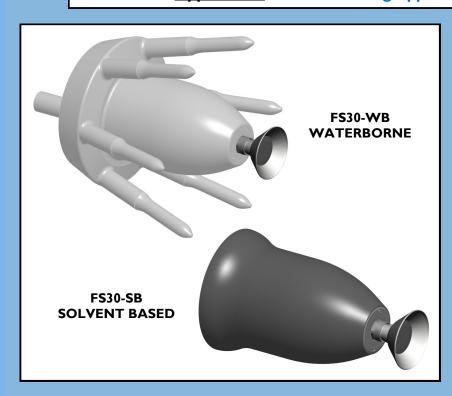


FS30 Replacement Parts

All EFC FS30 Turbine Parts
are Precision Engineered To
Provide Superior Quality and
Appearance In Your Finishing Applications.



1851 Clark Road Havre de Grace, MD 21078 USA Toll Free 1-800-365-5897 www.efcusa.com

ISO 9001:2008
Quality Management System

System Features:

- Air Bearing Motors to 85,000 rpm
- Precision Balanced, Highly Wear Resistant Titanium Bell Cups
- Valves and O-Rings (Tekrez®)
- Replacement Manifolds
- All Parts Precision CNC Machined
- High Voltage Components to I00kV
- Paint Resistant Engineered Plastic Components
- Repair Service Available on Air Motors
- Fast Delivery & Quick Turn-Around on Parts & Repairs



Introduction

EFC SYSTEMS, INC., A LEADING MANUFACTURER OF ELECTROSTATIC FINISHING SYSTEMS, INTRODUCES ITS NEW LINE OF OEM REPLACEMENT COMPONENTS. ALL OF THESE PARTS HAVE UNDERGONE A THOROUGH REVIEW, WHICH INCLUDES: US PATENT REVIEW, CUSTOMER INPUT AND EXTENSIVE TESTING.

ALL EFC PARTS, BOTH ORIGINAL AND REPLACEMENT, ARE DESIGNED AND ENGINEERED USING THE LATEST CAD SOFTWARE. THE PARTS ARE THEN MANUFACTURED IN OUR STATE-OF-THE-ART FACILITY UTILIZING HIGH END CAM SOFTWARE AND 5-AXIS CNC MACHINERY. INSPECTION AND TESTING IS AN IMPORTANT PROCESS AT EFC AND IS DONE SIMULTANEOUSLY DURING PRODUCTION WITH IN-PROCESS CHECK SHEETS AND FINAL INSPECTION. BY CONTINUOUSLY PRODUCING PARTS TO THE HIGHEST STANDARDS POSSIBLE, EFC HAS MAINTAINED ITS ISO 9001:2008 CERTIFICATION.

IT IS OUR BELIEF THAT BY DESIGNING AND MANUFACTURING HIGH QUALITY FINISHING SYSTEMS, YOU THE CUSTOMER WILL NOT ONLY PRODUCE THE BEST QUALITY PAINT FINISHES; BUT WILL ALSO SEE A CONSIDERABLE AMOUNT OF COST SAVINGS. PLEASE DO NOT HESITATE TO CONTACT US IF YOU HAVE QUESTIONS, COMMENTS OR INPUT ON HOW WE MAY BETTER SERVE YOU.

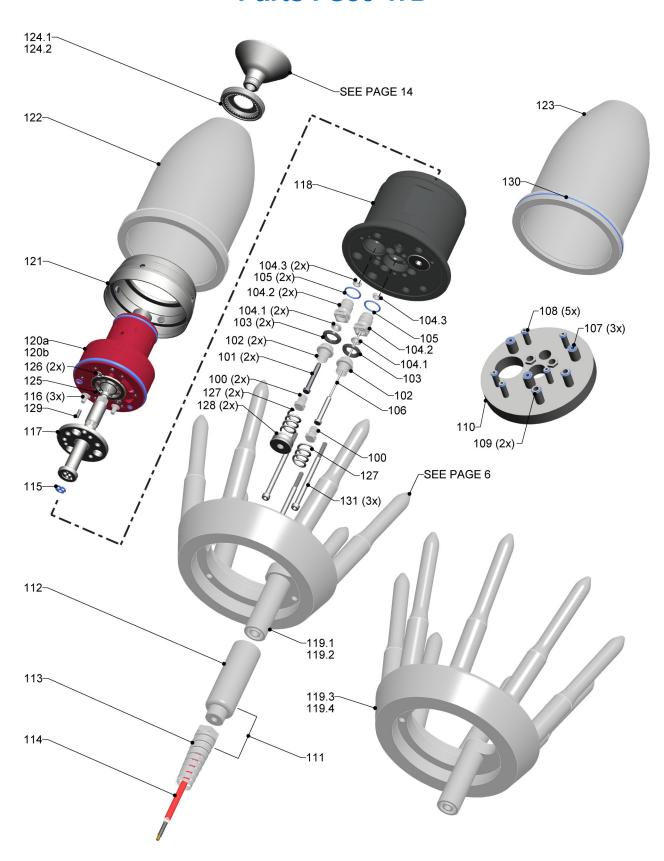
WE THANK YOU FOR YOUR SUPPORT AND WELCOME THE OPPORTUNITY TO WORK WITH YOU IN THE FUTURE.

