



Work No. 3

Invitation for EoI to Implement and Commercialize 'Dry Fog System in Crushing, Screening and Loading Plants'

1. Background

CSIR-CIMFR has developed a dust suppression technology for controlling dust emission from crushing, screening and loading plants. CSIR-CIMFR require an Implementation Partner for deployment of the system at different sites as per the process design as well as supervision of CSIR-CIMFR. CSIR-CIMFR will also assists in assessment of the present dust level at the selected crushing, screening and loading plants prior to installation of dust control measures, process design of dust suppression system, supervision of the system installation by Implementation Partner and monitoring of dust level around the plant after installation of the system system as per the guidelines of CPCB/MoEF&CC as well as the tolerance limits explained in DGMS Circular-124 of Metalliferous Mines-MMR Regulations, 1961.

Hence, Expression of Interest (EoI) is invited from the reputed and experienced firms to implement 'Dry Fog System in Crushing, Screening and Loading Plants' by acting as Implementation Partner.

2. System Description

As per the site requirement both Dry Fog and Mist Fog systems will be installed for effective control of dust emission from crushing, screening and loading plants of a mine as per the process design of CSIR-CIMFR.

2.1 Dry Fog System

The "Dry Fog" name is used for its resemble with natural fog which does not make anything wet. The fog is generated using the energy in the compressed air to shear the water particles in micron size (10 to 50 μm with mean of 20 μm). These extremely fine particles generated in billions by nozzle/s are used to direct to the source of dust. The fog not only create a impenetrable blanket over the dust source, but also velocity of the compressed air helps to resist the out coming dust laden air. The fog particle floats longer in the air and does not disturb air around it (does not create aerofoil around it while moving) and so very fine dust particles colloid with the water droplets of fog to get wet and settle in the main stream of material. In addition to that due to its extreme fine size the water droplets evaporate quickly to hardly add 0.1% moisture.

2.2 Mist Fog System

The name is derived for its similarity with mist in nature. However, by increasing the water pressure beyond 5 kg/cm^2 the water droplets become finer and approaches to size of <200 μm . However, with increased pressure as the droplets become smaller, it loses its momentum while traveling in air. This system typically adds 0.5 to 2% moisture to the material based on application. The system is use in confined spaces (i.e. at conveyor skirt, hood, etc.) where moisture addition is not critical.



3. Operational Procedure

- The system shall be designed to operate automatically in synchronisation with flow of material (iron ore), i.e. spray should commence only when material is being handled by conveyor/equipment at that location by using necessary sensors, etc.
- All dust suppression systems should be designed to operate automatically and also manually by the operators of each house. For this flow activation and pressure control units to be employed at each house at suitable places. Each such unit should be fabricated from 2 mm CRCA sheet with IP54 protection, wall mounting type, powder coated. Each unit would be connected to the pipelines with flexible hose through isolation valves, Air Filters and Strainers to intake cleaner air and water. Each unit should have Pressure Gauge, Pressure switch (as required for air and water line), isolation valve (as required), solenoid valves, pressure regulator, pressure control valve, etc. as applicable, in addition to control circuitry for manual and automatic spray operation through material flow detecting sensors. Each unit shall have following facilities:
 - ✓ Indication for power ON, pressure fault, spray ON,
 - ✓ Push button to operate manually by the operator,
 - ✓ Provision for remote operation from plant Programmable Logic Controller (PLC)/Distributed Control System (DCS) in future,
 - ✓ Provision for feedback to plant PLC/DCS for pressure fault, spray ON.

3.1 Maintenance

Maintenance of the installed dust suppression system shall be carried out as follows:

- a) Two technicians shall be deputed continuously at site for regular maintenance as per the maintenance schedule given in O&M Manual also as and when required during 4 years comprehensive annual maintenance contract (CAMC),
- b) Consumables, i.e. change of oil, filters, etc. as per the maintenance schedule in O&M Manual,
- c) Taking care of teething problem and any other, e.g. leakage, cleaning, etc., and
- d) Replace/change of faulty equipment/spares.

