

Ceramic AXI 80° & 110°



The Albus® AXI wide pressure range ceramic spray tips are suited for creating numerous fine to medium droplets. The ceramic orifice of the AXI will provide long service life even when spraying abrasive chemicals.

- Adjustable droplet size according to pressure
- Maintains good spray distribution and makes larger droplets at low pressures
- FastCap includes tip, cap and gasket
- 80° fan models ideal for use in directed spray applications
(See page 159 for more information)

US Units

Tip Size	Droplet Size		Pressure (PSI)	Flow Rate (GPM)	Gallons per Acre 20 inch nozzle spacing MPH										GAL/1000 Ft ² 20 inch nozzle spacing			
	80°	110°			4	5	6	8	10	12	15	20	2	3	4	5		
015	F	F	20	0.11	8.2	6.5	5.4	4.1	3.3	2.7	2.2	1.6	0.38	0.25	0.19	0.15		
	F	F	30	0.13	9.7	7.7	6.4	4.8	3.9	3.2	2.6	1.9	0.44	0.30	0.22	0.18		
	F	F	40	0.15	11.1	8.9	7.4	5.6	4.5	3.7	3.0	2.2	0.51	0.34	0.26	0.20		
	F	F	50	0.17	12.6	10.1	8.4	6.3	5.0	4.2	3.4	2.5	0.58	0.39	0.29	0.23		
	VF	VF	60	0.18	13.4	10.7	8.9	6.7	5.3	4.5	3.6	2.7	0.61	0.41	0.31	0.25		
	VF	VF	70	0.20	14.9	11.9	9.9	7.4	5.9	5.0	4.0	3.0	0.68	0.45	0.34	0.27		
02	F	F	20	0.14	10.4	8.3	6.9	5.2	4.2	3.5	2.8	2.1	0.48	0.32	0.24	0.19		
	F	F	30	0.17	12.6	10.1	8.4	6.3	5.0	4.2	3.4	2.5	0.58	0.39	0.29	0.23		
	F	F	40	0.20	14.9	11.9	9.9	7.4	5.9	5.0	4.0	3.0	0.68	0.45	0.34	0.27		
	F	F	50	0.22	16.3	13.1	10.9	8.2	6.5	5.4	4.4	3.3	0.75	0.50	0.38	0.30		
	F	F	60	0.24	17.8	14.3	11.9	8.9	7.1	5.9	4.8	3.6	0.82	0.55	0.41	0.33		
	F	F	70	0.26	19.3	15.4	12.9	9.7	7.7	6.4	5.1	3.9	0.89	0.59	0.44	0.35		
03	M	M	20	0.21	15.6	12.5	10.4	7.8	6.2	5.2	4.2	3.1	0.72	0.48	0.36	0.29		
	M	M	30	0.26	19.3	15.4	12.9	9.7	7.7	6.4	5.1	3.9	0.89	0.59	0.44	0.35		
	M	M	40	0.30	22.3	17.8	14.9	11.1	8.9	7.4	5.9	4.5	1.02	0.68	0.51	0.41		
	F	F	50	0.34	25.2	20.2	16.8	12.6	10.1	8.4	6.7	5.0	1.16	0.77	0.58	0.46		
	F	F	60	0.37	27.5	22.0	18.3	13.7	11.0	9.2	7.3	5.5	1.26	0.84	0.63	0.50		
	F	F	70	0.40	29.7	23.8	19.8	14.9	11.9	9.9	7.9	5.9	1.36	0.91	0.68	0.55		
04	M	M	20	0.28	20.8	16.6	13.9	10.4	8.3	6.9	5.5	4.2	0.95	0.64	0.48	0.38		
	M	M	30	0.35	26.0	20.8	17.3	13.0	10.4	8.7	6.9	5.2	1.19	0.80	0.60	0.48		
	M	M	40	0.40	29.7	23.8	19.8	14.9	11.9	9.9	7.9	5.9	1.36	0.91	0.68	0.55		
	M	M	50	0.45	33.4	26.7	22.3	16.7	13.4	11.1	8.9	6.7	1.53	1.02	0.77	0.61		
	F	M	60	0.49	36.4	29.1	24.3	18.2	14.6	12.1	9.7	7.3	1.67	1.11	0.84	0.67		
	F	F	70	0.53	39.4	31.5	26.2	19.7	15.7	13.1	10.5	7.9	1.81	1.20	0.90	0.72		
05	M	M	20	0.35	26.0	20.8	17.3	13.0	10.4	8.7	6.9	5.2	1.19	0.80	0.60	0.48		
	M	M	30	0.43	31.9	25.5	21.3	16.0	12.8	10.6	8.5	6.4	1.47	0.98	0.73	0.59		
	M	M	40	0.50	37.1	29.7	24.8	18.6	14.9	12.4	9.9	7.4	1.71	1.14	0.85	0.68		
	M	M	50	0.56	41.6	33.3	27.7	20.8	16.6	13.9	11.1	8.3	1.91	1.27	0.95	0.76		
	M	M	60	0.61	45.3	36.2	30.2	22.6	18.1	15.1	12.1	9.1	2.08	1.39	1.04	0.83		
	M	M	70	0.66	49.0	39.2	32.7	24.5	19.6	16.3	13.1	9.8	2.25	1.50	1.13	0.90		
06	M	C	20	0.42	31.2	24.9	20.8	15.6	12.5	10.4	8.3	6.2	1.43	0.95	0.72	0.57		
	M	M	30	0.52	38.6	30.9	25.7	19.3	15.4	12.9	10.3	7.7	1.77	1.18	0.89	0.71		
	M	M	40	0.60	44.6	35.6	29.7	22.3	17.8	14.9	11.9	8.9	2.05	1.36	1.02	0.82		
	M	M	50	0.67	49.7	39.8	33.2	24.9	19.9	16.6	13.3	9.9	2.28	1.52	1.14	0.91		
	M	M	60	0.73	54.2	43.4	36.1	27.1	21.7	18.1	14.5	10.8	2.49	1.66	1.24	1.00		
	M	M	70	0.79	58.7	46.9	39.1	29.3	23.5	19.6	15.6	11.7	2.69	1.80	1.35	1.08		

