Rajasthan State Pollution Control Board

Headquarter, 4, Institutional Area, JhalanaDoongri, Jaipur-302004
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HelpLineNo. : 0141-2716877

LiFE Lifestyle for Environment

No.Gen-816/Jaipur/RSPCB/OGM/ Date:-

OFFICE ORDER

Subject: - Guidelines for best practices in foundries (Cupola furnaces) in Rajasthan-reg.

In order to mitigate air pollution and promote sustainable practices in Foundry sector, the Rajasthan State Pollution Control Board has issued guidelines for best practices in foundries (Cupola furnaces) in Rajasthan, July, 2023. All concerned are directed to ensure compliance of the guidelines while conducting inspection of foundries (cupola furnace) and processing consent applications of these units. In addition to this, all existing units are directed to up-grade their pollution control measures and adopt best practices as per the provisions of the guidelines. A copy of the guidelines is enclosed.

Encl:- As above

(Vijai N.)
Member Secretary

No.Gen-816/Jaipur/RSPCB/OGM/887-933 Date:-11/07/2023

Copy to following for information/necessary action please:–

1. P.S. to Chairperson, RSPCB, Jaipur.
2. P.S. to Member Secretary, RSPCB, Jaipur.
3. Chief Environmental Engineer, RSPCB, Jaipur.
4. Chief Scientific Officer, RSPCB, Jaipur.
5. Group Incharge, Planning/Textile/CPP/OGM/MSW,EW/Mines, SCMG/Project, IEC/ PDF& CD/Legal/Hotel, B &C/Hazardous/Food & Misc./Liquid Waste/ BMW/Plastic & ECC/ Project & IEC, RSPCB, Jaipur.
6. Group Incharge (IT), RSPCB, Jaipur with direction to upload on Board's website.
7. Regional Officer, Regional Office, Rajasthan State Pollution Control Board Alwar/Bhiwadi/Bharatpur/Bhilwara/Bikaner/Balotra/Chittorgarh/Jaipur(North)/Jaipur (South)/Jodhpur/Kota/Kishangarh/Pali/Sikar/Udaipur/Sirohi/Rajsamand/Jhunjhunu/Jaisalmer/Banswara/Jhalawar/Nagaur/Sawaimadhopur/Hanumangarh/Bundi - with directions to circulate among all stakeholders/associations under your jurisdiction about the guidelines and ensure compliance.
8. Master File, OGM/ RSPCB, Jaipur.

Member Secretary

Guidelines for best practices in foundries (Cupola furnaces) in Rajasthan

JULY-2023

Rajasthan State Pollution Control Board
Headquarter, 4, Institutional Area, Jhalana Doongri, Jaipur-302004
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1. Introduction:-

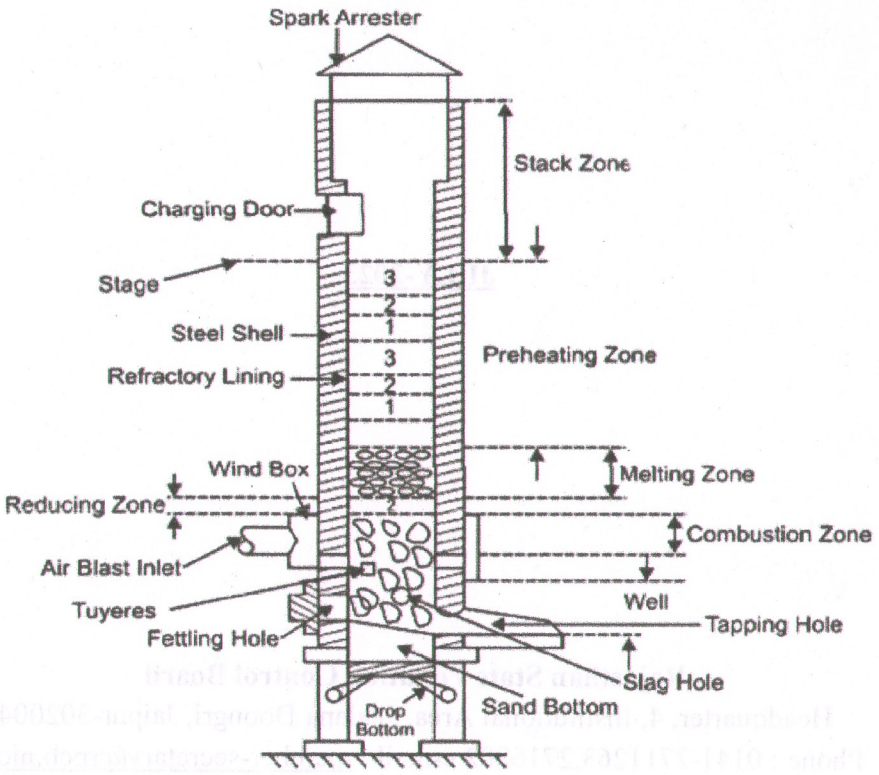
Rajasthan is a state where a large number of small foundries are operated in clusters. Major clusters of foundries are situated at VKIA, Jhotwara, Sarnadoonar(Jaipur), Ajmer, etc. The foundry industry is one of the major contributors to air pollution among all other industries in the state. Most of these casting industries use cupola furnaces that emit gases such as carbon dioxide, carbon monoxide, nitrogen dioxide, sulphur dioxide, suspended particulate matter, dust, and ash.

