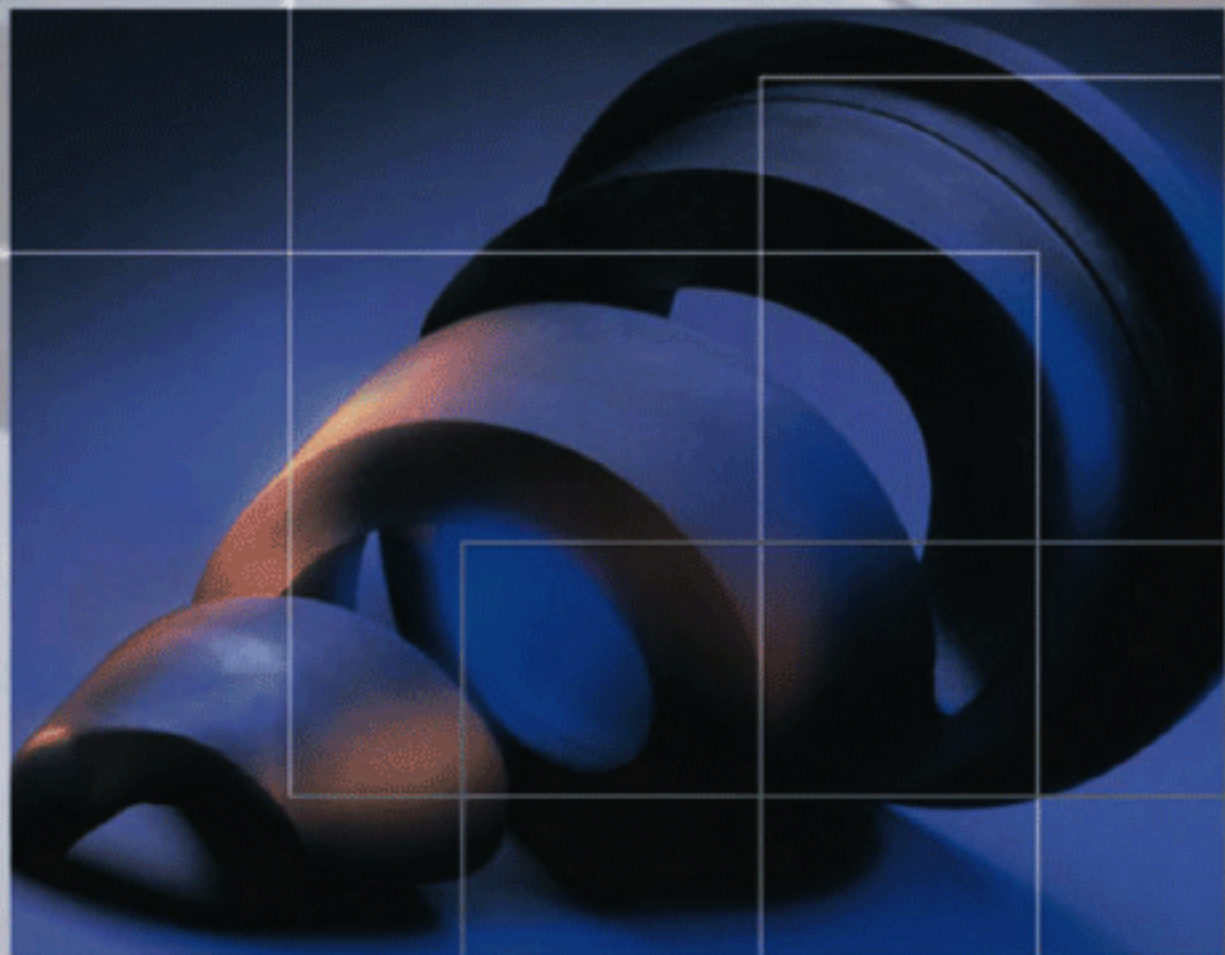


FUE GAS DESULPHURIZATION

Silicon Carbide for **Extreme**



For your toughest
nozzles application,
Call (85) 67741828

WE Series Nozzles



WEAR APPLICATIONS



NITRIDE BONDED SILICON CARBIDE

Nitride Bonded Silicon Carbide is a water based thixotropic compound with several different grit sizes of silicon carbide and silicon oxide particles. A ceramic material with excellent resistance to corrosion, chemical inertness and abrasion. The mixture of high purity Silicon Carbide grains, alumina fine powder, silicon metal powder and other compound goes through a sintering process at 1400 to 1500 degrees C, during which the furnace is filled with pure nitrogen. The silicon reacts with the nitrogen to generate Si₃N₄, producing a two phase composite of 75% SiC and 23% Si₃N₄.

Properties

Maximum Bulk Density	: 2.6 gm/cc
Apparent Porosity	: approximately 15 to 16%
Average Modulus of Rupture	: 7,000 psi +/- 1,000 psi
Average Crushing Strength	: approximately 20,000 psi

NSIC has the properties of high strength, strong oxidation resistance ability. It can withstand high operating temperature up to 1450 deg C

REACTION BONDED SILICON CARBIDE

Reaction Bonded Silicon Carbide is a formulation of finer particle sizes of silicon carbide with carbon into a homogeneous mixture. Fired at high temperature in the presence of silicon, the vapour silicon penetrated the compound reacting with the carbonaceous contents, thereby achieving thorough filling of all porosity in the molecular structure with silicon carbide. The characteristics of fine molecular grain structure is smooth and uniform as a result.



