Nozzle Technology, Product Efficacy and Drift Management

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Pentar - Hypro & Shurflo Products

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What Is Drift & Off Target Application

**Spray Drift:** The unintentional diffusion of pesticides and the potential negative effects of pesticide application.

Physical (Spray Drift)  Volatilization (Vapor)  Runoff (Ground)
Spray Drift

**How is Spray Drift created?**
Spray Drift is represented by the creation of droplets less than 105µ or 150µ in diameter. This size of droplet has a greater chance of being moved off target or prone to suspension / evaporation.

**Special attention to:**
- Nozzle Design & Technology
- Relative Span
- Intended Target
Factors Influencing Drift

1. Droplet Size
2. Wind
3. Temperature & Humidity
4. Boom Height
5. Speed
6. Chemical – Interaction With droplet Size
ASABE 572.1 Droplet Classification and Uses
Spray Nozzle Classification by Droplet Spectra

Liquid flow rate, liquid pressure, and physical changes to nozzle geometry and operation can affect the nozzle classification

- Nozzle can be classified into multiple categories.
- Depending on flow rate, operating pressure, etc.

Based on spraying water through a REFERENCE nozzle compared to the nozzle being classified

Spray liquid properties may and do affect droplet size

- Consider using surfactant-water mixtures
- Always consider the “FINER” classifications if comparing water to water with surfactant mixes.
ASABE 572.1 Droplet Classification

Current spray droplet sizing is measured against the ASABE572.1 standard which includes the following classifications:

Spray analysis is conducted to determine a spray’s ASABE572.1 classification through a VMD (Dv.0.5) measurement. More than just a VMD is needed to understand a nozzle’s performance.

Dv0.1  Dv0.9
ASABE 572.1 Classification
Practical Uses for ASABE S-572.1

• Manufacturers can have their products tested using the Droplet Size Standard and confidently recommend a Spray Quality to use with their products.

• The Spray Quality will provide data as to Efficacy and Drift Potential

*Picture of Wind Tunnel at the University of Nebraska West Central Research and Extension Center in North Platte*
Regulatory Update – Chemical Labels

**Chemical Labels**
Recently there has been actions by chemical companies to better clarify content on chemical labels to provide better application directions.

Direction is provided in three general forms:
- ASABE 572.1 droplet classifications
- Micron Size
- Nozzle identification

Recent examples include:
- Dow’s Enlist Herbicide
- BASF’s Engenia Herbicide

The re-emergence of Dicamba & 2,4-D are significant contributors to this initiative.

Why is this important to Pentair/Hypro?
Customers are realizing that new chemical formulations are not as forgiving as glyphosate (RoundUp) and proper application is going to be critical.

- Nozzle technology knowledge
  - An understanding of what nozzle technology works best with changing solution types

- Basis of chemical knowledge
  - Changing chemical solutions modify droplet spectrums how?

20 year anniversary of

[Roundup Logos]
How Applicators Can Use this Standard?

APPLICATION AND MIXING PROCEDURES

• **Ground Application:** Ignite 280 SL should be applied broadcast in a minimum of 15 gallons of water per acre. Under dense weed/crop canopies, 20 to 40 gallons of water per acre should be used so that thorough spray coverage will be obtained. Apply Ignite 280 SL using nozzles and pressures that generate **MEDIUM** (about 250 to 350 microns) spray droplets category as reported by the nozzle manufacturer and in accordance to **ASABE S 572**. Do **not use** nozzles and pressures that result in **COARSE** sprays. **FINE** sprays should also be avoided to minimize spray drift risk. Boom height should be based on nozzle manufacturer recommendations. See the *Spray Drift Management* section of this label for additional information on proper application of Ignite 280 SL.

• **Aerial Application:** Poor coverage will result in reduced weed control. For optimal weed control, apply Ignite 280 SL in a minimum of 10 gallons per acre. Apply Ignite 280 SL using nozzles and pressures that generate **MEDIUM** (about 300 to 400 microns) spray droplets category as reported by the nozzle manufacturer and in accordance to **ASABE S 572** based upon the selected air speed. Do **not use** nozzles and pressures that result in **COARSE** sprays. **FINE** sprays should also be avoided to minimize spray drift risk. See the *Spray Drift Management* section of this label for additional information on proper application of Ignite 280 SL.