Salient features of typical cupola furnace in the state:-

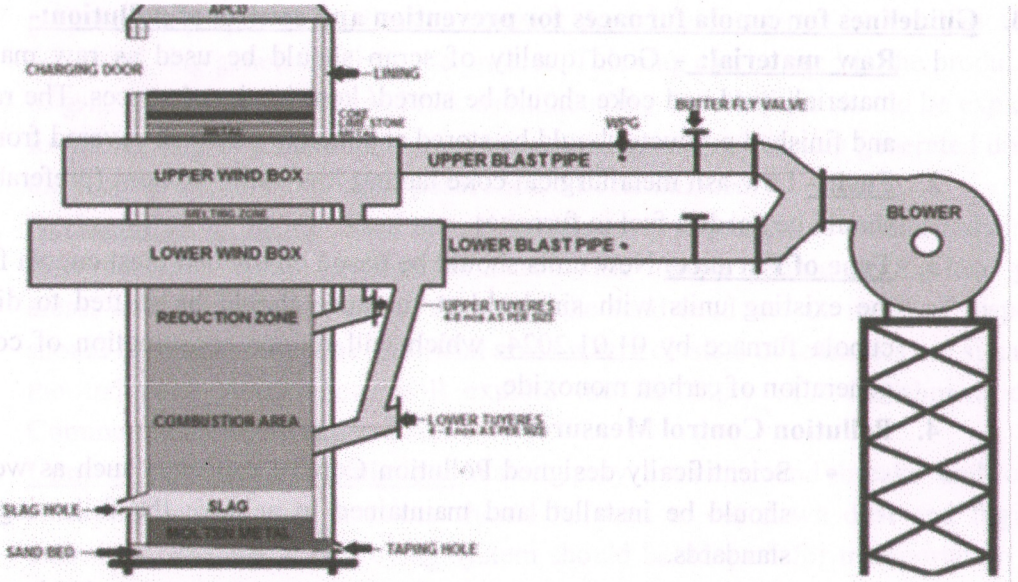
- Small scale units. (Production – 50 to 150 Ton/Month)
- Normally operational for 6-8 hrs once in 4-5 days.
- Approximately 135 kg of coke is used for the melting of one tonne of metal.
- Raw Material used in cupola furnace: - Pig Iron, Iron Scrap, additives, Coal, Sand.

Types of Cupola Furnace:-

(i) **Single blast cupola furnace**: - Air is supplied through the blower and passes through one blast pipe. Most commonly used by small-scale industries. Coke consumption and the generation of carbon monoxide are high.



(ii) **Divided blast cupola furnace:-** Having two air blast pipes and two wind boxes which reduce formation of carbon monoxide. This technology is upgraded version of single blast cupola furnace for improving the energy performance. Coke consumption (by 18 to 20 %) and pollution load (by 30 %) is reduced in this type of furnace.



2. **Environmental issues in foundries:-**

Among all different industries one of the polluting industrial sectors is foundry sector. The complete manufacturing process of foundry involves the generation of fumes, smoke and fugitive dust emission. Cupola –based foundries are using ash coke as a fuel which emits carbon monoxide, dust, carbon dioxide, nitrogen dioxide, sulphur dioxide, suspended particulate matter and ash. In addition to this heavy metals, ammonia, dioxins (when dirty scarp is used) and volatile organic compounds (VOCs) are also released.