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ALL STATEMENTS, INFORMATION, AND DATA PRESENTED HEREIN ARE BELIEVED TO BE ACCURATE AND RELIABLE BUT ARE PRESENTED WITHOUT WARRANTY, GUARANTY, OR RESPONSIBILITY OF ANY KIND, EXPRESSED OR IMPLIED. STATEMENTS OR SUGGESTIONS REGARDING POSSIBLE USE OF OUR PRODUCTS ARE MADE WITHOUT REPRESENTATION OR WARRANTY THAT ANY SUCH USE IS FREE OF PATENT INFRINGEMENT, AND WE ARE NOT INTENDING TO INFRINGE ON ANY PATENT. THE USER SHOULD NOT ASSUME THAT ALL SAFETY MEASURES ARE INDICATED OR THAT OTHER MEASURES MAY NOT BE REQUIRED. TEKREZ IS A REGISTERED TRADEMARK OF EFC SYSTEMS, INC.

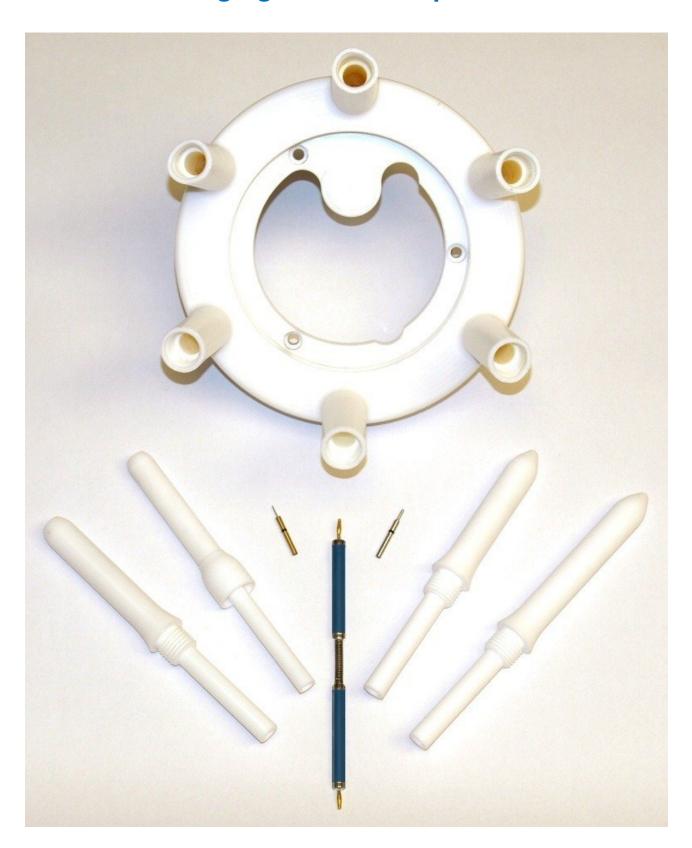
Parts FS30-WB



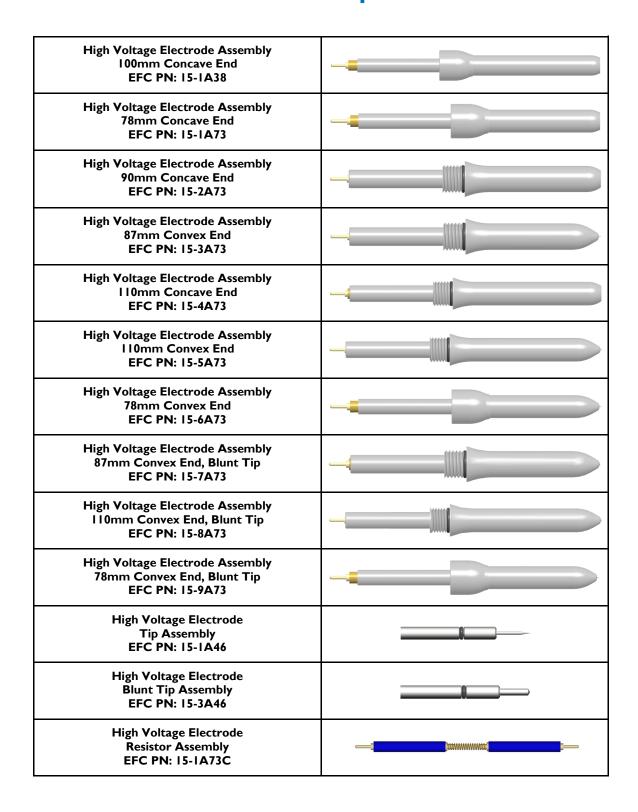
Parts FS30-WB (cont.)

	1 411 555 112 (55	,	
ltem #	Description	EFC Part #	OEM Part #
100	Control Unit	15-1A49	M06040014
101	Needle	I5-IA4I	M32020055
102	Piston	I5-IA43	M67010011
103	Piston Packing	I5-IA44	M08050015
104.1	Needle Packing, Pneumatic Side	15-2A44	M08130027
104.2	Packing Screw	I5-IA42	M08160006
104.3	Needle Packing, Fluid Side	I5-2A45	M08130006
105	O-Ring, Tekrez®	1615CR	M08030240
106	Main Needle	I5-IA48	M32020054
106A	Main Needle w / DLC Coating	15-1A05	N/A
107	Packing Ring Flat Washer, Tekrez®	15-1A62	M08010113
108	O-Ring, Tekrez®	4015CR	M08030296
109	O-Ring, Tekrez®	7015CR	M08030297
110	Connecting Flange	15-1A03	N34730016