SPRAY DRIFT MANAGEMENT

Spray drift may result in injury to non-target crops or vegetation. To avoid spray drift, do not apply when wind speed is greater than 10 MPH or during periods of temperature inversions. Do not apply when weather conditions, wind speed, or wind direction may cause spray drift to non-target areas. **AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR.**

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**Read and Follow the Label**
With Monsanto’s RoundUp Ready Extend System the Ultra Lo-Drift is featured as an option.

- RRE launch plan
- 2014 Cotton Release
- 2015 limited release for other crops
- 2016 full release

Other companies that are in progress of developing next steps:

- Dow – Enlist system, nozzle testing
- NuFarm - Nozzle testing in AU
- Helena – Turf sales program

Seeking Additional Partnerships for Marketing and Event Support
Droplet Dynamics
Droplet Size

• Statistical Analysis of Droplet Spectrum
  – Dv0.1 (Small Droplets In Relation)
  – Dv0.5 (VMD) Volume Medium Diameter
  – Dv0.9 (Large Droplets In Relation)
* Mostly, Droplet Sizes Are * Expressed in VMD

• Defining Spray Droplets
  • Particles or Droplets are what make up the spray pattern from the nozzle.
  • Droplet size directly impacts efficacy and drift.
  • For a given pressure, a spray tip will produce a range of droplet sizes.
  • Measured with sophisticated Laser equipment. (Malvern, PMS, PDPA, Oxford)
  • Expressed in Microns (micrometers).
1/2 of spray volume = smaller droplets

1/2 of spray volume = larger droplets

Robert E. Wolf • Extension Specialists Agrichemical Technology • Biological and Agricultural Technology Dept. • Kansas State University
Droplet Spectrum

There are 3 classifications of measurement when analyzing spray nozzle performance.

Dv0.9
- Particle size, below which 90% of the volume of droplets exist

Dv0.5 (VMD)
- Particle size, below which 50% of the volume of droplets exist

Dv0.1
- Particle size, below which 10% of the volume of droplets exist

Relative Span
The measurement of droplet variability within a spray pattern
- $Rs = (Dv0.9 - Dv0.1)/Dv0.5$
- I.E. ULD spray tip

Low Relative Span results in reliable control of droplets formed
# Droplet Size Chart

<table>
<thead>
<tr>
<th>Degree of atomization</th>
<th>Droplet size (microns)</th>
<th>Relative size</th>
<th>Relative size related to common objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fog</td>
<td>Up to 20</td>
<td></td>
<td>Point of needle (25 microns)</td>
</tr>
<tr>
<td>Fine mist</td>
<td>20–100</td>
<td></td>
<td>Human hair (100 microns)</td>
</tr>
<tr>
<td>Fine drizzle</td>
<td>100–250</td>
<td></td>
<td>Sewing thread (150 microns)</td>
</tr>
<tr>
<td>Light rain</td>
<td>250–1000</td>
<td></td>
<td>Staple (420 microns)</td>
</tr>
<tr>
<td>Thunderstorm rain</td>
<td>1000–4000</td>
<td></td>
<td>#2 pencil lead (2000 microns)</td>
</tr>
</tbody>
</table>
## Droplet Size, Coverage and Drift

### Effects of Droplet Size

<table>
<thead>
<tr>
<th>Droplet Size (\mu m)</th>
<th>Spray Quality (for illustration only) (\dagger)</th>
<th>Drift distance (feet) in 8 mph wind*</th>
<th>Droplets created per square inch of leaf**</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 (\mu m)</td>
<td>Very Fine</td>
<td>24.2 ft</td>
<td>1966</td>
</tr>
<tr>
<td>375 (\mu m)</td>
<td>Coarse</td>
<td>0.3 ft</td>
<td>37</td>
</tr>
<tr>
<td>800 (\mu m)</td>
<td>Extremely Coarse</td>
<td>0.1 ft</td>
<td>4</td>
</tr>
</tbody>
</table>