Properties

Maximum Bulk Density	: 3.0 gm/cc
Apparent Porosity	: 0 (Zero) gm/cc
Average Modulus of Rupture	: 50,000 psi +/- 3,000 psi
Average Crushing Strength	: approximately 320,000 psi

With zero apparent porosity at molecular level, the bulk density (gm/cc) and the crushing strength (psi) is many times higher. These features allow spiral nozzles to be manufactured in intricate designs of sharp edges and precise dimensional accuracy. Complex shapes with higher strength capability to take on the most demanding of FGD conditions.



WILSON ABSORBER NOZZLE



SPRAY CHARACTERISTICS

Uniform distribution of Spray Droplets
 Large Flow Passage. No internal vanes. Spray angle from 90 to 120 degrees
 Single or Twin Tangential Discharge

MATERIALS OF CONSTRUCTION

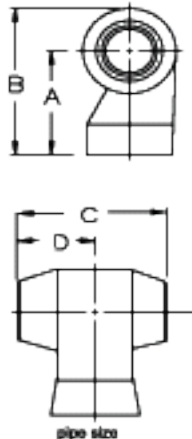
One piece construction.
 No clog and no internal parts
 Material in Nitride Bonded Silicon Carbide (NSIC) and Recrystallized Silicon Carbide.
 Connections in Flange, thread, bell & spigot joint, butt joint.
 Epoxy adhesive for bonding Fiberglass Reinforce plastic pipe.
 Single cast from nitrogen fired furnace
 Flow-rate from 86.6 to 3499 litres per minute
 Size range from 2 to 4 inches



ORDERING METHOD

Model : 4WE483SIC(Twin)120

Size : 4 inch diameter
 Nozzle Number : WE483
 Material : Silicon Carbide (NSIC)
 Twin : Double Tangential Discharge
 Spray Angle : 120 degrees Hollow Cone
 Connection : Laminated or Flange or Thread (NPT or BSP).



