After Sales Service

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PT. INDOCEMENT
TUNGGAL PRAKARSA
TBK JL Jend.Sudirman Kav 70-71
Wisma Indocement Lt. 13
Jakarta 12910
Indonesia

Offer 25656

Schwerzenbach, June 17, 2016

Tarjun	
Our Reference No.:	A 8251
Document-No.:	25656
Customer:	103054
4 Set of spare parts "Made by ELEX India"	

Your Installation:	**ESP behind kiln/RMM**
Your Reference:	Inquiry by email
Your Contact:	Agus Rasad
E-Mail:	agus.rasad@indocement.com

Dear Sirs,

We thank you for your inquiry and have pleasure in quoting for the following material. The below indicated materials are for all 4 electr. fields:

Item	Description	Ident. No.	Quantity
001	**Collecting Electrode** type "500", length 14,0m material thickness 1.25mm ref. 552 512b (replacement for ref. 126 821)		**1'620**
002	**Guide plate** for collecting electrodes Ref. 203012 (equivalent to 225342c)		**1'620**
003	**Lifting beam** for load/unload of the collecting plates to truck and vessel		**1**

Total Price	**CHF**	**367'134.00**

Price conditions:	Material delivered, FCA Indian Works, as per Incoterms 2010, without taxes - Suspension bar, supporting pins etc. are not included in this offer -
Validity of offer:	90 days
Delivery time:	15 weeks after receipt of your written order and prepayment or LC
Delivery:	According to your instructions
Payment:	100% payable by prepayment to: Credit Suisse CH-8604 Volketswil to our account CHF: IBAN CH89 0483 5014 5895 11 00 0 S.W.I.F.T. Code CRESCHZZ80A or 100% payable by an irrevocable letter of credit, to be opened within 30 days after placing the order, through your Bank at Credit Suisse Paradeplatz 8 Postfach 100 CH-8070 ZÜRICH (Switzerland) S.W.I.F.T. CRESCHZZ80A

We hope that our offer is in line with your requirements and look forward to receiving your corresponding written order.

Best Regards

ELEX AG

Thomas Hunger
Manager Services

Harry Kern
After Sales Service

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Certified to ISO 9001

Operating Data ESP - P12 Tarjun Plant			
ESP Raw Mill ELEX AG	Compound Operation	unit	
Kiln Cap.	7500	t/d	
RM Mill cap.	570	t/h	
Gas Volume	366.67	m3/s	
Gas temperature	85	degC	
Statis Pressure	-115	mbar	
Dew point temperature	52.8	degC	
Inlet dust content	800	g/m3 (wet)	
Outlet dust content	0.043	g/m3 (wet)	
Efficiency	99.9946	%	
Cross section	218.4	m2	
Projected collecting surface area	21,840	m2	
length of collecting electrodes	14	m	
number of fields	4		
length of field	5	m	
number of gas passages	39		
spacing of gas passages	400	mm	
HT controller	RICO-micromatic type 838		
	EPROM version 5.53/96		
ESP Cooler FLS Miljo	Compound Operation	unit	
Kiln Cap.	7500	t/d	
Gas Volume	407,077	Nm3/H	
Gas temperature	300	degC	
Statis Pressure	-15.3	mbar	
Dew point temperature	300	degC	
Inlet dust content	13	g/m3 (wet)	
Outlet dust content	50	mg/Nm3 (wet)	
Projected collecting surface area	14	m2	
number of fields	4		
number of field per chamber	2		
Number of row/row width	40/400	mm	
HT controller	PIACS DC		
Field dimension			
Width	11.2	m	
Height	14	m	
Length	4.5	m	

Estimasi flow udara pada jalur hotgas EP Raw Mill

Flowrate outlet mill

dik : D = 4.5 m → r = 2.25 m

g = 9.8 m/s^2

Pv = 37.513 mmH_2O = 1.478 inH_2O

T = 88 °C

ρ = 0.978 kg/m^3 = 0.061 lb/cuft

dit: flowrate udara

jawab

$A = \pi r^2$

= 3.14 x (2.25 $m)^2$

= 15.910714 m^2

menentukan velocity udara

$v = 1096.2 \left(\frac{Pv}{\rho}\right)^{(0,5)}$

$= 1096.2 \left(\frac{1.478}{0.0611}\right)^{(0,5)}$

= 5392.891 ft/min

= **27.396 m/s**

menentukan flowrate

Q = v x A

= 27.396 m/s x 15.911 m^2

= 435.88813 m^3/s

= **1,569,197.260 m^3/h**

Temperature - t - (°C)	Density - ρ - (kg/m^3)
-150	2.793
-100	1.980
-50	1.534
0	1.293
20	1.205
40	1.127
60	1.067
80	1.000
100	0.946
120	0.898
140	0.854
160	0.815
180	0.779
200	0.746
250	0.675
300	0.616
350	0.566
400	0.524