- Fugitive Emissions:- during process like, sand preparation, mould preparation, mould cooling, casting, melting, fettling, knocking out and finishing operations.
- Point Source Emissions: - released from the chimney or stack.
- Most of the cupola based foundries are using single blast furnace which consumes a high amount of coke as compared to 'Divided Blast Cupola' (DBC) furnace.
- Slag generated from cupola furnaces is a by-product of the foundry industry. It contains silicates, alumina silicates and calcium alumina silicates. Slag generation in cupola furnace is approx. 5-6 % of total production. This slag can be used in production of cement and concrete but there is no proper channel for utilization of this slag and industries dump this slag outside the industrial premises or nearby areas.
- Sand used in sand casting process is inexpensive. In mostly units sand used in casting is silica sand. This sand can be easily recycled but units are discarding

sand without exploring the possibilities of reuse and disposing of sand outside through trolleys.

- Inadequate pollution control measures and poor operation and maintenance of these measures.
- Poor housekeeping which results in air and water pollution.

3. Guidelines for cupola furnaces for prevention and control of pollution:-

1. **Raw material: -** Good quality of scrap should be used as raw material. Raw material, sand and coke should be stored/ kept in closed spaces. The raw material and finished products should be stored at concrete platform covered from all sides.
2. **Fuel: -** Low-ash metallurgical coke having low sulfur content (preferably < 0.6%) should be used as fuel in furnaces.
3. **Type of Furnace:** New units should be based on divided blast cupola furnace, and the existing units with single blast furnaces should be shifted to divided blast cupola furnace by 01.01.2024, which will reduce consumption of coke and the generation of carbon monoxide.
4. **Pollution Control Measures:-**
   - Scientifically designed Pollution Control measures such as wet scrubbers should be installed and maintained to achieve the following prescribed standards.
   - A stack of adequate height should be installed and maintained. The stack should be constructed over the cupola beyond the charging door and emissions are directed through the stack which should be at least six times the diameter of cupola.
   - Operation and maintenance of air pollution control devices should be checked time to time, and records of the same should be maintained. Production Plant & Pollution Control Measures should be interlocked.
   - Monitoring of carbon monoxide should be carried out along with other parameters.
   - Waste water generated from the wet scrubber should be treated scientifically before disposal.

Existing emission standards for cupola furnaces

Sr. No.	Cupola Capacity(Melting rate)	Emission Parameter	Standards
1	Less than 3 MT/hr	Particulate Matter	450 mg/Nm^3
2	3 MT/hr and above	Particulate Matter	150 mg/Nm^3
3	All cupola furnaces	SO_2	300 mg/Nm^3 at 12% CO_2 corrections

The industries should comply with the standards (especially for parameters- PM_{10},$PM_{2.5}$,CO,NO_2,SO_2) as prescribed vide MOEF notification No. GSR 826(E) dated 16th November, 2009 with respect to National Ambient Air Quality Standards.

5. **Slag Management:-** Slag generated during processes should be used for gainful purposes. A proper channelization network should be developed for the disposal of discarded slag generated from the process. This slag can be used in the production of grit, road construction and brick manufacturing. Possibilities should be explored for use of slag in cement industries. A record/logbook of the slag generated during the process and its mode of disposal should be maintained.
6. **Reclamation of Sand:-** Sand should be reused at maximum level and remaining discarded sand should be disposed in scientific manner such as filling low lying areas, road construction etc. A record of the sand used and its mode of disposal should be maintained. The industrial areas where clusters of foundries are situated, the Industrial Associations will explore the feasibility of establishment of a Common Sand Reclamation Plant.
7. **Control of Fugitive Emission:-**Water spray system, wind breaks and other stockpile management practices should be used to cut down dust and fugitive emissions. Pneumatic conveying system should be adopted for transportation and feeding additives in process area.
8. **Good housekeeping practices: -**
    - Raw material, product and other materials should be stored at designated closed and covered area, cleaning of area, proper drainage system, adequate height of boundary wall and main gate etc should be maintained.
    - Metallic roads should be maintained at entrance of the foundry to control fugitive emission generated during loading and unloading of the materials in trucks.
    - Material should be transferred through closed vessels.
    - Adequate plantation inside and outside the industry's premises should be developed.
    - Proper training should be given to the staff for process and energy saving techniques and record for the same should be maintained.
    - Measures should be adopted for occupational & safety of the staff. Proper ventilation & fume extraction system should be installed in the unit.