111	H.V. Protection Assembly	15-1A71	M01530005
112	H.V. Protection Tube	15-1A71A	N/A
113	H.V. Protection Hose Guard	15-1A71B	N/A
114	H.V. Cable	60-IAI3	N/A
115	Flat Packing Gasket, Tekrez®	15-1A20	M08090062
116	Screw, Nylon, Oval Slotted	510NSO	D09640036
117	Flange Plate	15-1A07	M39120015
118	Control Valve Body	15-1A34	M16020131
119.1	Charging Device, Complete, 6 Probe	15-1A39	N72020006
119.2	Charging Device, Less Electrodes, 6 Probe	15-1A39A	M35010142
119.3	Charging Device, Complete, 8 Probe	15-1A06	N72020005
119.4	Charging Device, Less Electrodes, 8 Probe	15-1A06A	M35010128
20a 20b	Air Bearing Motor Unit With Fluoroelastomer O-Rings Air Bearing Motor Unit With Perfluoroelastomer O-Rings	13-1A50 13-1A50CR	N21010101
121	Union Ring	15-1A31	M30010143
122	Atomizer Housing	15-1A32	M16040026
123	Atomizer Housing w/Shaping Air Ring, 40 Hole (Includes o-ring)	15-1A63	M16040049
124.1	Shaping Air Ring, 40 Hole	15-1A35	M35020022
124.2	Shaping Air Ring, 30 Hole	15-2A35	M35020028
125	Brush Ring	15-2A31	M35010122
126	Screws, Brush Ring	306BHCSZ	M41230021
127	Control Valve Spring	15-2A28	M68010005
128	Control Valve Cavity Cover	15-2A64	M63010178
129	Flange Plate Spring	15-1A07S	M68010015
130	O-Ring, Tekrez®	8120CR	
131	Screw, SS Socket Head Cap	590SSC	D09120212
Not shown	Bell Repair Kit (Includes Items: 3 pcs each—100, 102, 103, 104.1, 104.2, 104.3, 105, 2 pcs—101 & 1 pc—115	I5-2A48	N/A

