

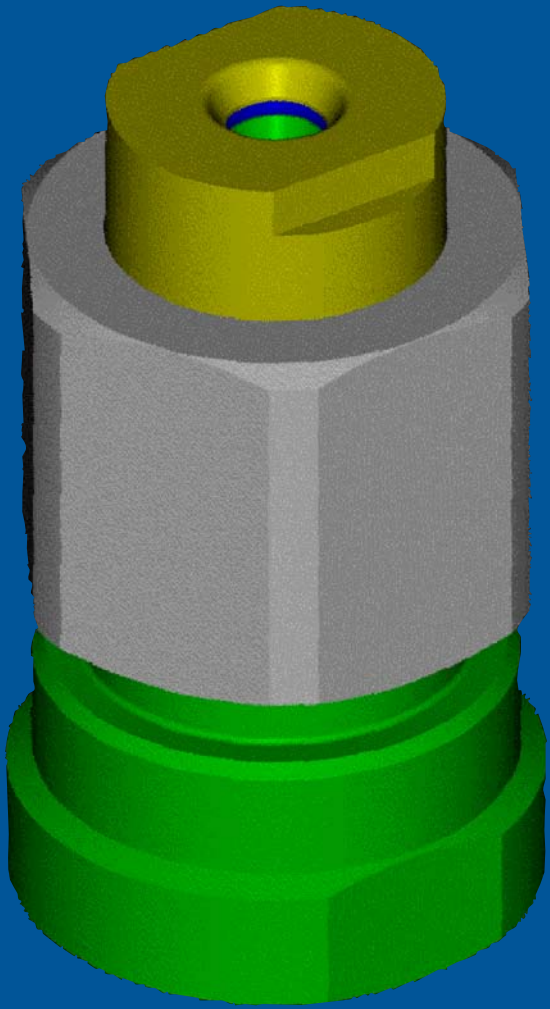
BETE[®]

NOZZLES FOR SPRAY DRYING



Manual No. 500.3.TD/L

BETE Introduces the New Twist & Dry™,
a Breakthrough in Spray Dryer Nozzle Maintenance



Choose The BETE Twist & Dry™

BETE Has Been Developing Specialized Industrial Nozzles for Over 50 Years

BETE's success is built on its ability to engineer its nozzle designs to deliver the specific spray performance required for the most exacting applications. The BETE Twist & Dry™ is one of over 20,000 nozzle designs, engineered with the same precision and innovation as the nozzles we make for the space shuttle and nuclear power plants.

Responsiveness to customer needs has led us to create designs that provide better performance, longer nozzle life, and greater ease of use. The BETE Twist & Dry™ is an engineered solution to an old maintenance problem that will save you valuable time and money.

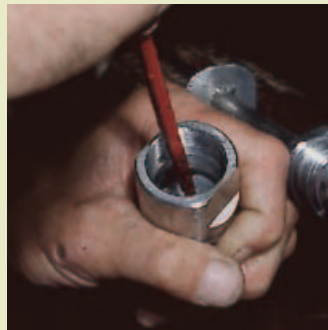
We Make Nozzles Designed for Ease of Use as well as Superior Performance!

Replace the wear parts of your spray dry nozzles without turning the lances upside down.

The BETE Twist & Dry™ is the dryer operator's nozzle. If you operate and maintain a spray dryer, you know just how difficult it can be to replace the nozzle wear parts. These unique features of the Twist & Dry™ design makes this chore much easier:

- **Fewer parts**
- **Rugged Design:** one piece swirl unit greatly reduces breakage of tungsten carbide pieces
- **Easy Assembly:** the Bete TD locking system* keeps the swirl chamber and orifice "locked" into position during assembly.
- **Materials:** Corrosion resistant 316 stainless steel body, tungsten carbide swirl unit and orifice disk, EPDM o-rings, other materials are available.
- **Software support:** Users of the Twist & Dry receive free-of-charge computer software that greatly simplifies selecting the correct swirl unit and orifice disk.
- **Maximum Design Pressure:** 7,500 psi, (517 bar)

* U.S. patent 5,934,569



Twist & Dry™

Nozzle For All Your Spray Drying Needs

Unique*
“locking”
mechanism
keeps
components
securely in
place during
assembly
and change
out