Maximum Recommended Pressure: 5 Bar.G.
 Maximum Recommended Temperature: 1650 deg C.

$$Flow Rate (l/min) = K \sqrt{\text{bar}}$$

FLOW RATES AND PRESSURE CHARACTERISTICS - Hollow Cone 90 degrees or 120 degrees

Female Pipe Size	Nozzle Number	K Factor	LITERS PER MINUTE @ BAR								Approx Orifice Dia. (mm)	Free Pass. Dia. (mm)	Dimensions (mm)				Wt. (kg)
			0.2 bar	0.3 bar	0.5 bar	0.7 bar	1 bar	1.5 bar	2 bar	3 bar			A	B	C	D	
2	WE 54	194	88.8	106	137	162	194	237	274	336	21.8	21.8	91.8	130	106	62.7	2.2
	WE 63	239	107	131	169	200	239	290	308	414	25.4	25.4					
	WE 75	285	127	156	201	238	295	349	403	490	29.0	29.0					
	WE 88	330	148	181	234	276	330	405	467	572	32.1	32.1					
	WE 100	387	173	212	274	324	387	474	548	671	35.3	35.3					
	WE 112	438	196	240	309	366	438	536	619	758	38.5	38.5					
	WE 122	467	209	256	330	391	467	572	661	809	41.3	36.5					
	WE 144	524	234	287	371	439	524	642	741	906	44.5	36.5					
2 1/2	WE 156	367	173	212	274	324	387	474	548	671	33.7	33.7	126	172	130	77.7	3.4
	WE 168	433	194	237	306	362	433	530	612	750	36.1	36.1					
	WE 180	467	209	256	330	391	467	572	661	809	37.3	37.3					
	WE 192	524	234	287	371	439	524	642	741	906	40.1	40.1					
	WE 204	638	285	349	451	534	638	781	902	1105	46.0	44.5					
	WE 216	729	326	399	516	610	729	899	1030	1293	51.2	44.5					
	WE 228	775	347	424	548	648	775	949	1096	1342	53.2	44.5					
	WE 240	991	443	543	701	829	991	1214	1402	1717	61.9	44.5					
3	WE 252	422	189	231	298	353	422	516	596	730	32.5	32.5	146	200	153	66.9	5.5
	WE 264	524	234	287	371	439	524	642	741	906	36.5	36.5					
	WE 276	638	285	349	451	534	638	781	902	1110	41.3	41.3					
	WE 288	729	326	399	516	610	729	899	1030	1299	45.2	45.2					
	WE 300	775	347	424	548	648	775	949	1100	1340	46.8	46.8					
	WE 312	939	420	514	664	786	939	1150	1330	1630	53.6	53.6					
	WE 324	1070	478	585	756	894	1070	1310	1510	1850	57.9	54.0					
	WE 336	1200	536	657	848	1000	1200	1470	1700	2090	63.1	54.0					
WE 348	1290	575	704	909	1060	1290	1570	1820	2230	65.9	54.0						
4	WE 483	1384	585	758	982	1144	1384	1728	2098	2598	70.0	54.0	178	282	253	127	7.5
	WE 597	1539	667	843	1081	1261	1545	1941	2396	2965	83.0	54.0					
	WE 613	2020	734	1027	1334	1578	1820	2415	2957	3499	95.0	54.0					

DESIGN SPECIFICATION:

Nozzles are designed in accordance to ASTM E799-92 (Pre-approved 1998) as per "STANDARD PRACTICE FOR DETERMINING DATA CRITERIA AND PROCESSING FOR LIQUID DROP SIZE ANALYSIS"

XT

High Flow - Full Cone Wear Resistant

DESIGN FEATURES

- Recrystallized Silicon Carbide or Cobalt Alloy 6
- High energy efficiency
- No internal parts
- Clog-resistant
- Connections to FRP pipe by flange, lamination overlay or clamp.