Charging Device Components

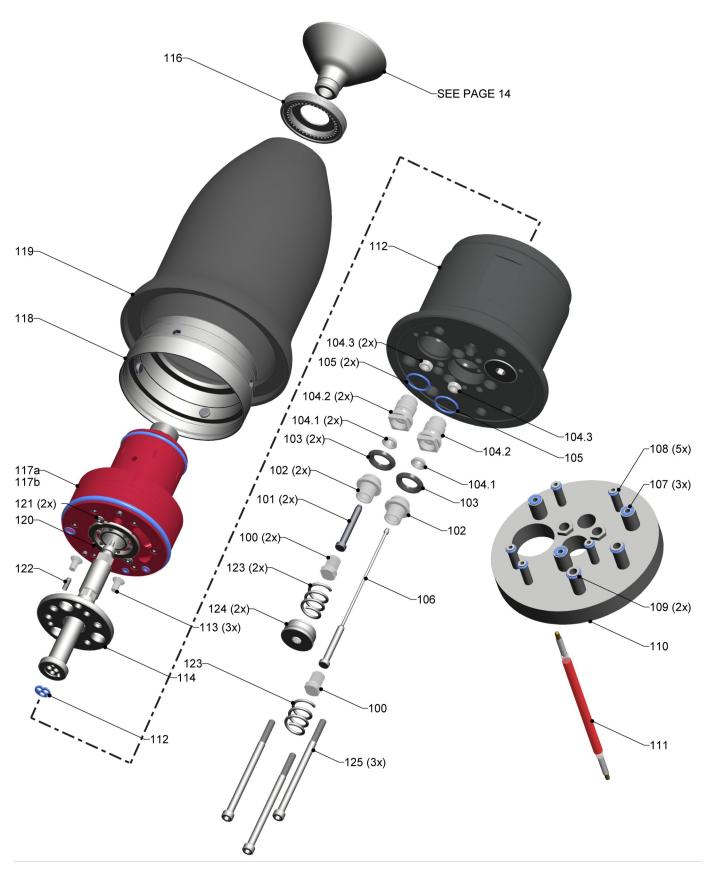


Parts FS30-WB (cont.) Electrode Options



Page 7

Parts FS30-SB



Parts FS30-SB (cont.)

100 101 102	Description Control Unit Needle Piston	I5-IA49	OEM Part # M06040014
101	Needle	_	M06040014
-		5- A4	
102	Distan	1	M32020055
	FISCOII	15-1A43	M67010011
103	Piston Packing	15-1A44	M08050015
104.1	Needle Packing, Pneumatic Side	I5-2A44	M08130027
104.2	Packing Screw	I5-IA42	M08160006
104.3	Needle Packing, Fluid Side	15-2A45	M08130006
105	O-Ring, Tekrez®	1615CR	M08030240
106	Main Needle	15-1A48	M32020054
106A	Main Needle w / DLC Coating	15-1A05	N/A
107	Packing Ring Flat Washer, Tekrez®	15-1A62	M08010113
108	O-Ring, Tekrez®	4015CR	M08030296
109	O-Ring, Tekrez®	7015CR	M08030297
110	Connecting Flange	15-1A04	N34730014
111	H.V. Cable	60-IAI3	N/A
112	Flat Packing Gasket, Tekrez®	15-1A20	M08090062
113	Screw, Nylon, Oval Slotted	510NSO	D09640036
114	Flange Plate	15-1A07	M39120015
115	Control Valve Body	15-1A34	M16020131
116	Shaping Air Ring, 40 Hole	15-1A36	M35020026
117a 117b	Air Bearing Motor Unit With Fluoroelastomer O-Rings Air Bearing Motor Unit With Perfluoroelastomer O-Rings	13-1A50 13-1A50CR	N21010101
118	Union Ring	15-1A31	M30010143
119	Atomizer Housing	15-1A33	M16040026
120	Brush Ring	15-2A31	M35010122
121	Screws, Brush Ring	306BHCSZ	M41230021
122	Flange Plate Spring	15-1A07S	M68010015
123	Control Valve Spring	15-2A28	M68010005
124	Control Valve Cavity Cover	15-2A64	M63010178
125	Screw, SS Socket Head Cap	590SSC	D09120212
Not shown	Bell Repair Kit (Includes Items: 3 pcs each—100, 102, 103, 104.1, 104.2, 104.3, 105, 2 pcs—101 & 1 pc—112)	I5-2A48	N/A

Atomizer Parts



Air Bearing Motor Overview





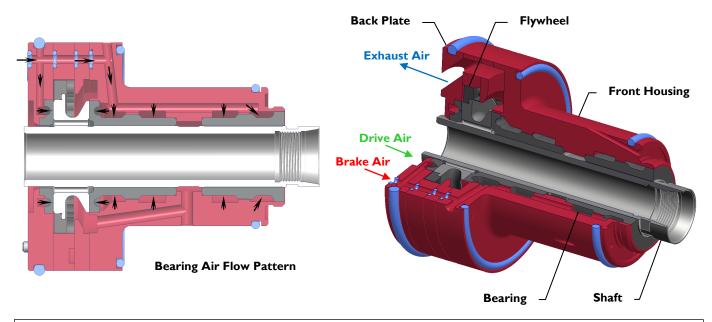
The EFC Air Bearing Motor has been re-engineered to provide greater performance and reliability while at the same time reducing the amount of drive air needed to attain desired speeds up to 85,000 rpm.