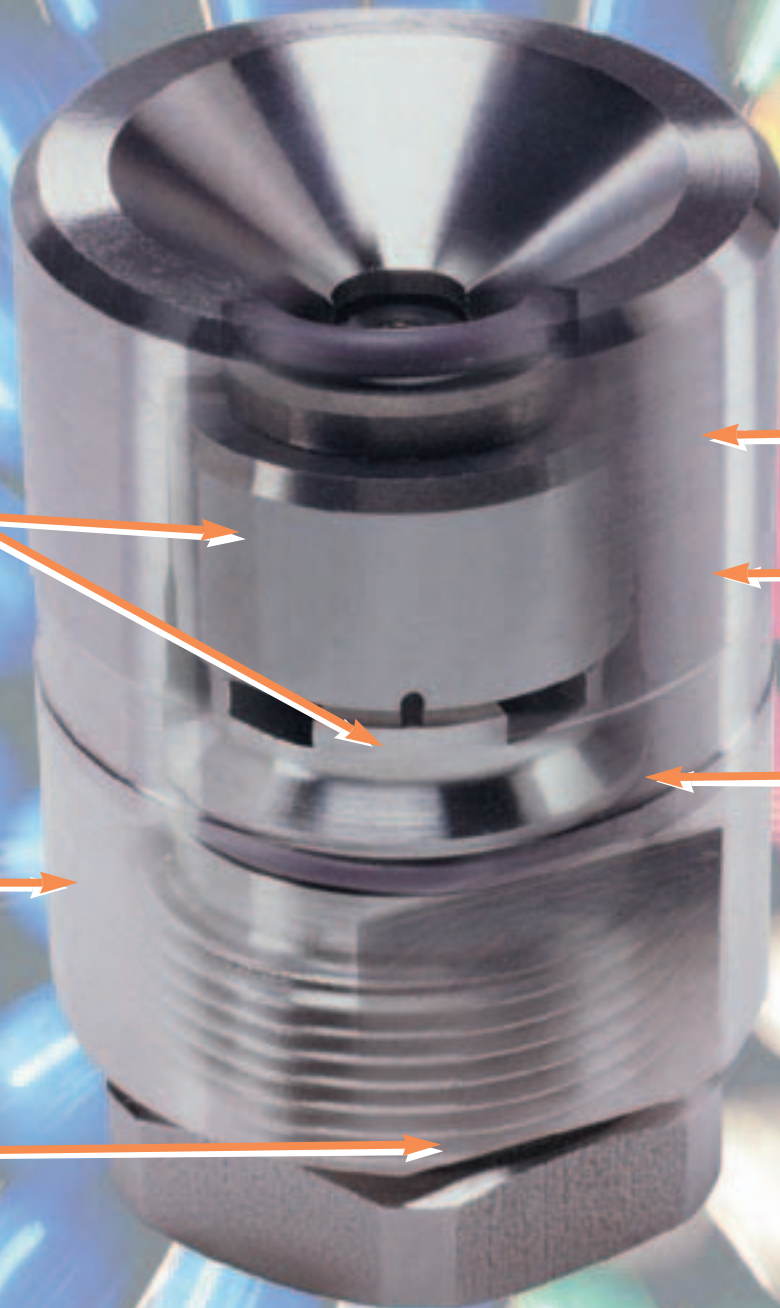
Rugged
Design

FDA
Compliant
materials for
all food
processing
applications

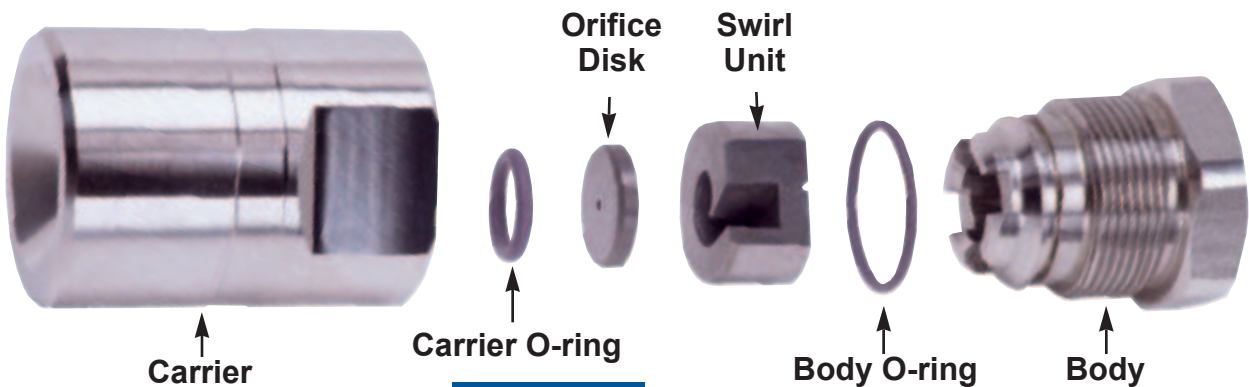
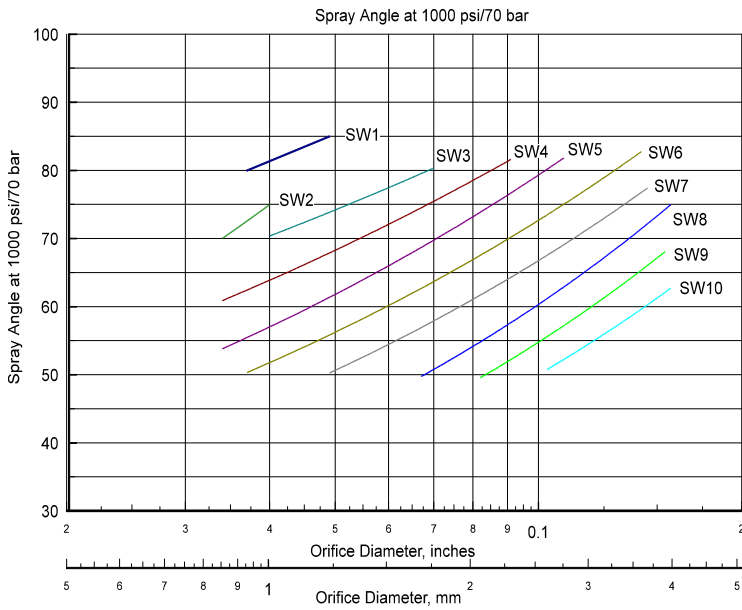
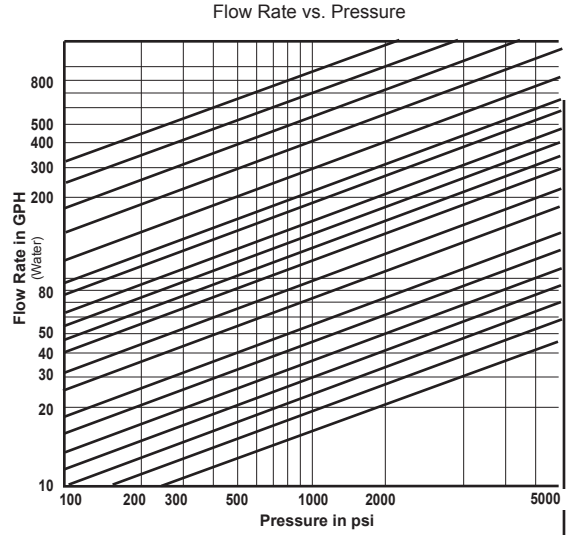
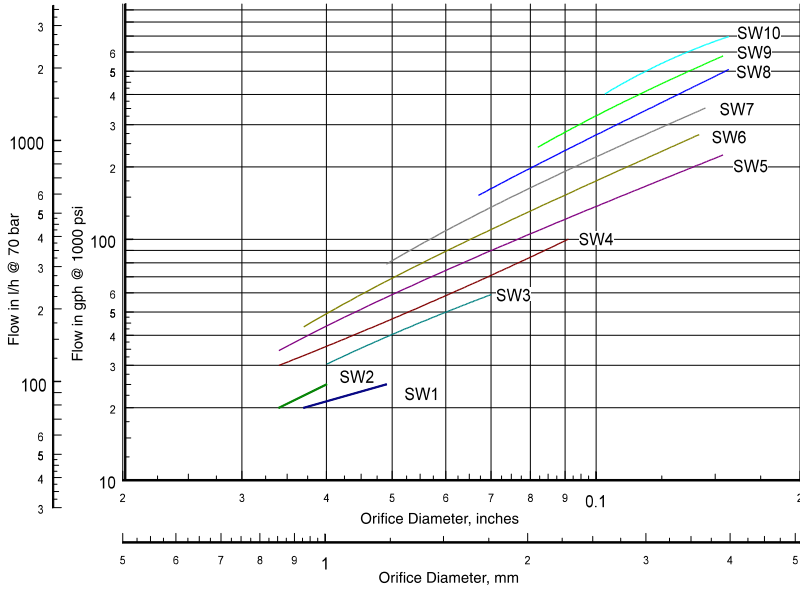
Abrasion and
corrosion
resistant
materials

One piece
swirl unit

Unobstructed
fluid passages
for clog-
resistance
and reliable
operation



Relationship of Twist & Dry™ Nozzle Design to Spray Characteristics and Performance



TD

Twist & Dry™ Hollow Cone

DESIGN FEATURES

- Patent pending locking mechanism for quick and easy change-out and maintenance.
- Female threaded or butt weld pipe connections
- Easy Assembly, no special tools required
- Orifice size: 0.034" through 0.157"
- Interchangeable swirl and orifice discs for variable patterns and flow rates

SPRAY CHARACTERISTICS

- Hollow Cone
- Flow rates:** 8.94 to 1,570 gph
- Spray Angle:** 50°, 55°, 60°, 65°, 70°, 75°, 80°