3.2 Guaranteed Performance

The firm should follow technical specifications mentioned in this document and agree to guarantee for the following parameter:

- i. Fugitive emission should be $<1200 \mu\text{g}/\text{Nm}^3$, measured in the downwind direction at a distance of $25(\pm 2)$ m from the source of dust generation as per the guidelines of CPCB/MOEF&CC as well as the tolerance limits explained in DGMS Circular-124 of Metalliferous Mines-MMR Regulations, 1961.
- ii. Moisture addition to material for Dry Fog system should be $<0.01\%$ to weight of material.

4. Requirement

CSIR-CIMFR requires an Implementation Partner for supply, assembly, testing at works, packing and forwarding, transportation including transit insurance, storage, handling at site,



erection, testing, trial run, commissioning, and performance test including comprehensive maintenance of the dust suppression system at crushing, screening and loading plant as per the requirement of mining industry. Therefore, Expression of Interest (EoI) is invited from the reputed industries having experienced in dust suppression systems.

5. Eligibility Criteria

- (i) The firm should have experienced on dust suppression system.
- (ii) Annual Turn Over of the firm should be not less than Rs. 1.00 Crore during last 5 years.

6. Terms and Conditions

- (i) The selected firm should sign a licensing agreement with CSIR-CIMFR for implementation and commercialization of the system.
- (ii) Licensing agreement would be valid for 5 years and which may be renewed based on mutual consent.
- (iii) The selected firm has to pay a lump sum licensing fee before signing the agreement as well as royalty during implementation and commercialization of the system.

7. Expression of Interest

The interested firm should submit their EoI with following information and documents in two bids system covering technical bid in one sealed envelope and financial bid in another sealed envelope by marking as financial bid. The financial bid should be kept inside the first envelope by writing reference details on top of both the envelopes. Technical and financial bids should contain following information/documents:

(i) *Technical bid*

- a) Company profile.
- b) Experience of the firm on application of dust suppression system.
- c) Annual Turn Over of the firm during last 5 years (Attach copy of Audited Balance sheet).
- d) Technical compliance of the technical specification as per the Table 1.
- e) Registration details of the company:
 - ☛ Company registration certificate
 - ☛ PAN details
 - ☛ TAN details
 - ☛ Service tax registration certificate
 - ☛ VAT registration certificate

(ii) *Financial bid*

- a) Unit cost of each equipment and components for dust suppression system as per Table 2.
- b) Cost of installation and other charges as per Table 3.
- c) Lump sum licensing fee agreed to pay by the firm before signing the licensing agreement for commercialization of the system. Minimum lump sum premium shall be Rs. 5.00 lakh. However, the technically qualified firm offering maximum lump sum premium will be selected for licensing agreement.
- d) Royalty rate agreed to pay by the firm based on per set of installation of the system in crushing, screening and loading plant of a mine.



Table 1: Specifications of major components of dust suppression system for crushing, screening and loading plants