Droplet size based on ASABE S572.1 standard.

Features	
Common Use	General
Pattern	Tapered Flat Fan
Technology	Elliptical Orifice
Material	Ceramic
Spray Angle	80° & 110°
Pressure Range	20-70 PSI (1.5-5 BAR)
Configuration	Tips, FastCap
Part Numbers	
Tips 80°	FastCaps 80°
AXI-80015	FC-AXI-80015
AXI-8002	FC-AXI-8002
AXI-8003	FC-AXI-8003
AXI-8004	FC-AXI-8004
AXI-8005	FC-AXI-8005
AXI-8006	FC-AXI-8006
Tips 110°	FastCaps 110°
AXI-110015	FC-AXI-110015
AXI-11002	FC-AXI-11002
AXI-110025	-
AXI-11003	FC-AXI-11003
AXI-11004	FC-AXI-11004
AXI-11005	FC-AXI-11005
AXI-11006	FC-AXI-11006
Replacement Cap Gasket	
22W11MF64	

Selecting the Right Spray Tip



Visit sprayit.hypropumps.com for Hypro's online tip calculator or download the FREE SprayIT app for Apple or Android devices.

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. (pg 112)
- 2) Check your sprayer speed. (pg 112)
- 3) Select the application rate from the pesticide label. (pg 112)
- 4) Determine the flow rate (GPM) needed for the spray tip, or use the application rate (GPA) chart for the desired tip. (pg 112)
- 5) Select the pattern type. (pg 113)
- 6) Select tip size and pressure that provides the desired flow rate and application rate. (pg 113)
- 7) Check the spray quality tables to be sure the spray tip and pressure create the droplet spectrum you require. (pg 113)

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:

$$\text{speed in MPH} = \frac{\text{distance (feet)} \times 60}{\text{time (seconds)} \times 88} \quad \text{or} \quad \text{speed in Kmph} = \frac{\text{distance (m)} \times 3.6}{\text{time (seconds)}}$$

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:

$$\text{GPM} = \frac{\text{GPA} \times \text{MPH} \times w}{5,940} \quad \text{or} \quad \text{LPM} = \frac{\text{L/ha} \times \text{Kmph} \times w}{600}$$

'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

Or you can read the application tables throughout this guide.

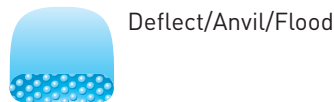
Selecting the Right Spray Tip

5) Spray Pattern Type:

Flat Fan pattern – Available as a tapered spray for boom applications or an even spray for single tip applications. Even spray tips produce a narrow pattern, where spray is evenly deposited across the spray’s width. Tapered spray tips produce an elliptical spray pattern where more of the spray is deposited immediately under the tip. By overlapping tapered sprays, an even distribution across the entire boom can be obtained.