TYPICAL APPLICATIONS

Spray Drying Food, Chemicals, and Pharmaceuticals



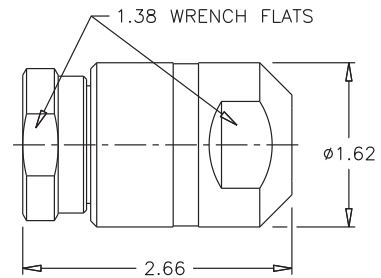
Female



70° Hollow Cone



Cutaway view of carrier showing lugs and BETE's unique locking design



TD Flow Rates and Dimensions

Hollow Cone, 50° to 80° Spray Angles, 1/4", 3/8", 1/2" and 3/4" Pipe Size NPT, BSP or Welded

Female Pipe Size	Nozzle Number	Spray Angle	Swirl	Dia. (in.)	K Factor	GALLONS PER HOUR @ PSI											
						200 PSI	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	1750 PSI	2000 PSI	2500 PSI	3000 PSI	4000 PSI	5000 PSI
	TD2-34	70°	SW2	0.034	0.632	8.94	14.1	17.3	20.0	22.4	24.5	26.5	28.3	31.6	34.6	40.0	44.7
	TD1-37	80°	SW1	0.037													
	TD2-40	75°	SW2	0.040	0.791	11.2	17.7	21.7	25.0	28.0	30.6	33.1	35.4	39.5	43.3	50.0	55.9
	TD1-49	85°	SW1	0.049													
1/4" OR	TD4-34	60°	SW4	0.034	0.949	13.4	21.2	26.0	30.0	33.5	36.7	39.7	42.4	47.4	52.0	60.0	67.1
	TD3-40	70°	SW3	0.040													
3/8" OR	TD5-34	50°	SW5	0.034	1.11	15.7	24.7	30.3	35.0	39.1	42.9	46.3	49.5	55.3	60.6	70.0	78.3
	TD4-40	65°	SW4	0.040													
1/2" OR	TD4-43	65°	SW4	0.043	1.26	17.9	28.3	34.6	40.0	44.7	49.0	52.9	56.6	63.2	69.3	80.0	89.4
	TD3-49	75°	SW3	0.049													
3/4"	TD6-37	50°	SW6	0.037	1.42	20.1	31.8	39.0	45.0	50.3	55.1	59.5	63.6	71.2	77.9	90.0	101
	TD5-40	60°	SW5	0.040													
	TD4-46	70°	SW4	0.046													
	TD3-55	75°	SW3	0.055													
	TD6-40	50°	SW6	0.040	1.58	22.4	35.4	43.3	50.0	55.9	61.2	66.1	70.7	79.1	86.6	100	112
	TD5-43	60°	SW5	0.043													
	TD4-52	70°	SW4	0.052													
	TD5-49	60°	SW5	0.049	1.74	24.6	38.9	47.6	55.0	61.5	67.4	72.8	77.8	87.0	95.3	110	123
	TD4-58	70°	SW4	0.058													
	TD3-67	80°	SW3	0.067													

$$\text{Flow Rate (GPH)} = K \sqrt{\text{PSI}}$$

Standard Materials: Stainless Steel, Tungsten Carbide. Other materials available .

TD Flow Rates and Dimensions

Hollow Cone, 50° to 80° Spray Angles, 1/4", 3/8", 1/2" and 3/4" Pipe Size NPT, BSP or Welded