With this new design, field repairs made by customers are much easier, faster and more reliable.

- Speeds Exceeding 85,000 rpm (no load)
- Replaces Both Blue and Black OEM Motors
- Self-Lubricating Orifice Bearings
- Available For Either Microphone or Fiber Optic Speed Control
- Rapid Acceleration and Braking Capability
- Reduced Drive Air Consumption
- Balanced to G0.4 Specification
- Complete Motor Replacement Warranty for I Year
- Motor Exchange Program Available—See Your Local Representative For Details

Air Bearing Motor Operation

See Technical Manual 80-13-1A50 for a complete motor description.



The motor is of the orifice bearing type that allows the shaft/flywheel/bell cup assembly to "float" frictionless on a thin film of air. Drive air (DA), brake air (BR), turbine exhaust (EX) as well as the bearing air (BE) are supplied to the motor assembly via the back plate.

All air supplied to the motor should be clean, dry and filtered to 5 micron. It is recommended that Teflon® tape not be used on any of the fittings leading to the back plate, because of possible bearing air contamination.

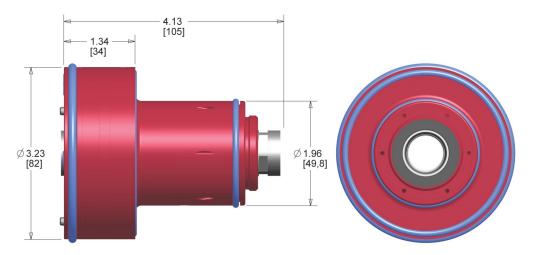
Bearing Air at 90 psi minimum must be supplied at all times during motor operation. It is not advisable to rotate the shaft of the motor assembly by hand without a bearing air supply.

Weight: 1.8 lbs. [0.82 kg]

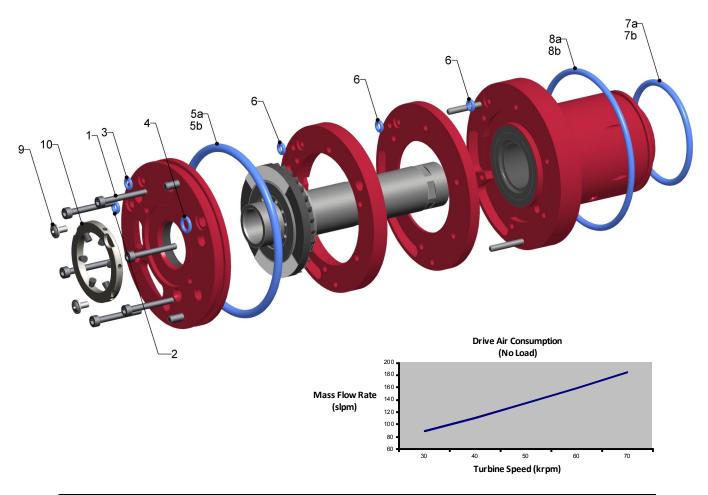
Materials: Aircraft Grade Aluminum

Stainless Steel

Carbon Orifice Bearings
Chemically Resistant O-Rings



Air Bearing Motor Components



Item #	Qty	Description	EFC Part #	OEM Part #
1	6	Screw, SS, Socket Head Cap	325SSC	
2	1	O-Ring, Tekrez®	3617CR	
3	1	O-Ring, Tekrez®	2917CR	M08030252
4	1	O-Ring, Tekrez®	5217CR	
5a 5b	1	O-Ring, Fluoroelastomer O-Ring, Tekrez®	7540VR 7540CR	M08030257 M08030300
6	3	O-Ring, Tekrez®	3116CR	
7a 7b	1	O-Ring, Fluoroelastomer O-Ring, Tekrez®	4630VR 4630CR	M08030255 M08030298
8a 8b	1	O-Ring, Fluoroelastomer O-Ring, Tekrez®	7230VR 7230CR	M08030256, M08030444 M08030299
9	2	Screw, Button Head Cap, Zinc	306BHCSZ	M41230021
10	1	Brush Ring	15-2A31	M14230021

Bell Cups



EFC bell cups are designed and manufactured to the highest quality standards and are available in wear resistant titanium. Their unique screw-in insert design allows for quick assembly / disassembly as well as ease of cleaning.