Deflect pattern – Also known as anvil or flood tips, deflect tips produce a wide-angled flat pattern when operated at low pressures (10-40 PSI/1-3 BAR), The tips generally produce a coarse, even spray.



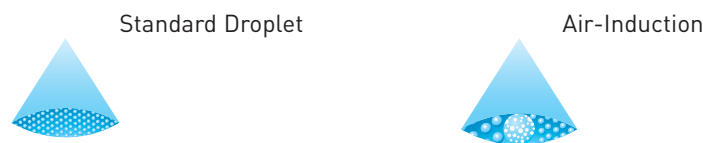
Cone pattern – These spray tips produce either a solid circular (full cone tips) or a hollow circular footprint (hollow cone tips). Full cones are ideal for spot spraying, whereas hollow cones are used on air-assisted sprayers and directed sprays.



Other patterns – Specialty sprays call for specialty patterns, such as off-center or streaming sprays. An off-center pattern is used to extend spray patterns past the boom structure and streaming patterns are commonly used for fertilizer applications.



Technology – Standard or Air Induction – Along with the spray pattern, it’s important to consider the engineering behind each droplet. Standard droplets produce the traditional solid droplet. Air-induction technology creates air-filled droplets, which increase droplet retention and reduces the number of small droplets prone to drift.



6) Tip Size and Pressure:

Use the flow rate tables provided throughout this guide to select the tip and pressure that provides the flow needed for the application.



Selecting the Right Spray Tip

7) Spray Quality:

An important performance characteristic of a spray tip is both the size and the variation of droplets or spray quality that it produces.

ASABE S572.1 Droplet Size Classification

The American Society of Agricultural and Biological Engineers (ASABE) developed the ASABE S572.1 standard to measure and interpret spray quality from tips.

Spray Quality*	Size of Droplets	VMD Range (Microns**)	Color Code	Retention on Difficult to Wet Leaves	Drift Potential
Extremely Fine	Small	<60	Purple	Excellent	High
Very Fine		61-105	Red	Excellent	
Fine		106-235	Orange	Very Good	
Medium		236-340	Yellow	Good	
Coarse		341-403	Blue	Moderate	
Very Coarse		404-502	Green	Poor	
Extremely Coarse	Large	503-665	White	Very Poor	Low
Ultra Coarse		>665	Black	Very Poor	

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

** Estimated from sample reference graph in ASABE/ANSI/ASAE Standard S572.1.

The ASABE S572.1 standard uses eight droplet classification categories, six of which are common for agriculture and horticulture: Very Fine, Fine, Medium, Coarse, Very Coarse and Extremely Coarse. Most agrochemical applications recommend a fine, medium, or coarse spray.

Fine	sprays provide enhanced retention for directed spraying on the target including: <ul style="list-style-type: none"> Foliar-acting weed control Contact-acting fungicides and insecticides 	Medium	sprays are the most widely used spray type. <ul style="list-style-type: none"> Used by default by most applicators when spray quality is not defined by the label. Systemic-acting fungicides, insecticides and herbicides. 	Coarse	sprays are used with systemic, residual, and soil-applied herbicides.
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BCPC Nozzle Classification

The British Crop Protection Council (BCPC) develop a standard for classifying nozzle droplet size. It was shown that to apply a spray solution safely and with the most agronomic value, a spray application needed to be delivered within the appropriate droplet size spectrum. The standard is based on relative comparisons of droplet size using a set of agreed upon reference nozzles. The BCPC standard also has an additional component that allows for further description of the drift potential of a nozzle.

For conventional hydraulic nozzles, spray quality varies according to nozzle size (defined by nozzle flow in l/min) and with pressure, larger sizes and lower pressures produce larger droplets. Spray quality is defined by Volume Median Diameter (VMD) which is the mid-droplet size where half of the volume of spray is in larger and half in smaller droplets. The BCPC International Spray Classification System, groups nozzles into five categories: VERY FINE, FINE, MEDIUM, COARSE AND VERY COARSE, each category covering a range of VMDs.

Fine Sprays	Enhance spray retention on the target. Suitable for small targets and contact acting fungicides and insecticides. There is a higher risk of spray drift with fine sprays.
Medium Sprays	The default option if no another spray quality is indicated.
Coarse Sprays	Use with residual/soil applied herbicides where drift reduction is the priority.