Flowrate outlet EP (FN 3 + FN 4)

FN3

dik : D = 3.5 m → r = 1.75 m

g = 9.8 m/s^2

Pv = 35.886 mmH_2O = 1.414 inH_2O

T = 80 °C

ρ = 1.0065 kg/m^3 = 0.063 lb/cuft

dit: flowrate udara

jawab

$A = \pi r^2$

= 3.14 x (1.75 $m)^2$

= 9.625 m^2

menentukan velocity udara

$v = 1096.2 \left(\frac{Pv}{\rho}\right)^{(0,5)}$

$= 1096.2 \left(\frac{1.414}{0.0628}\right)^{(0,5)}$

= 5200.508 ft/min

= **26.419 m/s**

menentukan flowrate

Q = v x A

= 26.418581 m/s x 9.625 m^2

= 254.27884 m^3/s

= **915,403.836 m^3/h**

Q false air = Q output - Q input

= 1836710.34 - 1569197.26

udara panas		
suhu	ρ	
60	1.0670	kg/m^3
80	1.0065	kg/m^4
100	0.9460	kg/m^5

FN4

dik : D = 3.5 m → r = 1.75

g = 9.8 m/s^2

Pv = 36.350 mmH_2O = 1.432 inH_2O

T = 80 °C

ρ = 1.0065 kg/m^3 = 0.063 lb/cuft

dit: flowrate udara

jawab

$A = \pi r^2$

= 3.14 x (1.75 $m)^2$

= 9.625 m^2

menentukan velocity udara

$v = 1096.2 \left(\frac{Pv}{\rho}\right)^{(0,5)}$

$= 1096.2 \left(\frac{1.432}{0.0628}\right)^{(0,5)}$

= 5234.042 ft/min

= **26.589 m/s**

menentukan flowrate

Q = v x A

= 26.58893235 m/s x 9.625 m^2

= 255.9184739 m^3/s

= **921,306.506 m3/h**

CALCULATING VELOCITY

Air Velocity = $1096.2\ (C_p)\ \sqrt{\frac{P_V}{D}}$

where:

P_V = Sensed pressure difference (velocity pressure) in inches of water column

D = Air density in lbs./ft.^{3} (dry air = .075)

C_p = Pitot tube coefficient: 0.84

Air Density = $1.325\ X\ \frac{P_B}{T}$

P_B = Barometric pressure in inches of mercury

T = Absolute Temperature (Indicated Temperature in °F plus 460)

2

1

Untuk nilai D, apakah langsung ambil dari nilai yang ini atau pakai rumus yang ini .

Jika menggunakan koefisien yang **nomer 1**, maka hasil dari debit seperti pada **nomer 3**.

Jika menggunakan formula **nomer 2,** untuk nilai P_B menggunakan yang mana?

$$V = 1096.2(Cp)\sqrt{\frac{Pv}{D}}$$

$$V = 1096.2(0.84)\sqrt{\frac{361OP1PT1P01}{0.075}}$$

$$V = 920.808\sqrt{\frac{20}{0.075}}$$

$$V = 15036.73\frac{feet}{minute} = 76.38\ m/s$$

$$Luas\ Penampang = 3.14 \times \frac{1}{4}(d)^2$$

$$A = 3.14 \times \frac{1}{4}(4.4)^2$$

$$A = 15.1976\ m^2$$

Debit $\boldsymbol{Q = V \times A = 76.38 \times 15.1976 \times 60 \times 60 = 4176763.92\ m^3/s}$ 3

Formula dari Setiawan (based on Production formula)

