 IMPORTANCE OF THE COMPONENTS

1. Tank/lid/vent

Sprayer tank holds the herbicide/water mixture and must be constructed with a material that is resistant to potential corrosion from certain herbicide formulations. There should be no leaks of tank contents anywhere.

The lid should form a watertight seal when closed to avoid spills. A vent hole or vented lid should be present to prevent the formation of a vacuum in the tank.

2. Tank Shut-off Valve

A tank shut-off valve is required to isolate the tank contents (herbicide and carrier) from the rest of the spray system. This valve allows removal or repair of spray rig components without loss of tank contents or undo exposure of applicators to herbicides during repairs of the sprayer. Valves may be gate valves or ball valves.

3. In-line Screen

Herbicide spray mixture needs to be filtered properly with the use of screens. Screens protect the working parts of the spraying system and help prevent nozzle tip(s) from clogging. For centrifugal pumps, an in-line screen no smaller than 30-mesh is recommended. Finer meshed screens can become clogged with drift control additives and should be avoided at this location. The screen should be placed on the suction side of the pump between the pump and the tank shut-off valve. It should be cleaned frequently (daily).
An agitator or agitation system is required to mix the components of the spray mixture uniformly and keep them mixed. Some herbicide formulations such as emulsions, wettable powders, liquid, or dry flowables require constant agitation. Constant agitation is needed to keep these herbicide formulations in suspension or they may separate or settle out within the sprayer tanks. Non-functioning/broken agitators should be fixed. Tank length sparge tubes are preferred.
9. Pressure Gauges

Pressure gauges are an integral part of every spray system to correctly indicate an accurate pressure at the nozzle tip(s). A liquid filled pressure gauge, with a maximum reading of 100 psi, is recommended for use on spray rigs and should be mounted as close to the nozzle tip(s) as possible. This provides a more accurate pressure reading during the spraying operation and during the calibration process. Gauges should be visible to operators in the cab to monitor application pressure consistency (a second gauge is necessary if nozzle(s) is rear mounted). Replace all non-functioning gauges.

10. Pressure Regulators

Pressure regulators control the output pressure of spray nozzles. Pressure regulators are used most often when multiple nozzles are used. Single nozzle spray rigs may not have a true “pressure regulator.” Instead, they may have an agitation-line throttling valve that controls the amount of bypass returning to the tank. Individual pressure regulators should operate within a selected pressure range without being screwed all the way in or out. If pressure regulators are not adjustable they should be disassembled, cleaned, and tested. Replace if nonfunctional or broken.

11. Spray Nozzles

Nozzle type determines the uniformity and volume of the spray mixture applied, the completeness of coverage, and the amount of drift. Stainless steel or hardened stainless steel tips are recommended because they are non-corrosive and resistant to abrasion. Boom bustertips produce a more uniform droplet size (fewer fine droplets). When ordering right-of-way nozzles, the letter “R” needs to be added to the specific nozzle model number. Tips with cracked diffusers (nylon tip insert) should be replaced and returned for refurbishing.

12. Control Arms

Control arms are usually electronically controlled rams that adjust the angle of spray nozzles so they can follow the contour of “fill slopes” or “cut slopes.” Initial tip angles should be set with the control arm in the level, or horizontal, position. Proper functioning allows spray pattern width adjustment as slopes are encountered. Improper width adjustment can result in over- or under-application of spray mixtures. All control arms should respond to controls operated by applicators or they should be checked/replaced.

13. Nozzle Shut-off valve(s)

Nozzle shut-off valves are usually activated by an electric solenoid or ball valve that is operated remotely by the applicator. This valve is mounted on the output or discharge line near the nozzle tip(s) to turn the nozzles on or off. It is imperative that this valve be operating properly (not leaking) to avoid misapplication on rights-of-way near sensitive areas. If non-functioning, they should be fixed or replaced.
14. In-cab Switches

Switches turn spray solenoids on and off, activate control arms, and can control hydraulic motor speeds. All should function properly every time they are turned on or off. If the switch does not function properly every time, replace or repair it.

15. Handgun & Hoses

Handguns are used to make spot applications with high carrier rates (50 to 250 GPA, carrier rate is found on the herbicide label). Handguns should turn on and off consistently with no leakage. Hoses should be made of pressure rated materials resistant to bursting. Hoses should be checked regularly for cracks or aging and replaced before hose failure.

16. Calc-An-Acre

This instrument is a digital speed monitoring device that, when properly calibrated, allows a very precise (to the nearest 0.1 MPH) measurement of the ground speed of the sprayer. These devices help provide for consistent and accurate applications. Calibration instructions are included with the device when purchased. Each spray rig should be equipped with a properly working unit to simplify speed adjustment necessary to maintain consistent herbicide application rates (Roadside Vegetation Management Guidelines, Current Edition, Ch. 11).

TROUBLESHOOTING GUIDE

1. No delivery of spray liquid through the nozzles.
   Check for:
   a. Empty tank.
   b. Clogged lines, screens, or nozzle tips.
   c. Sharp kinks in hoses.
   d. Tank vent closed.
   e. Improper or poor mixing of herbicide(s).
   f. Pump failure.
   g. Pressure regulator failure (if one is used).

2. Fluctuating pressure.
   Check for:
   a. Material in supply tank is low.
   b. Dirty screens.
   c. Trash in the seat of the pressure regulator (if one is used).
   d. Pump drive slipping (if using auxiliary engine).
   e. Trash in pump.
   f. Hydraulic fluid too hot and not adequately cooled (if using hydraulic fluid driven centrifugal pumps).

3. Excessive abrasive action in the pump.
   Check for:
   a. Sand, grit, dirt, or crystals.
   b. Failure to use suction screen.
   c. Poor agitation of chemicals or mixtures containing solids.

4. Starved pump.
   Check for:
   a. Shut-off valve to pump is closed.
   b. Too small of a suction hose or pipe.
   c. Leaks in suction line.
   d. Collapse in suction hose.
   e. Kinks in suction hose.
   f. Too long of suction line.
   g. Too high suction line lift.
   h. Stopped up in-line screen.
   i. Worn pump.

5. Dry pump (no flow or liquid in pump).
   Check for:
   a. Running pump too long without liquid.
   b. Running pump too long while trying to prime the pump.
   c. Points mentioned in number 4 above.