Female Pipe Size	Nozzle Number	Spray Angle	Swirl	Dia. (in.)	K Factor	GALLONS PER HOUR @ PSI											Pipe Size	Wt. (oz.)	
						200 PSI	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	1750 PSI	2000 PSI	2500 PSI	3000 PSI	4000 PSI			5000 PSI
1/4" OR 3/8" OR 1/2" OR 3/4"	TD6-46	55°	SW6	0.046	1.90	26.8	42.4	52.0	60.0	67.1	73.5	79.4	84.9	94.9	104	120	134	1/4	19
	TD5-52	65°	SW5	0.052															
	TD4-61	75°	SW4	0.061															
	TD3-70	80°	SW3	0.070															
	TD6-52	55°	SW6	0.052	2.21	31.3	49.5	60.6	70.0	78.3	85.7	92.6	99.0	111	121	140	157		
	TD5-58	65°	SW5	0.058															
	TD4-70	75°	SW4	0.070															
	TD7-49	50°	SW7	0.049	2.53	35.8	56.6	69.3	80.0	89.4	98.0	106	113	126	139	160	179		
	TD6-55	60°	SW6	0.055															
	TD5-64	70°	SW6	0.064															
	TD4-76	80°	SW4	0.076															
	TD7-52	50°	SW7	0.052	2.85	40.2	63.6	77.9	90.0	101	110	119	127	142	156	180	201		
	TD6-61	60°	SW6	0.061															
	TD5-70	70°	SW5	0.070															
	TD7-58	55°	SW7	0.058	3.16	44.7	70.7	86.6	100	112	122	132	141	158	173	200	224		
	TD6-64	65°	SW6	0.064															
	TD5-76	75°	SW5	0.076															
	TD4-91	80°	SW4	0.091															
	TD7-61	55°	SW7	0.061	3.48	49.2	77.8	95.3	110	123	135	146	156	174	191	220	246		
	TD6-70	65°	SW6	0.070															
TD5-82	75°	SW5	0.082																
TD7-64	55°	SW7	0.064	3.79	53.7	84.9	104	120	134	147	159	170	190	208	240	268			
TD6-76	65°	SW6	0.076																
TD5-88	75°	SW5	0.088																
TD8-67	50°	SW8	0.067	4.74	67.1	106	130	150	168	184	198	212	237	260	300	335			
TD7-76	60°	SW7	0.076																
TD6-88	70°	SW6	0.088																
TD5-109	80°	SW5	0.109																
TD8-76	50°	SW8	0.076	5.69	80.5	127	156	180	201	221	238	255	285	312	360	402			
TD7-85	65°	SW7	0.085																
TD6-103	75°	SW6	0.103																
TD8-82	55°	SW8	0.082	6.64	93.9	148	182	210	235	257	278	297	332	364	420	470			
TD7-97	65°	SW7	0.097																
TD6-115	75°	SW6	0.115																
TD9-82	50°	SW9	0.082	7.59	107	170	208	240	268	294	317	339	379	416	480	537			
TD8-91	60°	SW8	0.091																
TD7-106	70°	SW7	0.106																
TD6-127	80°	SW6	0.127																
TD9-88	50°	SW9	0.088	8.54	121	191	234	270	302	331	357	382	427	468	540	604			
TD8-100	60°	SW8	0.100																
TD7-118	70°	SW7	0.118																
TD6-142	80°	SW6	0.142																
TD9-94	55°	SW9	0.094	9.49	134	212	260	300	335	367	397	424	474	520	600	671			
TD8-106	65°	SW8	0.106																
TD7-127	75°	SW7	0.127																
TD9-106	55°	SW9	0.106	11.1	157	247	303	350	391	429	463	495	553	606	700	783			
TD8-121	65°	SW8	0.121																
TD7-145	75°	SW7	0.145																
TD10-103	50°	SW10	0.103	12.7	179	283	346	400	447	490	529	566	632	693	800	894			
TD9-115	60°	SW9	0.115																
TD8-133	70°	SW8	0.133																
TD10-118	55°	SW10	0.118	14.2	201	318	390	450	503	551	595	636	712	779	900	1010			
TD9-127	60°	SW9	0.127																
TD8-145	70°	SW8	0.145																
TD9-136	65°	SW9	0.136	15.8	224	354	433	500	559	612	661	707	791	866	1000	1120			
TD8-157	75°	SW8	0.157																
TD9-148	65°	SW9	0.148	17.4	246	389	476	550	615	674	728	778	870	953	1100	1230			
TD10-136	60°	SW10	0.136	19.0	268	424	520	600	671	735	794	849	949	1040	1200	1340			
TD9-154	70°	SW9	0.154																
TD10-151	60°	SW10	0.151	20.6	291	460	563	650	727	796	860	919	1030	1130	1300	1450			
TD10-157	65°	SW10	0.157	22.1	313	495	606	700	783	857	926	990	1110	1210	1400	1570			

$$\text{Flow Rate (GPH)} = K \sqrt{\text{PSI}}$$

Standard Materials: Stainless Steel, Tungsten Carbide. Other materials available .

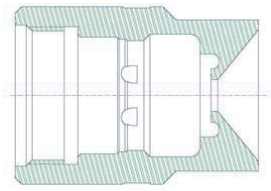
WHIRL

TO ORDER: Specify pipe size, connection type, nozzle number, spray angle, and material