Sl. No.	Description	Required make	Make offered and enclosed page number of brochure	Confirmation of specification by the firm (Yes/ No)
1	Dual fluid, internal mixed, sonic core, Dry Fog nozzles, SS-304 body with header/clamp, connectors, adaptors etc., all nozzle accessories	CSS/TPS/Eqv.		
2	Mist Nozzle, solid cone pattern, SS-304 construction in protective housing with connectors, adaptors, clamp, etc. nozzle accessories	CSS/TPS/Eqv.		
3	Part circle, impact type, automatic swiveling sprinkler, constructed from Cast Aluminum body, SS nozzle.	CSS/TPS/Eqv.		
4	Flow activation and pressure regulating units, fabricated from 2 mm CRCA sheet as per IP54, wall mounted, powder coated, including flexible nylon braided 10 kg/cm ² class hose with swivel coupling and control circuit to activate spray Automatically or Manually.	CSS/TPS/Eqv.		
5	Solenoid valve: 2/2 way, Pilot operated, Diaphragm type, ASTM A351 Gr. CF8 body, 0.5 to 10 kg/cm ² working pressure, -5 to 85 °C Temperature range, 230V AC, continuous rating coil, insulation Class F.	Aira/Rotex/Av con/Eqv.		
6	Air Filter: Pressure die cast Aluminium body, polycarbonate body with safety guard, 25µm filter element, inlet pressure 10 kg/cm ² , with 40 mm dial pressure gauge	Airmax/Norgren/janatics/Eqv.		
6	Air Regulator: Pressure die cast Aluminium body, inlet pressure 10 kg/cm ² , with 40 mm dial pressure gauge	Airmax/Norgren/janatics/Eqv.		
7	Pressure Reducing Valve: ASTM A351 Gr. CF8 body, 21 kg/cm ² working pressure, 80 °C working Temperature, pressure adjustment 1–13 kg/cm ²	Suzhik/Bellstone/Eqv.		
8	Pressure Switch: Blind type, Pressure die cast Aluminium enclosure of IP67 class, Range 1 to 10 kg/cm ² , Repeatability ±0.5% FS, Maximum Working temp 110 °C, 5A SPDT	Indfos/Switzer/Danfoss/Eqv.		
9	Ball valve, SS (ASTM A351 Gr. CF8) body, 65 kg/cm ² working pressure, screwed end	Zac/Audco/Legend/Eqv.		
10	“Y” Strainer, SS body, SS elements (100 µm), screwed end	Zac/Cair/Bellstone/Eqv.		
11	Non return valve, SS body, screwed end, PN-	Alto/Audco/Le		



	10 rating	gend/Eqv.		
12	Globe valve, SS body, screwed end	Alto/Audco/Le gend/Eqv.		
13	Pressure Relief valve (Safety valve): Angle type, SS body	Suzhik/Bellsto ne/Eqv.		
14	Butterfly valve, valve body - CI, Seat - moulded nitrite seat, leakage class VI,	Hawa/Cair/Av con/Eqv,		
15	Pump, Centrifugal, multistage, CI casing, SS/equivalent Impeller, mechanical sealing arrangement with 10% margin over capacity & head including motor	Grundfos/KBL /KSB/Eqv.		
16	Compressor, Air cooled, oil flooded, screw type, motor driven in acoustic enclosure with 20% over design air consumption	ELGI/Kirloska r/Atlas Copco/IR/Eqv.		
17	Air Receiver, vertical type, 10 kg/cm ² working pressure including safety and drain valves, gauge, etc.	KEW/Elgi/IR/ Eqv.		
18	GI, ERW, Medium grade pipe, screwed end as per IS: 1239 (Part-I) including fittings as per IS:1239 (Part-II)	Jindal/Nezone/ Bansal/Eqv.		
19	PVC tank: Vertical, cylindrical type, including cover hatch	Sintex/Reno/E qv.		
20	Under Belt Switch in cast Aluminum enclosure, IP65, 230V supply, Relay output, to provide signal when conveyor is running with material,	Jayashree/Sai Controls/ MSA /Eqv.		
21	Zero Speed Switch with Inductive Proximity sensor to get run feedback of Apron Feeders,	Jayashree/Sai Controls/ Precision Inst./Proto Control/Eq		
22	Proximity Sensor, Inductive type, 5 to 10 mm range	Autonics/Preci sion Instruments/O mron/Eq		
23	Level Transmitter: Capacitance type with 41/2 digit level display, 3 Nos. potential free level output and 4-20 mA signal for level status for client's PLC	Levcon/Protoc ontrol/Eqv.		
24	Control cable: Multi core, Cu, 1.5 mm ² , armored, PVC sheathed, 1100 V grade	Polycab/Natio nal/CCI/Eqv.		
25	Power cable: Cu, armored, PVC sheathed, 1100V Grade	Polycab/Natio nal/CCI/Eqv.		
26	MCC: Self standing, fabricated from 2 mm CRCA sheet, powder coated, Indoor type, compartmentalized, bottom entry, as per IP54 with MCCB feeder for Compressor and Starter circuitry for pumps	CSS/TPS/Eqv.		
27	Cable Tray: Hot dip Perforated type for upto 300 mm and GI Ladder type for above	Reputed		



