until gauge on charging pump read approximately 280psi.

Note: Gauge will only show accurate reading on the down / in stroke, while pressure is building (peak pressure). During charging of accumulator, if air is heard exiting the front of the gun or appropriate valve, this indicates that the polyball in the accumulator is not seating properly. Repair the accumulator as needed.

Note: <u>A general rule of thumb…</u>

For Spray Application:
Charge Accumulators to 280psi to 300psi.

Note: The above is a general rule of thumb… some materials and applications may require different charging pressures to achieve an even flow of material. Increase or decrease the charge by 5psi increments as required to fine tune the accumulator charge.

14. Disconnect air hose form the charging pump and remove the charging pump hose from the resin accumulator. Check the top of the accumulator for air leaks by applying a light fluid (water) to the top of the accumulator valve body. If air leaks remove and repair charging valve.

15. Close the gun and flush into appropriate container or close the appropriate. For the catalyst, close the recirculation valve on the catalyst manifold.

16. Repeat the above procedures for the catalyst accumulator.

Charging Procedures: Using High Pressure Tank & Regulators

17. Shut off air to the resin pump by either turning regulator to zero or turning the pump control valve to off position.

18. Lock the gun in the on position over an appropriate container, or open the ball valve at the bottom of the resin filter.

Note: For catalyst charging lock the gun in the open position over an appropriate container, or open the recirculation/dump valve on the manifold.

19. Relieve any existing charge by inserting a blunt object (allen wrench) into the top of the charging valve.

20. Attach charging system to the resin accumulator by connecting the black charging hose to the charging valve on top of the resin accumulator.

Note: Do not over tighten charging pump hose.

21. Open the main regulator on the top of the tank.

22. Set the desired pressure on the charging regulator attached to the charging valve.

23. Slowly open the ball valve connected to the charging hose to charge the accumulator. Allow approximately 5 seconds for charging before closing the valve again.

Note: During charging of the accumulator, if air is heard exiting the front of the gun or appropriate valve, this indicates that the polyball in the accumulator is not seating properly. Repair the accumulator as needed.

Note: ***<u>A general rule of thumb…</u>***

For Spray Application:
Charge Accumulators to 280psi to 300psi.

Note: The above is a general rule of thumb… some materials and applications may require different charging pressures to achieve an even flow of material. Increase or decrease the charge by 5psi increments as required to fine tune the accumulator charge.

24. Disconnect charging hose from the resin accumulator. Check the top of the accumulator for air leaks by applying a light fluid (water) to the top of the accumulator valve body. If air leaks remove and repair charging valve.

25. Close the gun and flush into appropriate container or close the resin return valve at the bottom of the filter. For the catalyst, close the recirculation valve on the catalyst manifold.

26. Repeat the above procedures for the catalyst accumulator.

Internal Start-up & Shut-down:

PRE-START CHECKLIST - Internal Mix System

FIRST TIME START-UP CHECK LIST - Internal Mix System

DAILY START UP - Internal Mix System

DAILY SHUT DOWN CHECKLIST - Internal Mix Systems

PRE-START CHECKLIST

ACTIVITIES MUST BE DONE IN THE SEQUENCE SHOWN, AND MUST BE TICKED OFF AS COMPLETED. USE THIS CHECKLIST IN CONJUNCTION WITH THE OPERATING MANUAL FOR THE ULTRAMAX UNIT.

ACTIVITY NO.	ACTIVITY	TICK WHEN COMPLETED
Priority	**Put on Respirator as specified for spray painting, Protective Clothing, Eye Protection, and PVC Gloves**	
1	Tools and materials are available for pre-start checks.	
2	Incoming airline is ½ inch.	
3	Incoming airline is connected to the inlet manifold.	
4	Earth straps are connected to the resin drum and to earth.	
5	Incoming air valve is in the OPEN position.	
6	Air supply is ON.	
7	At the Manifold, open the air supply to the gun.	
8	Seat the catalyst and resin seals on the ProGun.	
9	Compress the resin pump packing.	
10	Check for oil in the pump reservoir.	
11	Adjust the Catalyst Pump Packing Nut.	
12	Check that there is Catalyst in the Catalyst Bottle.	
13	Check that the Catalyst Bottle Cap is in place.	
14	Place the Resin Pick-up wand in the resin supply container.	
15	Place the end of the Resin Return Hose in the resin container.	
16	Fill the Solvent Flush Tank.	
17	At the Manifold, turn the Air Pressure on to the Solvent Flush Tank - 60psi	
18	Flush the mix chamber on the ProGun.	
19	Remove air from the Catalyst feed line to the Catalyst Pump.	
20	Close the ball valve below the Surge Chamber.	