T =	100.00	deg C
D =	4.4	m
Speed =	80	%

No	Posisi	Data1	Data 2	Data 3	Data 4	Data 5	Rata-rata (mBar)	Rata-rata (mmAq)
Pd								
1	A	2.60	3.40	2.90	3.10	3.00	3.00	30.00
2	B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ps								
1	A	2.00	2.00	2.00	2.00	2.00	2.00	20.00
2	B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	C	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NO	PARAMETER	SATUAN	Posisi A
1	Dynamic Pressure (Pd)	mmAq	30.00
2	Pressure Static (Ps)	mmAq	20.00
3	Temperature (T)	°C	100.00
4	Density of gas in meas. Duct on suction side $\rho_s = 1.3 \times (\frac{273}{273+T}) \times \frac{10336 + Ps}{10336}$	Kg/m^3	0.9533
5	Density of gas in meas. Pos. for Din. Pressure $\rho_d = 1.3 \times (\frac{273}{273+T}) \times \frac{10336 + Pd}{10336}$	Kg/m^3	0.9542
6	Koefisien Pitot Tube (k)	-	0.8478
7	Velocity Gas $v = \frac{k}{\rho_s} \sqrt{2 \cdot g \cdot \rho_d \cdot p_s}$	m/det	20.39
8	Diameter Duct (d)	M	4.4
9	Luas penampang $A = 3{,}14 \times \frac{1}{4} (d)^2$	m^2	15.20
10	Debit $Q = V \times A \times 60 \times 60$	m^3/s	1115473.136
11	Debit Gas pada 0°C & 1 atm $Qn = Q(\frac{273}{273+T}) \times \frac{10336 + Ps}{10336}$	Nm^3/H	817998.4333

$$\rho_s = 1.3 \times \left(\frac{273}{273+T}\right) \times \left(\frac{10336+P_s}{10336}\right) = 1.3 \times \left(\frac{273}{273+100}\right) \times \left(\frac{10336+20}{10336}\right)$$

$$\boldsymbol{\rho_s = 1.3 \times 0.73 \times 1.0019 = 0.9508\ Kg/m^3}$$

$$\rho_d = 1.3 \times \left(\frac{273}{273+T}\right) \times \left(\frac{10336+P_d}{10336}\right) = 1.3 \times \left(\frac{273}{273+100}\right) \times \left(\frac{10336+30}{10336}\right)$$

$$\boldsymbol{\rho_d = 1.3 \times 0.73 \times 1.0029 = 0.9517\ Kg/m^3}$$

$$\boldsymbol{A = 3.14 \times \frac{1}{4}(d)^2 = 3.14 \times \frac{1}{4}(4.4)^2 = 15.1976\ m^2}$$

$$V = \frac{k}{\rho_s}\sqrt{2 \times g \times \rho_d \times P_s}$$

$$\boldsymbol{V = \frac{0.84}{0.9508}\sqrt{2 \times 9.8 \times 0.9517 \times 20} = 0.88 \times 19.315 = 16.9972\ m/s}$$

$$\boldsymbol{Q = V \times A \times 60 \times 60 = 16.9972 \times 15.1976 \times 60 \times 60 = 929939.92\ m^3/h}$$

Date :	
Checked by :	