28.	Clamp, Foundation bolts/nuts, etc.; Junction Box, Cable Gland, Lugs, Pipe and Cable Tray support, etc.	Standard make		
29.	Motorised Actuator: body - aluminium alloy, IP:67, 90° travel, 230V AC power supply, insulation class F, Limit Switch – 2 Nos., Manual override wheel	Avcon/Rotork/Cair/Eqv.		
30.	Fog Cannon: Trolley mounted with automatic tilt and swing facility as required, throw range – 25m, Impeller & hub - Aluminium alloy, direct driven, Motor - 415V, 3 phase, TEFC, IP-55, insulation class F, Pump - >6.5kg/cm ² pressure, directly coupled with 415V, 3 phase motor, including SS nozzle and tubing to generate fine mist/fog.	Excel Combine/CSS/TPS/Eqv.		

Table 2: Unit cost of equipment and components

Sl. No	Item	Specification	Make required	Make offered	Quantity	Rate (Rs.)	Enclosed page number of rate justification document
1	Nozzle	Dry Fog	CSS/TPS/Eqv.		1 No.		
2	Nozzle Accessories	Clamp, Adaptor, Connector, Tube Fastener, etc.	CSS/TPS/Eqv.		1 No.		
3	Nozzle	Mist type with housing,	CSS/TPS/Eqv.		1 No.		
4	Nozzle Accessories	Adaptor, connector, etc.	CSS/TPS/Eqv.		1 No.		
5	Solenoid valve	15 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
6	Solenoid valve	20 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
7	Solenoid valve	25 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
8	Solenoid valve	32 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
9	Solenoid valve	40 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
10	Ball Valve	15NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
11	Ball Valve	20NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
12	Ball Valve	25NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
13	Ball Valve	32NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
14	Ball Valve	40NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		



15	Ball Valve	50NB, SS body, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
16	"Y" Strainer	15NB, Body & Mesh CF8,O Ring NBR, Screwed	Zac/Cair/Bellstone/Eqv		1 No.		
17	Air Filter	20 NB	Airmax/Amatic/Bellstone/Eq		1 No.		
18	Air Filter	25 NB	Airmax/Amatic/Bellstone/Eq		1 No.		
19	Air Filter	40 NB	Airmax/Amatic/Bellstone/Eq		1 No.		
20	Air Regulator	20 NB	Airmax/Amatic/Bellstone/Eq		1 No.		
21	Air Regulator	25 NB	Airmax/Amatic/Bellstone/Eq		1 No.		
22	Pressure Reducing valve	15 NB, SS body, Screwed	Suzhik/Bellstone/Eq		1 No.		
23	Pressure Reducing valve	25 NB, SS body, Screwed	Suzhik/Bellstone/Eq		1 No.		
24	Pressure Reducing valve	50 NB, SS body, Screwed	Suzhik/Bellstone/Eq		1 No.		
25	Pressure Switch		Indfos/Switzer/Danfoss/Eq		1 No.		
26	Flow Control valve		Airmax/Janatics/Feto/Eq		1 No.		
27	FAS Enclosure	600x1000x450 mm	CSS/TPS/Eqv.		1 No.		
28	FAS Enclosure	600x1400x450 mm	CSS/TPS/Eqv.		1 No.		
29	FAS Enclosure	600x1600x450 mm	CSS/TPS/Eqv.		1 No.		
30	MCB	6A, DP	L&T/Siemens/ABB/Eq		1 No.		
31	Indication Lamp		L&T/Siemens/ABB/Eq		1 No.		
32	Selector Switch	10A	L&T/Siemens/ABB/Eq		1 No.		
33	Push button	Emergency type with 2 NO	L&T/Siemens/ABB/Eq		1 No.		
34	Timer	Multifunction	L&T/Siemens/ABB/Eq		1 No.		
35	Relay	4 CO	Idec/Omron/Plaa/Eq		1 No.		
36	Terminals		Elmex		1 No.		
37	Pipe & fittings		CSS		1 Lot		
38	PU tube		Standard		1 No.		
39	Flexible hose	1/2", Transparent PVC,	Hydrax/Reput		1 m		