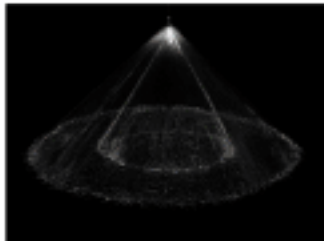
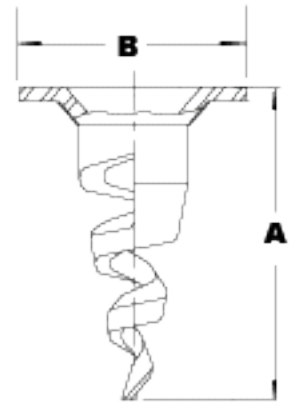
SPRAY CHARACTERISTICS

- Fine atomization
- Spray pattern:** Full Cone / Hollow Cone

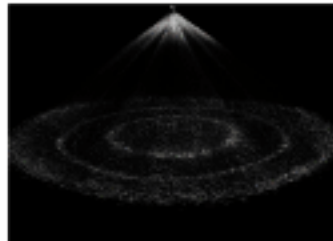
Spray angles: 90° and 120° standard

Flow rates: 2.26 to 10700 l/min

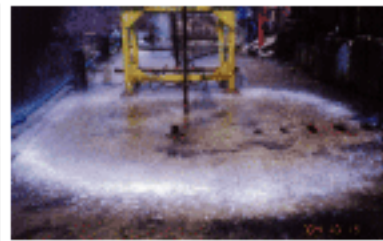
$$\text{Flow Rate (l/min)} = K \text{ bar}$$



90 degrees Full Cone



120 degrees Full Cone



HOLLOW CONE SPRAY

XT FLOW RATES AND DIMENSIONS

Full Cone, 90 degrees or 120 degrees Full Cone or Hollow Cone spray

Size	Nozzle Number	K Factor	LITERS PER MINUTE @ BAR								Approx. (mm) Free Orifice Pass.		Approx. Dimension (mm)		Wt. (kg) Male
			0.5 bar	0.7 bar	1 bar	2 bar	3 bar	5 bar	10 bar	20 bar	Di.	Di.	A	B	
3/4	XT24	54.9	38.8	46.0	54.9	77.7	95.1	123	174	246	9.53	4.76	30.2	38.1	0.28
	XT28	75.2	53.2	62.9	75.2	106	130	168	238	336	11.1	4.76	45.2	38.1	
	XT32	95.7	67.7	80.1	95.7	135	166	214	303	428	12.7	4.76	44.7	38.1	
1	XT40	153	108	128	153	216	264	341	483	683	15.9	6.35	61.0	50.8	0.57
	XT48	216	153	181	216	306	375	484	685	968	19.1	6.35	60.5	50.8	
1 1/2	XT56	294	208	246	294	416	509	657	930	1320	22.2	7.94	84.8	55.6	0.79
	XT64	385	272	322	385	545	667	861	1220	1720	25.4	7.94	85.6	55.6	
	XT72	438	309	366	438	619	758	978	1380	1960	28.6	7.94	83.8	55.6	
2	XT88	638	451	534	638	902	1110	1430	2020	2850	34.9	11.1	121	88.9	2.27
	XT96	806	570	674	806	1140	1400	1800	2550	3600	38.1	11.1	143	102	
3	XT112	1170	826	977	1170	1650	2020	2610	3690	5220	44.5	14.3	168	102	4.08
	XT128	1540	1090	1280	1540	2180	2670	3450	4880	6900	50.8	14.3	185	102	
4	XT160	2390	1690	2000	2390	3380	4140	5350	7570	10700	63.5	15.9	208	127	6.35

MATERIAL DESCRIPTION

TEMPERATURE RATING (F)

ASTM CODE

Stellite 6 or Cobalt Alloy 6
Incoloy 625
Hastelloy C22
Hastelloy G

1900 degrees F
2000 degrees F
2000 degrees F
2000 degrees F

AMS 5387
AMS 5402
A494
B581

TIP MATERIAL : STELLITE 6 (COBALT ALLOY 6), INCONEL625, RBSC (REACTION BONDED SILICON CARBIDE)