*Drift distances calculated with DriftSim software using 40% RH, 80º F, 8 mph wind, 2 ft height, and 60 fps velocity

**Theoretical using uniform droplet size, 10 GPA, and leaf area index of 6

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### Hollow Cone vs. Twin Cap™+ LD

- **Hollow Cone**: Suitable for fine droplet sizes and low drift distances.
- **Twin Cap™+ LD**: Allows for larger droplets with minimal drift.

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### So What is the Point?

Droplets Can Be Too Small and Drift...Too Big and Not Cover

Properly Sized for Peak Performance
Droplet Size, Drift and Coverage

- How does droplet size effect timing and placement?
  - It affects drift potential, allowing more spraying time
  - It affects the ability of the gallons you apply to cover the plant.

- A balance between drift and coverage must be struck

How many will never reach the target?
Droplet Speed

At tip:
- All droplets: 70 km/h (43mph)

50 cm (19.7 in) below tip:
- Large droplets: 28 km/h (17mph)
- Small droplets: 7 km/h (4.3 mph)
Droplet Direction

**Large Droplets**
- combination of nozzle and travel direction
- e.g. 30 km/h (18 mph) \(\downarrow\), 10 km/h (6 mph) \(\rightarrow\)

**Small Droplets**
- Whichever way the wind is blowing
100 um droplets become 50 um droplets in 5 sec and completely evaporate in 10 sec. No Drift and no chemistry reaching the Target
Is Boom Height Important?
# Spray Height Chart

## Suggested minimum spray heights

<table>
<thead>
<tr>
<th>Spray angle</th>
<th>15-in. spacing</th>
<th>20-in. spacing</th>
<th>30-in. spacing</th>
<th>40-in. spacing**</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 deg. (ER)</td>
<td>13–14 in.</td>
<td>17–19 in.</td>
<td>26–28 in.</td>
<td>NR*</td>
</tr>
<tr>
<td>110 deg. (ER)</td>
<td>10–11 in.</td>
<td>15–16 in.</td>
<td>20–22 in.</td>
<td>NR*</td>
</tr>
<tr>
<td>120 deg. (UL)</td>
<td>8–10 in.</td>
<td>12–15 in.</td>
<td>16–20 in.</td>
<td>24–30 in.</td>
</tr>
</tbody>
</table>

*Not recommended.

**This spray tip spacing is prone to off-target trespass under certain conditions that affect drift.

## Optimum spray heights

<table>
<thead>
<tr>
<th>Spray angle</th>
<th>15-in. spacing</th>
<th>20-in. spacing</th>
<th>30-in. spacing</th>
<th>40-in. spacing**</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 deg. (ER)</td>
<td>22 in.</td>
<td>30 in.</td>
<td>43 in.</td>
<td>NR*</td>
</tr>
<tr>
<td>110 deg. (ER)</td>
<td>15 in.</td>
<td>20 in.</td>
<td>30 in.</td>
<td>NR*</td>
</tr>
<tr>
<td>120 deg. (UL)</td>
<td>15 in.</td>
<td>20 in.</td>
<td>30 in.</td>
<td>40 in.</td>
</tr>
</tbody>
</table>

*Not recommended.

**This spray tip spacing is prone to off-target trespass under certain conditions that affect drift.
Spray overlap is critical for achieving optimal spray coverage and efficacy.