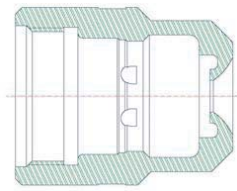
Twist & Dry™ Components & Options



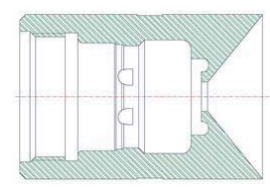
Pressure		Temperature		
bar	psi	up to 302°F (150°C)	up to 400°F (204°C)	up to 450°F (232°C)
689	10,000	TD 10K Viton 90 O-ring w/ PEEK Backup Ring Carrier in Duplex 2205 TD 10K only available in Carriers 5 and 11	TD 10K Viton 90 O-ring w/ PEEK Backup Ring Carrier in Duplex 2205 TD 10K only available in Carriers 5 and 11	TD 10K Silicone O-ring w/ PEEK Backup Ring Carrier in Duplex 2205 TD 10K only available in Carriers 5 and 11
483	7,000	TD 7K Viton 90 O-ring w/ PEEK Backup Ring	TD 7K Viton 90 O-ring w/ PEEK Backup Ring	TD 7K Silicone O-ring w/ PEEK Backup Ring
350	5,076	TD Viton 90 O-ring	TD Viton 90 O-ring	TD Silicone O-ring
241	3,500			
55	800			



Carrier 1 (C11) (shown)
Carrier 11 (C111) - without lugs



Standard TD Carrier
Carrier 2 (C12) (shown)
Carrier 5 (C15) - without lugs



Carrier 10 (C110) (shown)
Carrier 12 (C112) - without lugs

To Order: Spray Set-up Number

¼ TD 2 - 025 - C11 - 7K - 45 - B @ 7H

pipe size

series

swirl number

orifice

carrier style
omit for TDL, or standard carrier, model #2

pressure
omit for TDL or if pressure is less than or equal to 3,500 psi (241 bar)

7K if pressure is greater than 3,500 psi and less than or equal to 7,000 psi; needs PEEK backup ring

10K if pressure is greater than 7,000 psi and less than or equal to 10,000 psi; needs PEEK backup ring + Duplex 2205 carrier material

material

thread
omit if NPT

temperature
omit if temperature is less than or equal to 400°F (204°C)

45 if temperature is greater than 400°F and less than or equal to 450°F (232°C); needs Silicone O-ring

PEEK™ is a registered trademark of Victrex.

CALL 413-772-0846
 Call for the name of your nearest BETE representative.

TDL

Twist & Dry™ Low Flow Hollow Cone

DESIGN FEATURES

- Patent pending
- Locking mechanism for quick and easy change-out
- 2 piece body for easy maintenance
- Lower flow rates than TD series
- Female threaded or butt weld pipe connections
- Orifice size: 0.018" through 0.058"
- Interchangeable swirl and orifice discs for variable patterns and flow rates

SPRAY CHARACTERISTICS

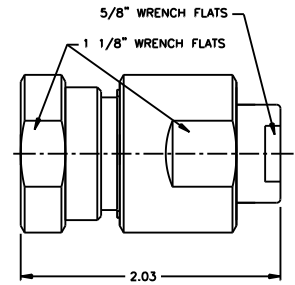
- Hollow Cone
- **Flow rates:** 2.86 to 123 gph
- **Spray angle:** 70° - 75°



Female



70° Hollow Cone



TDL Flow Rates and Dimensions

Hollow Cone, 70° to 75° Spray Angles, 1/4", and 3/8" Pipe Size NPT, BSP or Welded

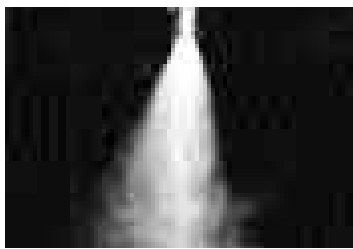
Female Pipe Size	Nozzle Number	Swirl Dia. (in.)	K Factor	GALLONS PER HOUR @ PSI												Pipe Size	Wt. (oz.)
				200 PSI	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	1750 PSI	2000 PSI	2500 PSI	3000 PSI	4000 PSI	5000 PSI		
1/4"	TDL4-18	SWL4 0.018	0.202	2.86	4.53	5.54	6.40	7.16	7.84	8.47	9.1	10.1	11.1	12.8	14.3	1/4	4.2
	TDL4-20	SWL4 0.020	0.215	3.04	4.81	5.89	6.80	7.60	8.33	9.00	9.62	10.8	11.8	13.6	15.2		
	TDL4-22	SWL4 0.022	0.237	3.35	5.30	6.50	7.50	8.39	9.19	9.92	10.6	11.9	13.0	15.0	16.8		
	TDL4-24	SWL4 0.024	0.272	3.85	6.08	7.45	8.60	9.62	10.5	11.4	12.2	13.6	14.9	17.2	19.2		
	TDL4-27	SWL4 0.027	0.316	4.47	7.07	8.66	10.0	11.2	12.2	13.2	14.1	15.8	17.3	20.0	22.4		
OR	TDL1-22	SWL1 0.022	0.348	4.92	7.78	9.53	11.0	12.3	13.5	14.6	15.6	17.4	19.1	22.0	24.6	3/8	3.8
	TDL1-24	SWL1 0.024	0.395	5.59	8.84	10.8	12.5	14.0	15.3	16.5	17.7	19.8	21.7	25.0	28.0		
	TDL1-27	SWL1 0.027	0.459	6.48	10.3	12.6	14.5	16.2	17.8	19.2	20.5	22.9	25.1	29.0	32.4		
	TDL1-30	SWL1 0.030	0.522	7.38	11.7	14.3	16.5	18.4	20.2	21.8	23.3	26.1	28.6	33.0	36.9		
3/8"	TDL2-30	SWL2 0.030	0.632	8.94	14.1	17.3	20.0	22.4	24.5	26.5	28.3	31.6	34.6	40.0	44.7	3/8	3.8
	TDL2-33	SWL2 0.033	0.712	10.1	15.9	19.5	22.5	25.2	27.6	29.8	31.8	35.6	39.0	45.0	50.3		
	TDL2-36	SWL2 0.036	0.791	11.2	17.7	21.7	25.0	28.0	30.6	33.1	35.4	39.5	43.3	50.0	55.9		
	TDL2-38	SWL2 0.038	0.838	11.9	18.7	22.9	26.5	29.6	32.5	35.1	37.5	41.9	45.9	53.0	59.3		
	TDL2-40	SWL2 0.040	0.917	13.0	20.5	25.1	29.0	32.4	35.5	38.4	41.0	45.9	50.2	58.0	64.8		
	TDL2-42	SWL2 0.042	0.949	13.4	21.2	26.0	30.0	33.5	36.7	39.7	42.4	47.4	52.0	60.0	67.1		