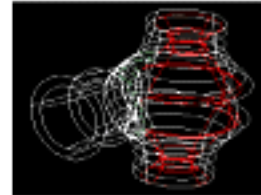
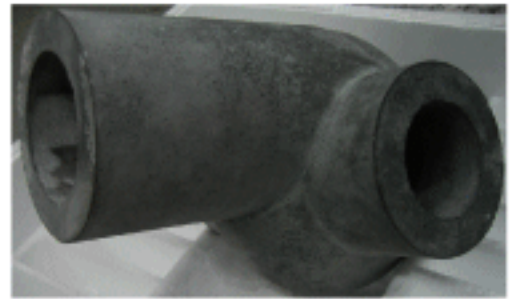
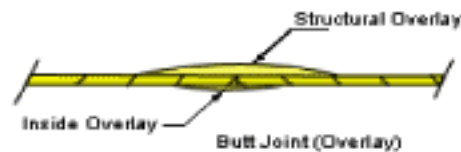
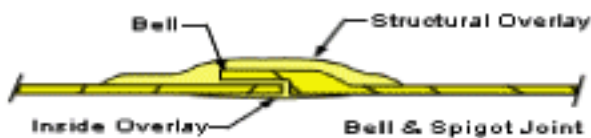
TYPES OF CONNECTIONS

There are four types of connections that can be used to inter-connect the Silicon Carbide Nozzles to the FRP pipe.

1) DIRECT LAMINATION OR BONDING

Epoxy adhesive for direct bonding to fiberglass reinforce plastic pipe and fitting using Butt Joint (overlay), Bell & Spigot joint or Taper-Taper adhesive Bonded Joint.

Epoxy glue lined on the inside of the nozzle inlet and on the nipple insert inter-connect to the FRP pipe for permanent bond. Once installed, the nozzles are removed either by chiseling or sawing the inlet snub. The FRP stub must then be re-surfaced in order to attach a new nozzle.



2) THREAD CONNECTIONS

Piping system typically use NPT, BSP or machined thread systems.

Polypropylene piping systems generally use coarse, non-tapered thread systems, such as Acme or Trapezoidal metric. The nozzles attached to polypropylene piping systems generally have internal threads.

3) FLANGE CONNECTIONS

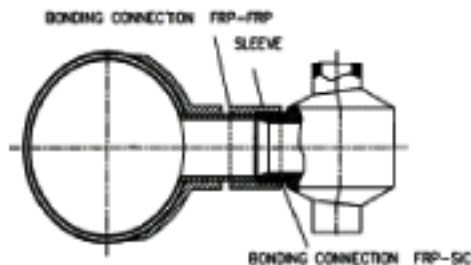
Flange connections are commonly used in Fiber Reinforced Plastic (FRP) piping system. Typically, ANSI 150# or DIN PN 6 flanges with 8 bolts arrangements.



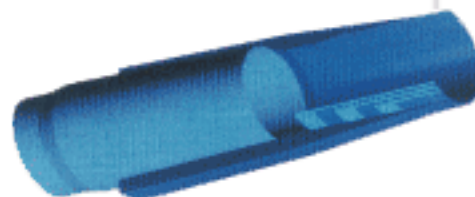
CONNECTIONS TO PIPE

NOZZLE SLIP- ON WITH SLEEVE TO FRP PIPE

STEP 1

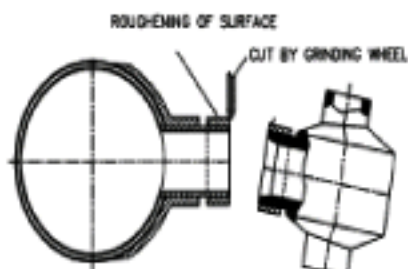


Taper - Taper Bonded Joints

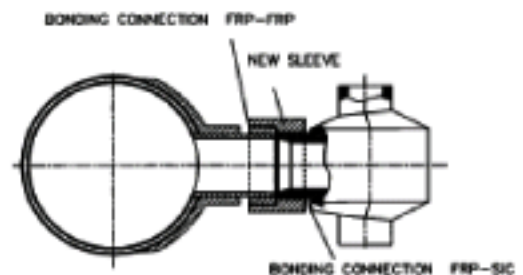


REPAIR AND REPLACEMENT OF SILICON CARBIDE NOZZLES FOR MAINTENANCE.