		nylon braided, 10 kg/cm ² , Swivel end	ed				
40	Flexible hose	3/4", Transparent PVC, nylon braided, 10 kg/cm ² , Swivel end	Hydrax/Reputed		1 m		
41	Flexible hose	1", Transparent PVC, nylon braided, 10 kg/cm ² , Swivel end	Hydrax/Reputed		1 m		
42	Flexible hose	1-1/4", Transparent PVC, nylon braided, 10 kg/cm ² , Swivel end	Hydrax/Reputed		1 m		
43	Flexible hose	1-1/2", Transparent PVC, nylon braided, 10 kg/cm ² , Swivel end	Hydrax/Reputed		1 m		
44	Under Belt Switch	Model MT-4W-AA-41	Jayashree/Sai Controls/ Proto Control /Eqv.		1 No.		
45	Zero Speed Switch		Jayashree/Sai Controls/ Precision Inst./Proto Control/ Eq		1 No.		
46	Proximity Sensor		Autonics/Precision Instruments/ Omron/ Eq		1 No.		
47	PVC Tank	10 m ³	Sintex/Reno/ Eq		1 No.		
48	Pump	0.8m ³ /hr, 6.8 Bar,	Grundfos/KBL /KSB/ Eq		1 No.		
49	"Y" Strainer	25NB, Body & Mesh CF8,O Ring NBR, Screwed	Marck/Flowtech/Superflow		1 No.		
50	"Y" Strainer	50NB, Body & Mesh CF8,O Ring NBR, Screwed	Marck/Flowtech/Superflow		1 No.		
51	Ball Valve	25NB, FS A-105, 800#, 3 Pc design with 200mm nipple	Zac/Cair/Bellstone/ Eqv		1 No.		
52	Ball Valve	50NB, FS A-105, 800#, 3 Pc design with 200mm nipple	Zac/Cair/Bellstone/ Eqv		1 No.		
53	NRV	25NB, FS A-105, 800#,, Screwed, Single disk Swing type	Cair/BDK/XO MOX		1 No.		
54	Globe valve	25 NB, GM, PN-16, Screwed	Alto/Qinn/Bellstone/ Eq		1 No.		
55	Pressure Relief Valve	25 NB, Angle Pattern, GM, Screwed	Suzhik/Metso/ Xomox		1 No.		
56	Pressure Gauge	1-10 kg/cm ² ,	GIC/Hguru		1 No.		
57	Push Button Station	for Start/Stop of pumps	L&T/BCH/Siemens/ Eq		1 No.		



58	Solenoid valve	25 NB, SS body, 230V AC, Screwed	Aira/Rotex/Avcon/Eqv.		1 No.		
59	Level Transmitter	Capacitance type with 3 level output & level display	Levcon/Nivo Controls/Punet ectrol/Eqv		1 No.		
60	GI Pipe	15 NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
61	GI Pipe	20NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
62	GI Pipe	25NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
63	GI Pipe	32 NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
64	GI Pipe	40 NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
65	GI Pipe	50 NB, GI, ERW, M, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
66	MS Pipe	50 NB, MS, ERW, H, Screwed end with socket, IS:1239	Jindal/Tata/Sail/Eq		1 m		
67	Pipe Fittings		Standard		1 Lot		
68	Support	500mm long L-50x50x6 support at 2.5m spacing	Standard		1 t		
69	U Clamp with nut etc.		Standard		1 No.		
70	Painting		Standard		1 litre		
71	Compressor	227 CFM, 7.5 Bar, 37kW, Screw	ELGI/Kirloskar/Atlas Copco/IR/Eqv		1 No.		
72	Compressor	267 CFM, 7.5 Bar, 45kW, Screw	ELGI/Kirloskar/Atlas Copco/IR/Eqv		1 No.		
73	Air Receiver	2 m ³	KEW/Elgi/IR/ Eq		1 No.		
74	MCC	Compartmentalised, 1200x450x1800 mm	CSS/TPS/Eqv.		1 No.		
75	Incomer	MCCB, DN-250N, 100-125A, TPN with Ext. Handle	L&T/Siemens/ABB/Eq		1 No.		
76	Compressor MCCB	MCCB, DN0-100D, TP, 63-80A	L&T/Siemens/ABB/Eq		1 No.		
77	Pump MPCB	MPCB, MOG-H1, 2.5-4A with Handle	L&T/Siemens/ABB/Eq		1 No.		
78	Pump Contactor	MNX-9	L&T/Siemens/ABB/Eq		1 No.		