- Co-variance (CV) is the measure of variance in distribution.
  - Low percentage CV spray tips will provide the best distribution of spray

Hypro design standard is less than 7% variance
## Overlap Results

<table>
<thead>
<tr>
<th>Under Nozzle</th>
<th>125 L/ha</th>
<th>85 L/ha</th>
<th>45 L/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>205 ( \mu m )</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>295 ( \mu m )</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>370 ( \mu m )</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>510 ( \mu m )</td>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
</tr>
<tr>
<td>670 ( \mu m )</td>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td><img src="image15.png" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Under 30% Overlap</th>
<th>125 L/ha</th>
<th>85 L/ha</th>
<th>45 L/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>205 ( \mu m )</td>
<td><img src="image16.png" alt="Image" /></td>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
</tr>
<tr>
<td>295 ( \mu m )</td>
<td><img src="image19.png" alt="Image" /></td>
<td><img src="image20.png" alt="Image" /></td>
<td><img src="image21.png" alt="Image" /></td>
</tr>
<tr>
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<td><img src="image23.png" alt="Image" /></td>
<td><img src="image24.png" alt="Image" /></td>
</tr>
<tr>
<td>510 ( \mu m )</td>
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<td><img src="image26.png" alt="Image" /></td>
<td><img src="image27.png" alt="Image" /></td>
</tr>
<tr>
<td>670 ( \mu m )</td>
<td><img src="image28.png" alt="Image" /></td>
<td><img src="image29.png" alt="Image" /></td>
<td><img src="image30.png" alt="Image" /></td>
</tr>
</tbody>
</table>
7 Ways to Reduce Drift

1. Select a nozzle that produces coarser droplets
   - Use droplets that are as coarse as practical to provide necessary coverage. Nozzle examples: (air aspirated/inclusion), or (pre orifice).
   - Select a nozzle that provides an efficient droplet size for your job.

2. Use the lower end of the pressure range
   - Higher pressures generate many more small droplets (less than 100 microns). Under most conditions, do not exceed 40 to 45 psi with standard tips. (mid pressure range)
   - Use tips that control drift over a wide pressure range.

3. Lower boom height – Wind speed increases with boom height, A few inches lower reduces drift potential.
   - Use a wide angle tip and equipment with good boom stability to spray at a lower height.

4. Increase nozzle size
   - Larger capacity nozzles reduce drift. If you use nozzles that put out 10 to 15 gallons per acre (GPA), increase to nozzles that put out 15 to 20 GPA.
   - Use a tip size & pressure that provides effective flow rates for the full speed range you expect to use.
# 7 Ways to Reduce Drift

## 5. Spray when wind speeds are less than 10 m.p.h.
- More spray will move off-target as wind increases.
- Don’t spray when it is windy or unpredictable. The wind speed limit depends on your surroundings.

## 6. Spray when wind is moving away from sensitive crops
- Leave a buffer zone if sensitive plants are downwind. Spray the buffer zone when the wind changes direction.
- Spray when wind is moving away from sensitive areas.

## 7. Use a drift control additive when needed
- Drift control additives increase the average droplet size produced by nozzles.
- With proper tip selection other additives may be unnecessary.
Spray Tips

Selecting the Right Nozzle and Pressure
Spray Nozzles & The Right Selection

* Functions Of A Spray Nozzle *

- Control Flow Rate
- Disperse Liquids Into Specific Patterns
- Form Droplets
Selecting the Right Spray Tip

Spray tips are often the smallest and most overlooked piece of equipment on a machine. However, they have the greatest effect on the accuracy and efficiency of each application. Hypro offers spray tips for a variety of pressure ranges, flow rates and spray patterns to fit any spray application.

To be effective, a pesticide must be applied properly. To select the correct spray tip for the job, first fully read the pesticide label and look for information on tip type, application rate, spray quality, and environmental restrictions. Then...

1) Check which type of spraying technique you will be using – broadcast or banding.
2) Check your sprayer speed.
3) Select the application rate from the pesticide label.
4) Determine the flow rate (GPM) needed for the spray tip, or use the application rate (GPA) chart for the desired tip.
5) Select the pattern type.
6) Select tip size and pressure that provides the desired flow rate and application rate.
7) Check the spray quality tables to be sure the spray tip and pressure create the droplet spectrum you require.

1) Spraying Technique:
Broadcast spraying is when the entire field is to be treated. The width that each tip sprays, adjusted for spray overlap, is the distance between tips on the spray boom.