ABNORMAL CONDITIONS OBSERVED AND CORRECTED

Abnormal Condition	**✓ when corrected**

OPERATORS NAME _____ **DATE:** _____

SIGN OFF WHEN PRE-START CHECKS ARE COMPLETED : _____

FIRST TIME START-UP CHECK LIST FOR PATRIOT

ACTIVITIES MUST BE DONE IN THE SEQUENCE SHOWN, AND MUST BE TICKED OFF AS COMPLETED. USE THIS CHECKLIST IN CONJUNCTION WITH THE OPERATING MANUAL FOR THE PATRIOT UNIT. THIS SEQUENCE FOLLOWS ON FROM "PRE-START CHECKLIST – INTERNAL MIX"

ACTIVITY NO.	ACTIVITY	TICK WHEN COMPLETED
Priority	**Put on Respirator as specified for spray painting, Protective Clothing, Eye Protection, and PVC Gloves**	
1	Lock the Gun trigger in the Open position over an appropriate container.	
2	Close the Ball Valve on the Catalyst Manifold	
3	Remove the Pivot Pin from the Catalyst Slave Drive.	
4	Manually pump the catalyst pump with the slave arm drive, observe for catalyst exiting the mix chamber on the gun. **Leave the pivot pin out.**	
5	Make sure the ball valve below the surge chamber is closed.	
6	Using the regulator on the manifold, slowly turn up the pump air pressure until the pump moves slowly and evenly.	
7	Turn up the air to the resin pump until air/resin exits the mix chamber on the gun.	
8	Turn the air to the pump down to zero.	
9	Disengage the gun trigger, leave it in the CLOSED position.	
10	Flush the mix chamber on the gun with acetone	
11	Turn up the pump pressure to 40 psi.	
11	Hand prime the catalyst pump with the slave arm drive until the pressure rises on the catalyst pump pressure gauge.	
12	Replace the Pivot Pin in the catalyst slide drive, lock it in.	
13	Adjust the catalyst percentage required with the slide arm, lock nut.	
14	Insert the Distribution Ring into the Mix Chamber locating rim on the ProGun.	
15	Insert the Catalyst Injector into the aperture in the Distribution Ring.	
16	Place Resin Seal into the Mix Chamber locating rim.	
17	Place Mix Chamber and Catalyst Injector onto the front of the ProGun, secure it with 2 grub screws	
18	Flush the Assembled mix chamber with solvent.	

ABNORMAL CONDITIONS OBSERVED AND CORRECTED

Abnormal Condition	**✓ when corrected**

OPERATORS NAME _____ **DATE:** _____

SIGN OFF WHEN START UP CHECKS ARE COMPLETED : _____

DAILY START UP CHECKLIST

ACTIVITIES MUST BE DONE IN THE SEQUENCE SHOWN, AND MUST BE TICKED OFF AS COMPLETED. USE THIS CHECKLIST IN CONJUNCTION WITH THE OPERATING MANUAL FOR THE ULTRAMAX UNIT. THIS SEQUENCE FOLLOWS ON FROM CHECKLIST 02 – START UP CHECKLIST