Other features include: efficient external bell wash, abrasion resistant coating for extreme wear and an array of serration styles such as straight, cross (diamond) and bi-directional (upon request).

- Speeds up to 85,000+ rpm
- 30, 55, 65 mm outer diameter
- Serrated, Non-Serrated, Super Round options
- Titanium for Waterborne & Powder Slurry
- Titanium for Clear Coat
- Unique Center Wash
- Balanced to G2.5 Specification
- Patent # 6,341,734

Bell Cup Options

Bell Cup Diameter (mm)	EFC PN Description	EFC	Insert	OEM PN
	25-1A83 Titanium No Serrations	7617CR O-Ring	25-1A83C Insert & O-Ring	N 1601 5374
30	25-1A83K Titanium Straight Serrations	7617CR O-Ring	25-1A83C Insert & O-Ring	14 1001 5574
	25-4C10 Titanium No Serrations	1015CR O-Ring	25-4C10B Insert & O-Ring	N 1601 0038 N 1601 0044 N 1601 0046 N 1601 0050
	25-4C10K Titanium Straight Serrations	1015CR O-Ring	25-4C10B Insert & O-Ring	N 1601 0037 N 1601 0043 N 1601 0045 N 1601 0049
55	25-4C10DK Titanium Cross Serrations	1015CR O-Ring	25-4C10B Insert & O-Ring	N 1601 0033 N 1601 0058
	25-1A88 Titanium No Serrations	1015CR O-Ring	25-IA88E Insert & O-Ring	N 1601 0048 N 1601 0052 N 1601 0059
	25-1A88K Titanium Straight Serrations	1015CR O-Ring	25-IA88E Insert & O-Ring	N 1601 0047 N 1601 0054 N 1601 0060
	25-IA88DK Titanium Cross Serrations	1015CR O-Ring	25-IA88E Insert & O-Ring	N 1601 0061
65	25-1A97X Titanium No Serrations	1015CR O-Ring	25-4C10ZC Insert & O-Ring	N 1601 0048 N 1601 0052 N 1601 0059

Bell Cups (cont.)



(12) United States Patent Van Der Steur

US 6,341,734 B1 (10) Patent No.: (45) Date of Patent: Jan. 29, 2002

ROTARY ATOMIZER AND BELL CUP AND METHODS THEREOF

- Gunnar Van Der Steur, Churchville, (75) Inventor: MD (US)
- EFC Systems, Inc., Havre de Grace, (73)Assignee: MD (US)
- Subject to any disclaimer, the term of this (*) Notice: patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/691,198
- Filed: Oct. 19, 2000 (22)
- 239/224
- 239/220, 223, Field of Search 239/224, 112, 104, 106, 214.25, 290, 296, 700, 703, 222; 285/243, 255, 322, 323, 242; 137/360

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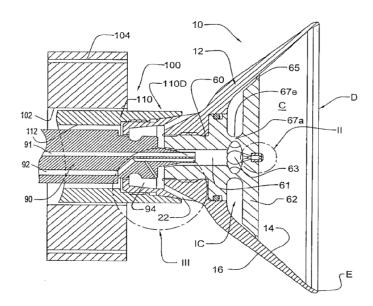
^{*} cited by examiner

Primary Examiner-David A. Scherbel Assistant Examiner—Davis Hwu
(74) Attorney, Agent, or Firm—Foley & Lardner

ABSTRACT

A rotary atomizer for a coating apparatus has a bell shaped body, e.g., a bell cup, having a cavity and a detachable flow control device, e.g., face cover, that substantially closes a portion of the cavity. The two-piece construction eases maintenance, such as cleaning, and the manufacturability since the inside the bell cup is easily accessible from the mouth (wider opening) of the bell cup. After the face cover is detached, it can be reused or discarded for a new one. The bell cup further has cleaning channels that can direct cleaning agent directly onto the outer surface of the bell cup, without any reservoir or the like that can accumulate coating material.

50 Claims, 6 Drawing Sheets



Bell Cup Performance Data

Summary

EFC focuses on producing bell cups made primarily of titanium. Titanium is the material of choice for our bell cups because of its durability, low weight and high strength characteristics. These bells are direct replacements to OEM cups.