Air Induction (AI) nozzles incorporate air as well as fluid in the droplets. As a result they are not classified in the same way as standard hydraulic nozzles. AI nozzles tend to have a more uniform droplets size and less of the driftable fines. Those at the finer end of the spectrum can be successfully used in place of conventional 'medium' spray quality whilst at the same time reducing spray drift.

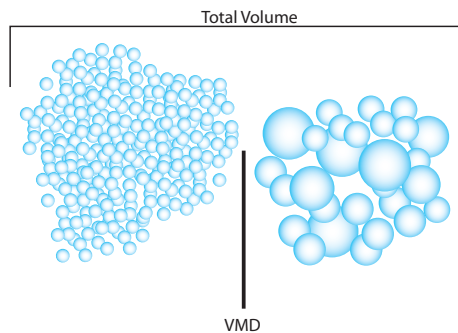
Selecting the Right Spray Tip

The following chart has been designed to simplify selection of the correct spray tip type for the agrochemical to be applied. It is based on having good conditions for spraying and should be used in conjunction with the agrochemical manufacturer's label. Increased carrier rates may allow for coarser sprays to reduce risk of drift. Always follow the agrochemical label exactly.

Section	Code	Spray Tip	Common Use	Pattern	Technology	Orifice Material	Nominal Spray Angle	Pressure Range		ASABE Droplet Classification								
								PSI	BAR	XF	VF	F	M	C	VC	XC	UC	
Broadcast	ULD	Ultra Lo-Drift	Weeds	Tapered Flat Fan	Air Induction	Polyacetal	120°	15-115	1-8									
	DB	Drift Beta	Weeds	Tapered Flat Fan	Air Induction	Polyacetal	120°	20-90	1.5-6									
	GAT	GuardianAIR Twin	Plant Health	Tapered Flat Fan	Air Induction	Polyacetal	110°	30-115	2-8									
	GA	GuardianAIR	Plant Health	Tapered Flat Fan	Air Induction	Polyacetal	110°	15-115	1-8									
	GRD	Guardian	Plant Health	Tapered Flat Fan	Pre-Orifice	Polyacetal	120°	15-115	1-8									
	LD	Lo-Drift	Plant Health	Tapered Flat Fan	Pre-Orifice	Polyacetal	80°, 110°	15-70	1-5									
	VP	Variable Pressure	General	Tapered Flat Fan	Elliptical Orifice	Polyacetal	80°, 110°	15-70	1-5									
	VPT	VP Tech	General	Tapered Flat Fan	Elliptical Orifice	Polyacetal	80°, 110°	15-70	1-5									
	TR	Total Range	General	Tapered Flat Fan	Elliptical Orifice	Stainless Steel	80°, 110°	15-70	1-5									
	F	FanTip	General	Tapered Flat Fan	Elliptical Orifice	Polyacetal	80°, 110°	30-60	2-4									
	AVI	Air Injected Anti-Drift	Weeds	Tapered Flat Fan	Air Induction	Ceramic	80°, 110°	30-100	2-7									
	ATW	Air Injected Twin Fan	Plant Health	Tapered Flat Fan	Air Induction	Ceramic	110°	40-100	3-7									
ADI	Drift Reduction	Plant Health	Tapered Flat Fan	Air Induction	Ceramic	110°	30-70	2-5										
AXI	Wide Range Fan	General	Tapered Flat Fan	Elliptical Orifice	Ceramic	80°, 110°	20-70	1-5										
Wide	HF	Hi-Flow	Fertilizer	Tapered Flat Fan	Pre-Orifice	Polyacetal	140°	20-80	1.5-6									
	DT	DeflecTip	Weeds & Fertilizer	Flood	Deflection	Polyacetal	80°-160°	10-60	1-4									
	APM	Wide Angle Flood	Weeds & Fertilizer	Flood	Deflection	Ceramic	80°-160°	10-60	1-4									
Stream	ESI	Six Stream	Fertilizer	Streams	Pre-Orifice	Ceramic or Polyacetal	110° Equivalent	15-60	1-4								S	
	CM	Fanjet 0°	Fertilizer	Stream	Round Orifice	PVDF	0°	15-60	1-4								S	
	DC	Flow Regulating Disc	Fertilizer	Stream	Round Orifice	Polyacetal	0°	10-150	1-10								S	
	AMT	Flow Regulating Disc	Fertilizer	Stream	Round Orifice	Ceramic	0°	10-725	1-50								S	
Banding & Directed	DC/CR	SwirlTip Disc/Core	Plant Health	Hollow Cone	Swirl	Polyacetal	25°-110°	10-150	1-10									
	DCC/CRC	Disc and Core	Plant Health	Hollow Cone	Swirl	Ceramic	13°-93°	10-300	1-20									
	HXC	HollowTip Hollow Cone	Plant Health	Hollow Cone	Swirl	Polyacetal	80°	40-150	3-10									
	ATR	Hollow Cone	Plant Health	Hollow Cone	Swirl	Ceramic	80°	40-350	3-24									
	HCA	Hollow Cone	Plant Health	Hollow Cone	Swirl	Ceramic	80°	40-350	3-24									
	TVI	Hollow Cone	Plant Health	Hollow Cone	Air Induction	Ceramic	80°	70-360	5-25									
	AVI	Air Injected Anti-Drift	Plant Health	Tapered Flat Fan	Air Induction	Ceramic	80°	40-350	3-24									
	AXI	Wide Range Fan	Plant Health	Tapered Flat Fan	Elliptical Orifice	Ceramic	80°	40-350	3-24									
	FCX	Full Cone	Plant Health	Full Cone	Swirl	Polyacetal	80°	15-150	1-10									
	DCC/CRC	Disc and Core	Plant Health	Full Cone	Swirl	Ceramic	14°-71°	10-300	1-20									
	E	FanTip Even Flat	Weeds	Even Flat Fan	Elliptical Orifice	Polyacetal	80°	30-60	2-4									
	OC	Off-Center Flat	Unspecialized	Off-Center Fan	Elliptical Orifice	Brass	80°	30-60	2-4									
OCI	Off-Center Ceramic	Unspecialized	Off-Center Fan	Elliptical Orifice	Ceramic	80°	30-60	2-4										
AVI-OC	Air Injected Off-Center	Weeds	Off-Center Fan	Air Induction	Ceramic	80°	40-100	3-7										
Special	XT	Boom X Tender	Weeds	Boomless Fan	Pre-Orifice	Stainless or Polyacetal	105°	30-60	2-5									
	ACID F	FanTip	Acid Defoliants	Tapered Flat Fan	Elliptical Orifice	PVDF	110°	30-60	2-4									
	ACID LD	Lo-Drift	Acid Defoliants	Tapered Flat Fan	Pre-Orifice	PVDF	110°	30-60	2-4									
	MISTING	F, HAF, PF, AFD, AF	Cooling & Humidification	Fan or Hollow Cone	Elliptical Orifice or Swirl	Polyacetal	65°-110°	40-150	3-10									
	E	Even	Knapsack	Even Flat Fan	Elliptical Orifice	Polyacetal	80°	15-45	1-3									
DT/AN	Deflect Tip/PoliJet	Knapsack	Flood	Deflection	Polyacetal	53°-127°	15-45	1-3										