79	MCB	DP, 6A	L&T/Siemens/ ABB/Eq		1 No.		
80	Selector Switch		L&T/Siemens/ ABB/Eq		1 No.		
81	Lamp		L&T/Siemens/ ABB/Eq		1 No.		
82	Push Button		L&T/Siemens/ ABB/Eq		1 No.		
83	Ammeter + ASS		AE/Rishov/Eq		1 No.		
84	Volt Meter +VSS		AE/Rishov/Eq		1 No.		
85	Relay	4CO	Idec/Omron/Pl a/Eq		1 No.		
86	Bus bar		Standard		1 No.		
87	CT	100/5A	Kappa/Eq		1 No.		
88	Terminals	Stud type	Elmex		1 No.		
89	Terminals	Control	Elmex		1 No.		
90	JB		Hencel/Baliga/ Eq		1 No.		
91	EM PB Box		L&T/BCH/Sie mens/Eq		1 No.		
92	Cable Tray	50mm to 150mm size, perforated, GI	Standard		1 m		
93	Control cable	2 core, 1.5mm ² , Cu, PVC sheathed	Polycab/Glost er/CCI/Eq		1 m		
94	Control cable	4 core, 1.5mm ² , Cu, PVC sheathed	Polycab/Glost er/CCI/Eq		1 m		
95	Power Cable	3 core, 35mm ² , Cu, PVC	Polycab/Glost er/CCI/Eq		1 m		
96	Power Cable	3 core, 2.5mm ² , Cu, PVC	Polycab/Glost er/CCI/Eq		1 m		
97	Cable Gland	3/4"	Polycab		1 No.		
98	Motorised Actuator	Body - aluminium alloy, IP:67, 90° travel, 230V AC power supply, insulation class F, Limit Switch – 2 Nos., Manual override wheel	Avcon/Rotork/C air/Eqv.		1 No.		
99	Fog Cannon	Trolley mounted with automatic tilt and swing facility as required, Throw range – 25m, Impeller & hub - Aluminium alloy, direct driven, Motor - 415V, 3 phase, TEFC, IP-55, insulation class F, Pump - >6.5kg/cm ² pressure, directly coupled with 415V, 3 phase motor, including SS nozzle and tubing to generate fine mist/fog.	Excel Combine/CSS/T PS/Eqv.		1 No.		
Total cost of equipment and components							



Table 3: Cost of installation and others charges

Sl. No.	Purpose	Rate (Percentage of total equipment cost of equipment and components)	Amount (Rs.)
1	Design, Engineering, Shop assembly of components, Consumables, internal testing etc., before despatch	@.....%	
2	Packing, Insurance and Transport	@.....%	
3	Erection and Commissioning (Mechanical and Electrical) as well as performance test	@.....%	
4	Maintenance charges during 1 year warranty period (Including consumables, spares and 2 technicians at the site)	@.....%	
	Total cost of installation and others charges		

Total cost of equipment supply and installation:

- i. Cost of equipment and components = Rs.....
- ii. Cost of installation and others charges = Rs.....
- iii. Total cost (i + ii) = Rs.....