Band spraying is when planted rows or unplanted gaps are treated. The width that each tip sprays is the width of the treated band.

2) Sprayer Speed:
Forward speed of the spraying machine should be measured accurately. Radar or ultrasound speed sensors should be calibrated after installation or servicing. Wheel-driven speedometers should be calibrated whenever the driving surface changes, such as after cultivation. Speed can be determined if it is known how long it takes to drive a measured distance:

\[
\text{speed in MPH} = \frac{\text{distance (feet)} \times 60}{\text{time (seconds)} \times 88}
\]

Improved vehicle design means that speeds up to 20 MPH are now possible. Higher speeds (10-20 MPH) improve work rates and timeliness; lower speeds (5-10 MPH) give improved canopy penetration and make spray drift control simpler.

3) Application Rate:
Read the pesticide label closely to determine an appropriate spray application rate. If a range of acceptable application rates is listed, choose a rate that best matches your situation.

4) Flow Rate:
Determine the exact flow required from each tip by calculating:

\[
\text{GPM} = \frac{\text{GPA} \times \text{MPH} \times w}{5,940}
\]

W' changes depending on the type of applications:
- Tip spacing (in/m) for broadcast spraying
- Spray width (in/m) for single-tip band spraying or boomless spraying
- Row spacing (in/m) divided by the number of tips per row for directed spraying
Spray Pattern Shapes

- **Tapered**
  - Broadcast Applications
  - ULD, GuardianAIR Twin

- **Even**
  - Banding Applications
  - E

- **Anvil / Flood**
  - Broadcast / Fertilizer Applications
  - DT

- **Full**
  - Broadcast / Banding Applications
  - FCX

- **Hollow**
  - Broadcast / Banding Applications
  - HCX

- **Solid Stream**
  - Broadcast / Banding Applications
  - ESI
Right on Technology, Right on Target

- Spray nozzles are designed for specific purposes and situations by manipulating droplet sizes and patterns.

- **Patterns**
  - Today’s nozzles are capable of producing a variety of patterns and angles
    - Inclines
    - Declines
    - Twin Spray
    - 80° 110° 120° 140° etc

So why do we use these different patterns?
The Balance

Drift Control:
• Larger Droplets
• Systemic Chemicals
• Herbicides

Coverage:
• Smaller Droplets
• Contact Chemicals
• Insecticides Fungicides

Drift Control vs. Coverage
Selection: Droplet classification

• There are SIX droplet categories that matter most to Ag and Horticultural Spraying
• The old practice of talking about droplet size in terms of “microns” is no longer necessary (or helpful)
• Catalogs and Labels usually refer to these categories

<table>
<thead>
<tr>
<th>Spray Quality</th>
<th>Size of Droplets</th>
<th>Retention on Difficult to Wet Leaves</th>
<th>Used for</th>
<th>Drift Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Fine</td>
<td>Small</td>
<td>Excellent</td>
<td>Exceptions</td>
<td>High</td>
</tr>
<tr>
<td>Fine</td>
<td></td>
<td>Very Good</td>
<td>Good Cover</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>Good</td>
<td>Most Products</td>
<td></td>
</tr>
<tr>
<td>Coarse</td>
<td></td>
<td>Moderate</td>
<td>Systemic Herbicides</td>
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<tr>
<td>Very Coarse</td>
<td></td>
<td>Poor</td>
<td>Soil Herbicides</td>
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</tr>
<tr>
<td>Extremely Coarse</td>
<td>Large</td>
<td>Very Poor</td>
<td>Liquid Fertilizer</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Always read the pesticide label to determine which spray quality is required.*
Spray Nozzle Technologies

Spray tips can be developed in many different ways to achieve specific droplet characteristics.