S These nozzles produce streams to minimize atomization

Understanding Droplet VMD



VMD is the droplet size at which 50% of the spray volume is in droplets larger than the VMD and 50% of the volume is in droplets smaller than the VMD (adapted from Matthews 1992).

Understanding Micron Size

Degree of Atomization	Droplet Size (Microns)	Relative Size Related to Common Objects
Fog	Up to 25	Point of a Needle (25 Microns)
Fine Mist	20-100	Human Hair (100 Microns)
Fine Drizzle	100-250	Sewing Thread (150 Microns)
Heavy Drizzle	250-500	Toothbrush Bristle (300 Microns)
Light Rain	500-800	Staple (550 Microns)
Heavy Rain	800-1000	Paper Clip (850 Microns)
Thunderstorm Rain	1000-4000	#2 Pencil Lead (2000 Microns)

Droplet sizes are usually expressed in microns (micrometers). One micron equals one thousandth of a millimeter. Other than the effects of the specific material being sprayed, the four major factors effecting droplet size are: tip style, capacity, spraying pressure and spray pattern type. Lower spraying pressures provide larger droplet sizes, while higher spraying pressures yield smaller droplet sizes. The smallest droplet sizes are achieved by air atomizing tips. Generally speaking, the largest spray droplets are produced by wide-angle, flat hydraulic spray tips. In the hydraulic spray tip series, the smallest droplet sizes are produced by hollow-cone spray tips.