STEP 2



STEP 3



SAMPLING TECHNIQUES

Utilising the spatial sampling technique to gather maximum repeatable test results in accordance to ASTM E799-92 It includes the use of high speed camera to capture images at a rate of 1000 frames per second. To accurately record and compare all the droplet size data and the quantity of droplets in its size class bounds.

ASTM Designation E799-92 (Reapproved 1998) - "Standard Practice for Determining Data Criteria and Processing for Liquid Drop Size Analysis" - gives procedures for determining appropriate sample size, size class widths, characteristic drop sizes and dispersion measure of drop size distribution.



TYPICAL DROPLET ANALYSIS

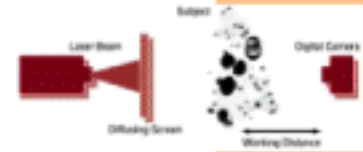
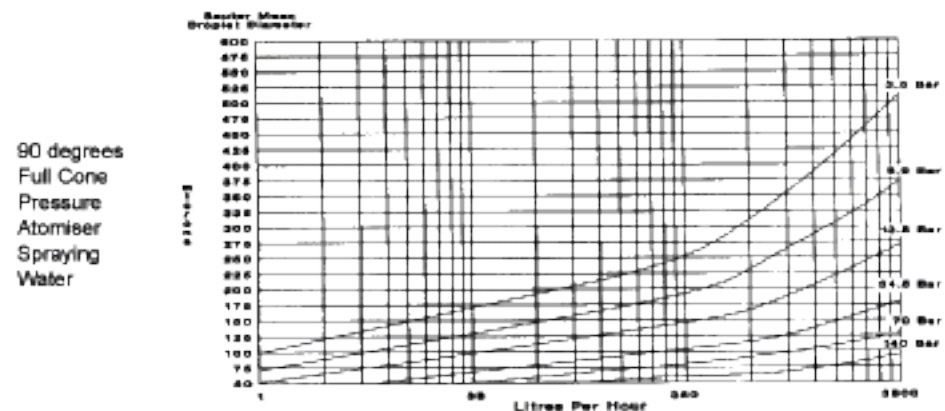
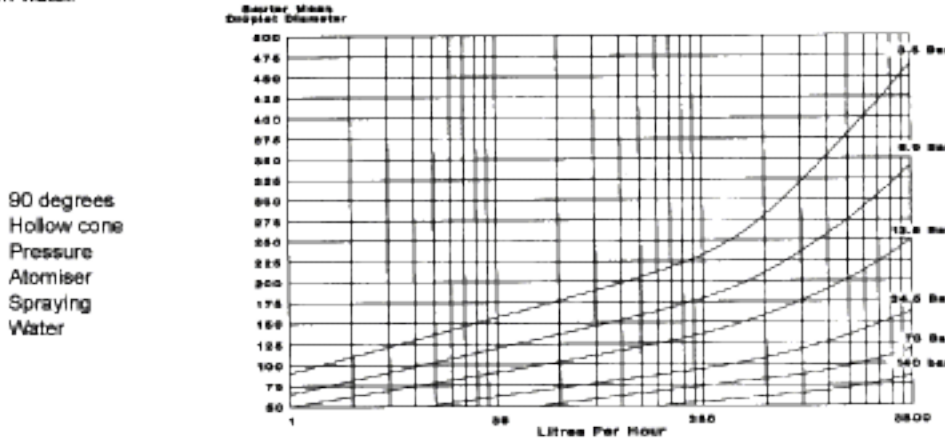
DROPLET ANALYSIS	841106.BLW	DATE	
FSSP INPUT FILE :	841106.BLW	OAP INPUT FILE :	841106.BLW
TEST REFERENCE :	LO-AIR NOZZLE	ATOMISER :	XA307
TEST LIQUID :	WATER	LIQUID PRESSURE :	24 PSIG
LIQUID FLOW :	3 GPH	ATOMISING GAS :	AIR
GAS PRESSURE :	30 PSIG	GAS FLOW RATE :	5.32 SCFM
FSSP PERIOD :	60 SEC	OAP PERIOD :	60 SEC
OVERLAP REGION :	20 TO 80 UM	MERGE DIAMETER :	50 UM