CELL CHART

EP RAW MILL

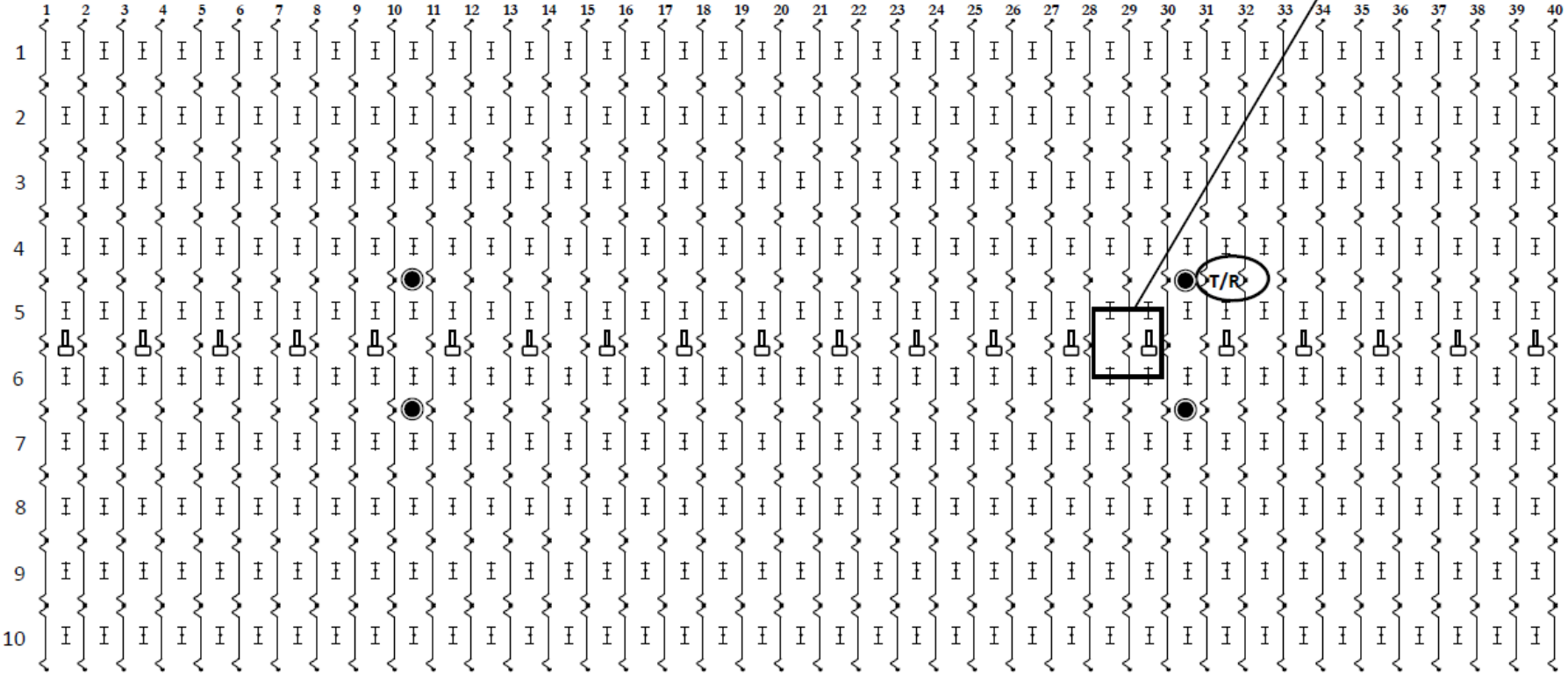
GAS FLOW

ESP 361
FIELD 1
FIELD 2
FIELD 3
FIELD 4

N
W E
S

MAINHOLE

MAINHOLE ATAS



LEGEND :

- Hammer for Collecting Plate
- Hammer for Electrode
- High Voltage Support
- Electrode
- Collecting Plate
- T/R Set

Comment :

dampak merugikan terhadap lingkungan dan ekosistem yang selanjutnya akan berpengaruh terhadap kesejahteraan manusia.

Pedoman ini bertujuan untuk memberikan acuan bagi gubernur dalam menetapkan BMUA daerah.

II. PROSEDUR PENYUSUNAN BAKU MUTU UDARA AMBIEN DAERAH

BMUA daerah ditetapkan dengan ketentuan sama dengan atau lebih ketat dari BMUA nasional serta berdasarkan pertimbangan status mutu udara ambien di daerah yang bersangkutan.

Dalam Pasal 5 PP. No. 41 Tahun 1999 dinyatakan bahwa daerah dapat menetapkan BMUA daerah berdasarkan status mutu udara ambien di daerah yang bersangkutan melalui keputusan gubernur. BMUA daerah ditetapkan sebagai batas maksimum kualitas udara ambien daerah yang diperbolehkan dan berlaku diseluruh wilayah udara di atas batas administrasi daerah, dengan ketentuan sama dengan atau lebih ketat dari baku mutu udara ambien nasional. Tabel di bawah ini menunjukkan BMUA sebagaimana tercantum dalam Lampiran PP. No. 41 Tahun 1999.

Tabel BMUA Nasional

No.	Parameter	Waktu Pengukuran	Baku Mutu
1.	Sulfur Dioksida (SO_2)	1 jam	900 ug/Nm^3
		24 jam	365 ug/Nm^3
		1 tahun	60 ug/Nm^3
2.	Karbon Monoksida (CO)	1 jam	30 000 ug/Nm^3
		24 jam	10 000 ug/Nm^3
		1 tahun	-
3.	Nitrogen Dioksida (NO2)	1 jam	400 ug/Nm^3
		24 jam	150 ug/Nm^3
		1 tahun	100 ug/Nm^3
4.	Oksidan (O3)	1 jam	235 ug/Nm^3
		24 jam	-
		1 tahun	50 ug/Nm^3
5.	Hidro Karbon (HC)	3 jam	160 ug/Nm^3
6.	Partikulat < 10 um (PM10)	1 jam	-
		24 jam	150 ug/Nm^3
		1 tahun	-
	Partikulat < 2,5 um (PM2,5)	1 jam	-
		24 jam	66 ug/Nm^3
		1 tahun	15 ug/Nm^3
7.	Debu (TSP)	1 jam	-