During the month of November 1999, the EFC staff of engineers, technicians, machinists and sales personnel, performed numerous tests on EFC and OEM bell cups to form a comparison. It was our hope that by bringing together such a wide variety of backgrounds, we would better understand the results.

The tests were performed in a fair and unbiased manner under controlled environmental conditions. These results are a comparison only, and EFC realizes that the final test is the one performed during actual production runs by our customers.

The bells were judged based upon:

- 1. Performance: Vibration, Speed under load, Ease of cleaning
- 2. Physical Characteristics: Size, Weight, Material
- 3. Atomization: Particle Size Distribution, Transmission

Test Results

Performance

	Vibration (mils x 10)	Speed Under Load (rpm)	Ease of Cleaning
EFC	.10	45,000	Excellent
OEM	.12	45,000	Fair

Performance Data (cont.)

Physical Characteristics

	Bell Cup Diameter (mm)	Weight (gr)	Material
EFC	65	54	Titanium
OEM	54	40	Titanium

Atomization

EFC utilizes its own in-house laser particle sizer. This Insetec® particle size analyzer displays graphically, the particle size distribution of an atomized spray. Two different paints were sprayed during testing:

- I. DuPont Waterborne Basecoat Red WA7475 WBBC
- 2. BASF Platinum WB/MS4 (data shown below)

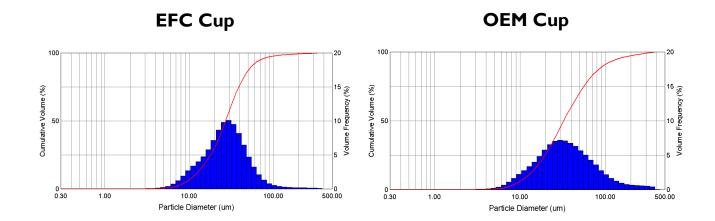
To insure accurate readings, (3) three trials were run for each bell at (2) two minutes per test run with the third being the one recorded on page 18.

The graphs display Volume Frequency (%) and Cumulative Volume (%) vs. Particle Diameter (μ m). The data taken are also displayed in a tabular form below the graphs.

The data shown indicate that the EFC cup produces a smaller and more uniform particle size distribution than the OEM cup.

Performance Data (cont.)

Atomization (cont.)

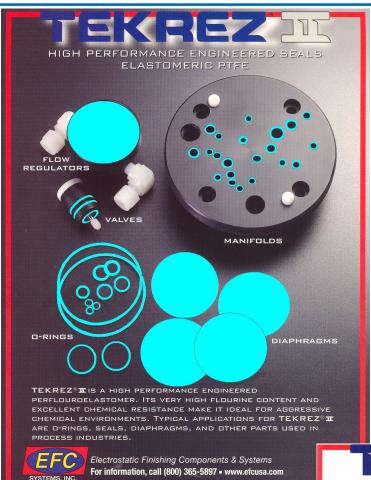


EFC is committed to producing the best rotary atomizer system possible, beginning with the bell cup. We have closely examined the bell cups that are currently available from the leading manufacturers. We chose the OEM bell cup for our study because it represents the market majority of bell cups currently in operation. In order to gain a better understanding of bell cup operation and design, we based our study on Performance, Physical and Atomization Characteristics. In conclusion of our study, the EFC bell cup is superior to the OEM bell cup in all three areas, at a lower price.

	AVI	RAGE	STANDARD DEVIATION		RD DEVIATION MAX		MIN	
TITLE	EFC	OEM	EFC	OEM	EFC	OEM	EFC	OEM
TRANSMISSION	48.31	61.44	3.08	4.37	59.75	69.15	41.27	50.70
Dv(10) (μm)	12.48	13.13	0.75	0.77	14.03	14.72	10.90	11.91
Dv(50.0) (μm)	29.28	33.94	1.75	1.63	32.38	37.60	25.90	30.73
Dv(90.0) (μm)	55.48	81.00	3.09	9.89	59.78	105.81	48.44	68.62

Tools

EFC Tool	EFC PN	OEM PN
Valve Wrench	N/A	W11010005
Motor Shaft Wrench	TL-IA3I	W09020003
Bell Cup Insert Tool	TL-1A28-4	N/A



Tekrez® Components

TEKREZ III

HIGH PERFORMANCE ENGINEERED SEALS ELASTOMERIC PTFE.