Matching nozzle technologies with spraying solutions & operator best practices will result in maximum performance results.
## Spray Tip Application Chart

<table>
<thead>
<tr>
<th>Spray Tip</th>
<th>Uses</th>
<th>Pressure Range</th>
<th>Part Number</th>
<th>30</th>
<th>40</th>
<th>60</th>
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<tbody>
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<td>FC-UL120-015</td>
<td>Ultra Le-Def®</td>
<td>15-115</td>
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For more complete application information, consult Hypro Form HYP01, visit the Hypro SprayIT Calculator online, or call our Technical/Applications Calculator line at 800-445-8360.
## Understanding Myth vs. Reality

<table>
<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
</tr>
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<tbody>
<tr>
<td>Fine sprays needed for coverage</td>
<td>Droplet number is more important</td>
</tr>
<tr>
<td>High pressures improve penetration</td>
<td>Pressure does not accelerate droplets</td>
</tr>
<tr>
<td>More coverage is better</td>
<td>Targeted coverage = better disease control</td>
</tr>
<tr>
<td>Low water volume (GPA) lets you cut rates</td>
<td>Not if droplet size doesn’t decrease</td>
</tr>
</tbody>
</table>
Know Impact of Worn Nozzles

Over application of chemicals can:
- Increase Production Costs
- Cause Crop Damage
- Produce excessive residue carryover
- Cause ground-water contamination

Under application of chemicals can:
- Reduce crop yield
- Promote inadequate weed, pest, or disease control
- Cause repeat trips over the field

If the discharge from a nozzle varies more than 10 PERCENT above or below the average of all the nozzles, replace it.
Calibration:
Spraying Solutions other than Water

Liquids that are more dense than water will flow through a spray tip more slowly than water. Solutions that are less dense than water will flow through a spray tip more quickly than water. Unless otherwise indicated, the performance tables in the spray tip section of this catalog show flow and application rates for water-based sprays. If you’re using a non-water sprayer, you can calculate an intermediate “look-up” application rate. To do this, you will multiply your actual desired application rate by a conversion factor and then use the resulting “look-up” figure to select a tip from the water-based performance tables. The conversion factors listed on this page are based on typical values for common fertilizer solutions. For other spray solutions, you can calculate the conversion factor by taking the square root of the solution’s specific gravity.

For easier tip selection using water and non-water sprays, use the SprayIT calculator online at: http://sprayITsprayerpumps.com

### U.S. Units

<table>
<thead>
<tr>
<th>Density (lb/gal)</th>
<th>Material</th>
<th>Specific Gravity</th>
<th>Conversion Factor</th>
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<td>1.05</td>
<td>water</td>
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<td>NaCl</td>
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</table>

### Metric

<table>
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<th>Material</th>
<th>Conversion Factor</th>
</tr>
</thead>
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<td>water</td>
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<td>NaCl</td>
<td>1.12</td>
</tr>
<tr>
<td>1.54</td>
<td>NaCl</td>
<td>1.23</td>
</tr>
</tbody>
</table>

**Example:**

Your desired application rate of 28% Nitrogen fertilizer (28-0-0) is 30 US GPA.

Multiply 30 GPA by Conversion Factor 1.13 to find the converted look-up application rate of 33.9 GPA.

Select a spray tip that will apply 33.9 GPA of water-based spray. A spray tip that will apply 33.9 GPA of water will apply 30 GPA of 28-0-0 fertilizer solution.

**Example:**

Your desired application rate of 28% Nitrogen fertilizer (28-0-0) is 300 L/ha.

Multiply 300 L/ha x Conversion Factor 1.13 to find the converted look-up application rate of 339 L/ha.

Select a spray tip that will apply 339 L/ha of water-based spray. A spray tip that will apply 339 L/ha of water will apply 300 L/ha of 28-0-0 fertilizer solution.

---

### Broadcast Application Formulas

**US Standard**

- **Application Formulas – US Standard**
  - **GPM** = GPA x MPH x W
  - **GPA** = 5,940 x GPM
  - **GAL/1000FT** = Gallons per 1000 square feet
  - **MPH** = Miles per hour
  - **W** = Tip spacing (inches) for broadcast spraying

- **Example:**
  - **GPM** = GPA x MPH x W
  - **GPA** = 5,940 x GPM
  - **GAL/1000FT** = 136
Selecting & Calibrating Flow Rates

Regardless of how many calculations and charts are used, it is good to capture spray from a single tip to validate your information.