Flow Rate (GPH) = K PSI

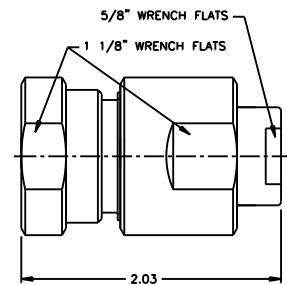
Standard Materials: Stainless Steel, Tungsten Carbide. Other materials available .

WHIRL

TO ORDER: specify pipe size, connection type, nozzle number and material.



70° Hollow Cone



TDL Flow Rates and Dimensions

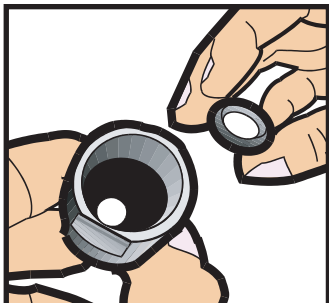
Hollow Cone, 70° to 75° Spray Angles, 1/4", 3/8", 1/2" and 3/4" Pipe Size NPT, BSP or Welded

Female Pipe Size	Nozzle Number	Swirl	Dia. (in.)	K Factor	GALLONS PER HOUR @ PSI												Pipe Size	Wt. (oz.)
					200 PSI	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	1750 PSI	2000 PSI	2500 PSI	3000 PSI	4000 PSI	5000 PSI		
1/4"	TDL2-44	SWL2	0.044	0.980	13.9	21.9	26.8	31.0	34.7	38.0	41.0	43.8	49.0	53.7	62.0	69.3	1/4	4.2
	TDL2-46	SWL2	0.046	1.03	14.5	23.0	28.1	32.5	36.3	39.8	43.0	46.0	51.4	56.3	65.0	72.7		
	TDL2-48	SWL2	0.048	1.11	15.7	24.7	30.3	35.0	39.1	42.9	46.3	49.5	55.3	60.6	70.0	78.3		
	TDL2-50	SWL2	0.050	1.15	16.3	25.8	31.6	36.5	40.8	44.7	48.3	51.6	57.7	63.2	73.0	81.6		
	TDL2-52	SWL2	0.052	1.25	17.7	27.9	34.2	39.5	44.2	48.4	52.3	55.9	62.5	68.4	79.0	88.3		
	TDL2-54	SWL2	0.054	1.30	18.3	29.0	35.5	41.0	45.8	50.2	54.2	58.0	64.8	71.0	82.0	91.7		
OR	TDL2-56	SWL2	0.056	1.33	18.8	29.7	36.4	42.0	47.0	51.4	55.6	59.4	66.4	72.7	84.0	93.9	3/8	3.8
3/8"	TDL3-50	SWL3	0.050	1.42	20.0	31.7	38.8	44.8	50.1	54.9	59.3	63.4	70.8	77.6	89.6	100		
	TDL3-52	SWL3	0.052	1.51	21.4	33.8	41.4	47.8	53.4	58.5	63.2	67.6	75.6	82.8	95.6	107		
	TDL3-54	SWL3	0.054	1.60	22.6	35.7	43.7	50.5	56.5	61.8	66.8	71.4	79.8	87.5	101	113		
	TDL3-56	SWL3	0.056	1.69	23.9	37.8	46.3	53.5	59.8	65.5	70.8	75.7	84.6	92.7	107	120		
	TDL3-58	SWL3	0.058	1.74	24.6	38.9	47.6	55.0	61.5	67.4	72.8	77.8	87.0	95.3	110	123		