ACTIVITY NO.	ACTIVITY	TICK WHEN COMPLETED
Priority	**Put on Respirator as specified for spray painting, Protective Clothing, Eye Protection, and PVC Gloves**	
1	Check all hoses for damage.	
2	Check all material supplies and fill or replace as needed.	
3	Open main inlet air valve on the manifold.	
4	Open recirculation valve on Catalyst Manifold	
5	Remove the Pivot Pin from the UPS catalyst pump drive.	
6	Manually pump the catalyst pump with the UPS drive, observe catalyst returning to the catalyst jug, pump until the stream is air free.	
7	Close recirculation valve on Catalyst Manifold.	
8	Manually pump the catalyst pump with the UPS drive, bring catalyst pressure to operating pressure 100 – 200 psi.	
9	Replace the Pivot Pin into the UPS catalyst pump drive.	
10	Adjust the catalyst percentage as required.	
11	Check pump air regulator and gauge if needed use the regulator on the manifold, slowly turn up the pump air pressure to the operating pressure, 30 – 50 psi. If a safety over ride valve in installed press and hold the priming button while adjusting air pressure	
12	Insert the Distribution Ring into the Mix Chamber locating rim.	
13	Place mix housing Seal into the Mix Chamber locating rim.	
14	Insert the Catalyst Injector and injector seal into the aperture in the Distribution Ring. The spring goes into the gun block.	
15	Place Mix Chamber and Catalyst Injector onto the front of the ProGun, secure it with 2 screws.	
16	Flush the Assembled mix chamber with solvent.	
17	Install mixer and nozzle onto the mix chamber.	

ABNORMAL CONDITIONS OBSERVED AND CORRECTED

Abnormal Condition	**✓ when corrected**

OPERATORS NAME _____ **DATE:** _____

SIGN OFF WHEN START UP CHECKS ARE COMPLETED : _____

END OF DAY SHUTDOWN CHECKLIST FOR ULTRAMAX

ACTIVITIES MUST BE DONE IN THE SEQUENCE SHOWN, AND MUST BE TICKED OFF AS COMPLETED. USE THIS CHECKLIST IN CONJUNCTION WITH THE OPERATING MANUAL FOR THE ULTRAMAX UNIT. THIS SEQUENCE FOLLOWS ON FROM CHECKLIST 03 – SET UP CHECKLIST

ACTIVITY NO.	ACTIVITY	TICK WHEN COMPLETED
Priority	**Put on Respirator as specified for spray painting, Protective Clothing, Eye Protection, and PVC Gloves**	
1	Flush the gun with solvent.	
2	Wipe the face of the nozzle after flushing.	
3	Turn off the air ball valve at the air intake.	
4	Release the solvent flush tank pressure.	
5	Remove the nozzle and clean it.	
6	Remove the Mix Housing and clean it.	
7	Wipe the gun block face with a clean rag.	
8	Hang the gun with the gun block exit holes facing upwards.	

ABNORMAL CONDITIONS OBSERVED AND CORRECTED

Abnormal Condition	**✓ when corrected**

OPERATORS NAME: _____ **DATE:** _____

SIGN OFF WHEN SHUT DOWN CHECKS ARE COMPLETED: _____

Appendix:

Test Notes – use the form below for recording the information from the Spray or Pour test.

TEST NOTES

Name of material being used:

_____

_____

_____

Catalyst Percentage: _____%

Catalyst type: _____

Material is being: ☐ **Sprayed** ☐ **Poured** ☐

Other:_____

This material was successfully applied under the following conditions:

☐ **Winter** ☐ **Spring** ☐ **Summer** ☐ **Fall**

Air temperature of the factory _____ **degrees**

Relative humidity of the factory _____ **%**

Other conditions:

_____

_____

_____

Power head pressure _____**psi**

Catalyst Accumulator charge _____**psi**

Resin Accumulator charge _____**psi**

In-line Heater setting _____

Nozzle size _____

Nozzle Fan Angle _____**degrees**

Revision Information:

Rev. 01/2013 Updated the manual format and Address. We added the Terms & Conditions of Sale and Revision Information sections to this manual. Added the Start-up and Shut-down sections

Rev. 08/2014 Updated the manual format, Address, name and the Terms & Conditions of Sale. Removed references to Plastech.

Rev. 01/2016 Updated the Address and Logo

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