FSSP SAMPLING LOCATION: 12" HORIZONTAL TRAVERSE
OAP SAMPLING LOCATION: 12" HORIZONTAL TRAVERSE
SUPPLEMENTAL INFORMATION: 10 MM DEPTH OF FIELD

DISTRIBUTION PARAMETERS

LENGTH MEAN DIAMETER (D10):	21.11 UM	NUMBER MEDIAN DIAM. (DN.5):	14.65 UM
AREA MEAN DIAMETER (D20):	30.25 UM	VOLUME MEDIAN DIAM. (DV5):	119.37 UM
VOLUME MEAN DIAMETER (D30):	42.43 UM	10% Ø VOLUME DIAMETER (DV1):	42.70 UM
SAUTER MEAN DIAMETER (D32):	83.48 UM	90% Ø VOLUME DIAMETER (DV9):	200.07 UM
STANDARD DEVIATION (VOL):	59.20 UM	MAXIMUM DIAMETER :	305.00 UM
COEFFOF VARIATION (VOL):	0.483 UM	UNIFORMITY INDEX (VOLUME) :	0.401_ UM

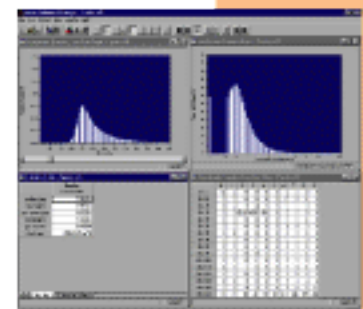
The following charts show the estimated Sauter mean diameter of droplets for various flow rates of typical 90 degrees hollow and solid cone spray patterns based on water.



Real time High Speed Digital Camera recording at 1000 frames per second.



Particle count software takes images obtained by the high speed camera imaging system and calculates the size of droplets, particles or bubble present. It measures size and also size vs velocity distributions at rates of up to 8000 particles per second and compensates out of focus images.



Multiple display of charts, tables and graphs.



Spray Testing and Gathering Facility

Refractory Product & Services

Wilson Engineering offers a wide range of refractory services for our clients. We offer quality refractory products, installation services, one-stop solutions and complete lining concepts. Refractory engineering are carried out on Computer-Aided-Design systems. We provide detailed project documentation, which include installation instructions. We also provide hassle free full maintenance program for our customers, where we will closely monitor the refractory condition and reduces the unwanted shutdown frequency. In addition, we provide technical study support, which recommends materials which are suitable for the customer needs and operation requirements.

Through active co-operation, **Wilson Engineering** offers its partners design, planning and implementation of solutions associated with all aspects of refractory work.

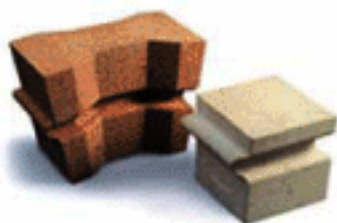
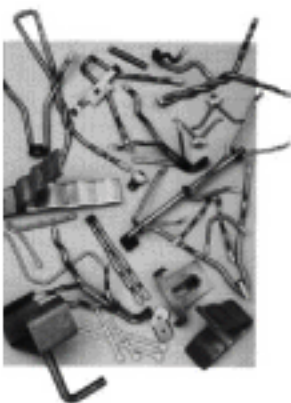
Our Services:

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- Refractory Engineering work.
- Detailed project documentation including installation instructions, heat transfer calculation.
- Refractory maintenance and repair service.
- Complete installation and lining supervision by experience engineers.



Our Products:

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- High temperature insulation (insulating bricks and concrete, fibre products).
- Ceramic and metallic anchoring systems for all applications.





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