Capture flow from several different nozzles on along your entire boom. Compare the captured flow versus your calculations.

If there is a difference:
- Inspect your tips
- Review your pressure settings

Does a spray controller eliminate the need to calibrate?

No, spray controllers only monitor a booms total flow, it doesn’t know if the spray is getting applied evenly, or as you would expect.
BACKPACK SPRAYER CALIBRATION
Broadcast - 1/128th Method

Step 1. Measure and mark a calibration plot that is exactly
18.5 feet wide X 18.5 feet long (Aprox. 340 Sq. Ft. = 1/128th Acre)

Step 2. Spray the calibration plot uniformly with water, noting the
number of seconds required, do this three times and average.
*** Spray at a consistent pace & pressure ***

Time Required = ____________ Seconds

Step 3. Spray into a bucket for the same number of seconds at the same
pressure.

Step 4. Measure the number of ounces of water in the bucket.
Volume Sprayed = ____________ Ounces

Step 5. The number of ounces collected from the bucket is equal to the
number of gallons per acre the sprayer is delivering.

Gallons Per Acre (GPA) = ________________

Step 6. From chemical label determine the amount of concentrate to
apply per acre.

______________ Chemical per acre, Oz, Pts, Qts.

Step 7. Determine the amount of chemical to add for each gallon of
water in the sprayer.

Example: (4 Gallon sprayer) Caught 40 Oz. over spray time = 40 GPA
4 Gal. tank divided by 40 GPA (4/40) = .1 tenth acre per tank.
Multiply Chem. label rate (64 oz. per acre) by area sprayer treats (.1 acre)
64 x .1 = 6.4 Oz. chemical per tank
**Calibration for spot spraying**

Spot spraying is common on clumps of brush or weeds that are scattered or difficult to walk through. Sprayer calibration is often done on a “spray until wet” basis. In other words, you apply spray until the vegetation appears to be covered by a light rain.

When “spraying to wet,” you’ll likely apply between 30 and 75 gallons/acre, depending on how you define “wet.”

Herbicide rates for spot spraying are typically given as a percentage dilution. For example, a typical recommendation for blackberry control might be to apply a 2% solution of glyphosate (Roundup) in the fall.

To mix a 2% solution, multiply \(0.02 \times 128\) (ounces in 1 gallon) to get 2.6 ounces per gallon. In a 5-gallon sprayer, mix 13 ounces of Roundup (\(5 \times 2.6\) ounces). Table 5 lists rates for various spray concentrations.

<table>
<thead>
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<th>Herbicide recommendation (%)</th>
<th>Amount herbicide (oz) to add to:</th>
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<th>3gal</th>
<th>5gal</th>
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<td>5%</td>
<td>6.4</td>
<td>19</td>
<td>32</td>
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</table>
Helpful Resources

 HYPRO WEBSITE
Visit the new Hypro-SHURflo website for information on our extensive line of pumps, spray tips and accessories.

www.hypropumps.com
www.hyprospraytips.com

 SPRAYIT CALCULATOR
Make spray tip selection easy by using the online SprayIT Calculator. Just enter your application information and the calculator does the rest.

sprayit.hyprospraytips.com

 MOBILE APP
Hypro’s new spray tip selection app is available for free on both Android and Apple platforms.

Key word: Hypro or SprayIT

Support Available 24/7
Take Home Message

Technology

- New nozzle & product technology is revolutionizing spray application

Simple Updates

- Simple, low cost adjustments and updates to the sprayer can have immediate positive results—economically and environmentally
Disclaimer

Brand names appearing in the presentation are for identification and illustration purposes only

No criticism is intended nor implied of similar products not mentioned.

Always read, follow and understand the Manufacturers Label and Recommendations.
Questions?

Mike Powers
Pacific Northwest Representative
Pentair - HYPRO / SHURFLO
www.hypropumps.com