TEKREZ® IS AVAILABLE IN MOST O-RING SIZES, AND MOST STANDARDS INCLUDING AS-568A, ISO AND JIS METRIC SIZES, CUSTOM O-RINGS AND OTHER SHARES, INCLUDING DIAPHRAGMS, VALVE SEATS, AND TUBING, ARE ALSO AVAILABLE, TEKREZ® IS COMPATIBLE IN MOST CHEMICAL ENVIRONMENTS AS A REPLACEMENT TO KALREZ®, ZALAK®, AND CHEMRAZ®.

PROPERTIES		OR RESERVOY THAT ANY RESERVE AS A THE OF PARTY REPRESENTATION. AND THE ARE THE PARTY THAT IS NOT THE OWN THAT AND THE PARTY THAT IS NOT THAT AND THE PARTY THAT IS NOT THAT IS		
COMPOUND NO.	UNITS	100PT.		
TYPICAL PHYSICAL PROPERTIES				
SPECIFIC GRAVITY	Б/СМЗ	2.15		
TENSILE STRENGTH	PSI.	2,700		
HARDNESS, SHORE A	POINTS	78		
ULTIMATE ELONGATION	%	220		
100% MODULUS	PSI.	780		
TR-10	°F	-5		
TR-30	°F	+ 1		
TR-50	°F	+4		
TR-70	°F	+7		
ESTIMATED SERVICE TEMPERATU	RE			
LOW TEMPERATURE LIMIT	°F	-20		
HIGH TEMPERATURE LIMIT	°F	450		
COMPRESSION SET (ASTM395 ME	ETHOD B)			
70 HRS @ 73°F	96	10		
70 HRS @ 392°F	96	12.3		

CHEMICAL COMPATIBILITY OF:

AROMATICS	BENZENE, XYLENE, STYRENE, TOLUENE, ETG.
ALCOHOLS	ETHYLENE GLYCOL, PHENOL, METHANOL, ETC.
ALDEHYDES	FURFURAL, FORMALDEHYDE, BUTYRALDEHYDE, ETG.
KETONES	ACETONE, METHYL ETHYL KETONE (MEK),
	METHYL ISOBUTYL KETONE, (MIBK), ETC.
SOLVENTS	METHYLENE CHLORIDE, DIMETHYL FORMAMIDE, N-METHYL,
	PYRROLIDONE (NMP), ETC.
INORGANIC ACIDS	SULFURIC, NITRIC, HYDROCHLORIC, ETC.
ORGANIC ACIDS	ACETIC, ADIPIC, FORMIC, ETC
INORGANIC BASES	SODIUM HYDROXIDE, AMMONIA, ETC.
ORGANIC BASES	ETHYLENE DIAMINE, DIETHANDLAMINE, ETC.
ETHERS	TETRAHYDROFURAN, DIMETHYL ETHER, DIOXANE, ETC.
ESTERS	VINYL ACETATE, BUTYL ACETATE, ETC.
ORGANIC	DIMETHYL TEREPHTHALATE, ETHYLENE DICHLORIDE, ADIPONITRILE, ET
INTERMEDIATES	

NOTE: KALREZ" AND ZALAK" ARE REGISTERED TRADEMARKS OF DUPONT. CHEMRAZ" IS A REGISTERED TRADEMARK OF GREENE TWEED



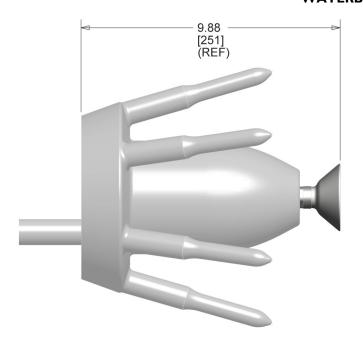
Electrostatic Finishing Components & Systems

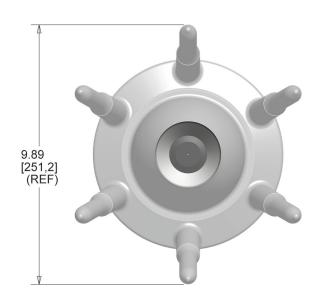
(800) 365-5897 = www.efcusa.com = Fax: (410) 939-7160

1325 Post Road ■ Havre de Grace, MD 21078

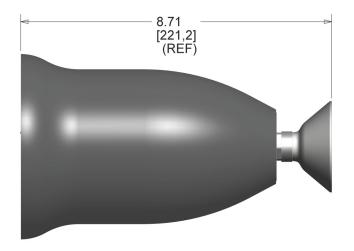
FS30 Overall Size

FS30-WB WATERBORNE





FS30-SB SOLVENT BASED





Notes