No.	Parameter	Waktu Pengukuran	Baku Mutu
		24 jam	230 ug/Nm^3
		1 tahun	90 ug/Nm^3
8.	Timah Hitam (Pb)	1 jam	-
		24 jam	2 ug/Nm^3
		1 tahun	1 ug/Nm^3
9.	Dustfall (debu jatuh)	30 hari	10 ton/km^2/bulan (Pemukiman)
			20 ton/km^2/bulan (Industri)
10.	Total Fluorides (sebagai F)	24 jam	3 ug/Nm^3
		90 hari	0,5 ug/Nm^3
11.	Fluor Indeks	30 hari	40 ug/100 cm^2 dari kertas lime filter
12.	Klorin dan Klorin Dioksida	24 jam	150 ug/Nm^3
13.	Sulphat Indeks	30 hari	1 mg SO_2/100 cm^2 dari lead peroksida

Catatan:
Nomor 10 sampai dengan 13 hanya diberlakukan untuk daerah/kawasan Industri kimia dasar
Contoh : Industri petrokimia dan industri pembuatan asam sulfat HC yang dimaksud adalah Non Methane HC

Faktor yang harus dipertimbangkan dalam menetapkan BMUA meliputi:
a. Reseptor sensitif.
b. Kelakuan Pollutant di atmosfir.
c. Kelakuan Pollutan di lingkungan.
d. Level natural dan fluktuasi, level konsentrasi dan fluktuasi pencemar yang terjadi secara alami atau masuk ke dalam atmosfir dari sumber pencemar yang tidak terkontrol atau sumber natural.
e. Teknologi, biaya dan ketersediaan teknologi untuk mengontrol atau mengurangi emisi.

Penyusunan BMUA dilakukan melalui tahapan sebagai berikut:
a. Inventarisasi sumber pencemar udara di seluruh wilayah provinsi.
b. Inventarisasi data pemantauan mutu udara ambien yang mewakili mutu udara ambien kabupaten/kota diseluruh wilayah provinsi.
c. Evaluasi status mutu udara ambien daerah.
d. Studi toksikologi atau epidemologi sesuai kaidah ilmiah apabila akan menetapkan parameter baru/spesifik.

TABEL RETURN DUST (GAS LANJUTAN DARI KILN DAN PREHETER)

TANGGAL	RETURN DUST RATA-RATA	RETURN DUST 7%
17/07/2017	475.27	33.27
18/07/2017	516.07	36.12
19/07/2017	517.59	36.23
20/07/2017	521.59	36.51
21/07/2017	525.33	36.77
22/07/2017	525.59	36.79
23/07/2017	467.42	32.72
24/07/2017	481.27	33.69
25/07/2017	522.29	36.56
26/07/2017	518.07	36.26
27/07/2017	507.98	35.56
28/07/2017	511.52	35.81
29/07/2017	518.61	36.3
30/07/2017	517.36	36.22
31/07/2017	507.51	35.53
01/08/2017	518.1	36.27
02/08/2017	519.82	36.39
03/08/2017	0.77	0.05
04/08/2017	0.77	0.05
05/08/2017	0.48	0.03
06/08/2017	0.48	0.03
07/08/2017	1.49	0.1
08/08/2017	21.61	1.51
09/08/2017	509.39	35.66
10/08/2017	529.33	37.05
11/08/2017	531.5	37.21
12/08/2017	527.79	36.95
13/08/2017	523.67	36.66
14/08/2017	524.3	36.7
15/08/2017	527.09	36.9