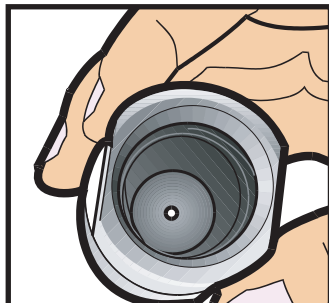
Flow Rate (GPH) = K $\sqrt{\text{PSI}}$

Standard Materials: Stainless Steel, Tungsten Carbide. Other materials available .

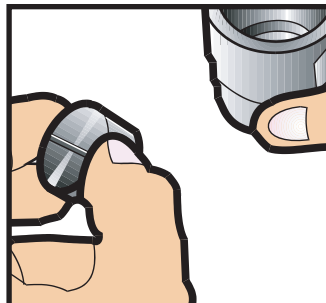
The Easiest Assembly of Any Spray Drying Nozzle Available Today



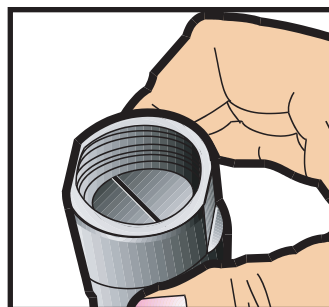
1. Place carrier o-ring into carrier



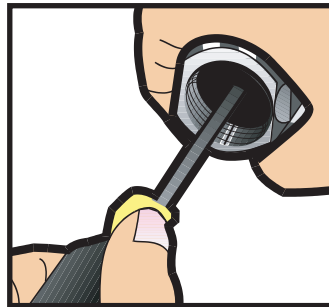
2. Place orifice disc into carrier. The polished radius side of the disc should be facing you when properly positioned.



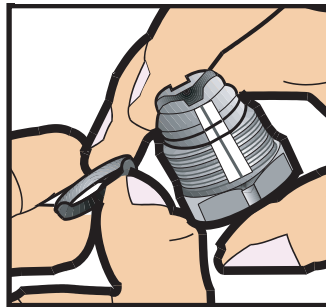
3. Place swirl chamber into carrier. Hold swirl chamber with screwdriver slot facing you. Align flat side of swirl with lugs in carrier. Drop into carrier.



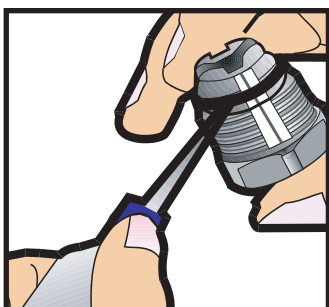
4. The swirl chamber is now ready to be "locked" into the carrier.



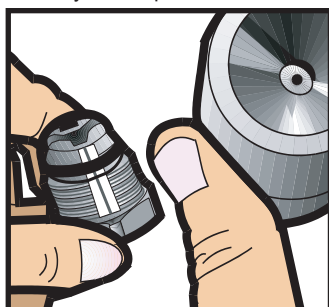
5. Use flathead screwdriver, with a slight push the swirl chamber can be twisted to 'lock' beneath the lugs. The swirl chamber and orifice disc are now securely held in place for continued



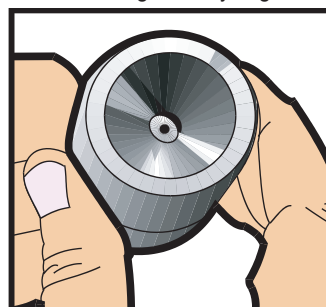
assembly. Components remain properly positioned regardless of orientation due to unique BETE locking system.



7. Although lubricating the large o-ring is not required, using the enclosed lubricant eases the last assembly step.



8. Hand tighten (25 in-lb. torque max.) the carrier to the body. (Even if the body is welded to a lance, the carrier goes on easily and the internal parts are held in their proper position.)



9. Now thread assembled TD nozzle onto system piping.



carrier



carrier o-ring



swirl disk



swirl unit



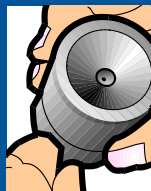
body o-ring




body

Tech Tip!

An easy way to line up the orifice disc inside the carrier is to place it on the point of a plastic rod or pencil and use the device to guide the disc into position. Then flip the carrier over and insert the swirl unit and twist.



Special TD Disassembly Tool.



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