TABEL MATERIAL MASUK RAW MILL + RETURN DUST

TANGGAL	MATERIAL MASUK RAW MILL RATA-RATA (t/h)	RETURN DUST 7 %	MATERIAL MASUK EP t/h	TERTANGKAP EP t/h	EMISI kg/h
17/07/2017	749.5	33.27	782.77	782.62	0.15
18/07/2017	730.06	36.12	766.18	766.04	0.14
19/07/2017	251.2	36.23	287.43	287.33	0.1
20/07/2017	864.09	36.51	900.6	900.46	0.14
21/07/2017	857.58	36.77	894.35	894.23	0.12
22/07/2017	26.72	36.79	63.51	63.4	0.11
23/07/2017	865.72	32.72	898.44	898.39	0.05
24/07/2017	781.31	33.69	815	814.88	0.12
25/07/2017	752.93	36.56	789.49	789.36	0.13
26/07/2017	848.1	36.26	884.36	884.22	0.14
27/07/2017	833.93	35.56	869.49	869.35	0.14
28/07/2017	852.39	35.81	888.2	888.06	0.14
29/07/2017	846.96	36.3	883.26	883.13	0.13
30/07/2017	789.57	36.22	825.79	825.66	0.13
31/07/2017	762.4	35.53	797.93	797.83	0.1
01/08/2017	610.02	36.27	646.29	646.16	0.13
02/08/2017	742.1	36.39	778.49	778.38	0.11
03/08/2017	0	0.05	0.05	-0.02	0.07
04/08/2017	824.24	0.05	824.29	824.15	0.14
05/08/2017	806.76	0.03	806.79	806.65	0.14
06/08/2017	809.34	0.03	809.37	809.24	0.13
07/08/2017	824.12	0.1	824.22	824.09	0.13
08/08/2017	0	1.51	1.51	1.44	0.07
09/08/2017	828.31	35.66	863.97	863.82	0.15
10/08/2017	839.32	37.05	876.37	876.24	0.13
11/08/2017	882.72	37.21	919.93	919.82	0.11
12/08/2017	267.05	36.95	304	303.86	0.14
13/08/2017	847.34	36.66	884	883.88	0.12
14/08/2017	806.86	36.7	843.56	843.39	0.17
15/08/2017	788.17	36.9	825.07	824.93	0.14

Specification comparison

No		Existing - Werck ELEX	Tai&Chyun - NWL Korea	FLS - Alstom
1	Model	Konvensiona TR	High frequncy TR	High frequncy TR
2	Input voltage	400Vac 50Hz 1 phase	480Vac 50Hz 3 phase	400Vac 50Hz 3 phase
3	kVA rating	275.2kVA	118kVA	131kVA
4	Rated input Current	688A	142A	196A
5	Output voltage - KVDC	78.5kV	83kV	100kV
6	Output current mADC	2500mA	1265mA	1200mA
7	Power factor	-	0.94	0.92
8	Arc shutdown time	-	30microsecond	10microsecond
9	Operating frequency	50Hz	25kHz	50kHz
10	Losses kW	10.2kW	5.5kW	4.8kW
11	% ripple kV p-p		3-5%	<1%

NWL Unit

Ph : 800-742-5695
Ph : 800-PICK-NWL

Model PP120 Series 6
Input : Output :
134 kVA 120 KW
480 VAC, 3 Ph, 50/60 Hz 83 kVDC
162 AAC 1445 mADC

Ambient : 40 Deg C Max
Tank Temp : 55 Deg C
Fluid Folume : 100 GAL/ 379 L
Weight of tank woth fluid : 1600 LBS/ 727 kg
Total Weight : 2300 LBS/ 1178 kg

Operating Data ESP - P12 Tarjun Plant

ESP Raw Mill ELEX AG	Compound Operation	unit
Kiln Cap.	7500	t/d
RM Mill cap.	570	t/h
Gas Volume	**366.67**	**m3/s**
Gas temperature	85	degC
Statis Pressure	-115	mbar
Dew point temperature	52.8	degC
Inlet dust content	800	g/m3 (wet)
Outlet dust content	0.043	g/m3 (wet)
Efficiency	99.9946	%
Cross section	218.4	m2
Projected collecting surface area	21,840	m2
length of collecting electrodes	14	m
number of fields	4	
length of field	5	m
number of gas passages	39	
spacing of gas passages	400	mm
HT controller	RICO-micromatic type 838 EPROM version 5.53/96	

NO.	PARAMETER	UNIT	VALUE		
			Sep'13	Dec'14	Aug' 15
1	Feeding Rawmill	t/h	683	668	653.9
2	CT Outlet Gas Temp.	°C	270	239	235.8
3	Mill Outlet Gas Temp.	°C	90	89	88.7
4	Mill Bypass Gas Temp.	°C	-	-	-
5	Gas Volume	m^3/h	1802604.94	1642718.87	1430725.55
6	Gas Velocity	m/s	31.47	28.68	25.00
7	Dust Content	mg/m3	300	123	71.3