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**Guidelines for ensuring health and safety of
employees carrying out Stack Monitoring in
industries or other places**

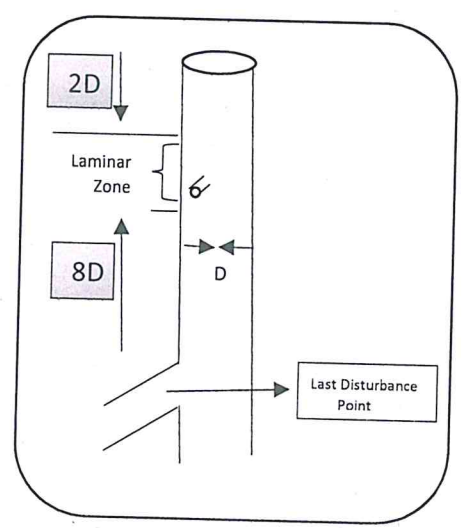


**Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongri,
Jaipur**

Stack-emissions monitoring is an inherently hazardous occupation. There are many hazards associated with carrying out a stack emissions test in industry. Therefore, the basic principles of good health and safety practice must be applied. These guidelines describe the requirements of stack monitoring infrastructure in industries and the steps to be taken to minimise the risks associated with stack monitoring.

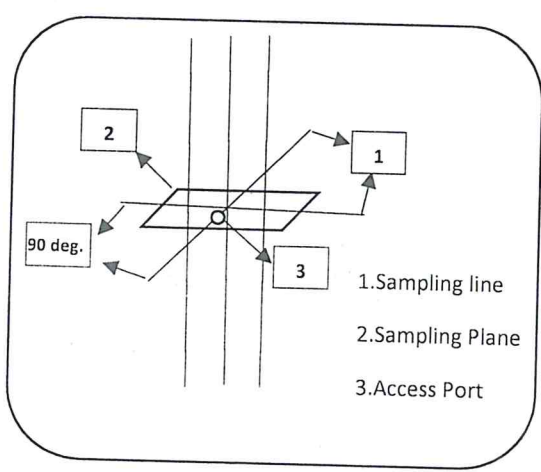
Stack monitoring is carried out as per IS 11255 : 2008 and CPCB guidelines for stack monitoring (LATS/80/2013-2014). Following are the requirements of stack infrastructure as per these documents:

1. **Location of Sampling Port:** To ensure laminar flow, sampling ports shall be located at least 8 times of chimney diameter (internal diameter) downstream and 2 times upstream from last flow disturbance. This is the Laminar Zone, where port should be installed. For a rectangular cross section, the equivalent diameter (De) shall be calculated by using following equation to determine up stream, downstream distances.



$$De = \frac{2LW}{L+W}$$

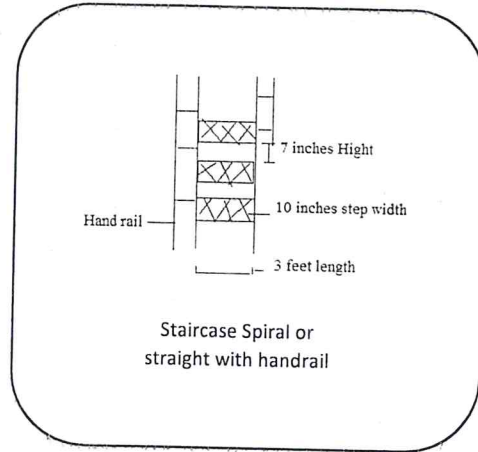
Where L =Length in m, W= width in m.



2. **Number of sampling ports:** Minimum two (at 90 degrees) sampling ports are required in a circular chimney, so that full stack cross-sectional area can be covered for measurements. For stacks having diameter between 2 and 4 meters, two mutually orthogonal sampling ports are to be increased to four by providing additional sampling ports at diametrically opposite position, to the first two sampling ports.

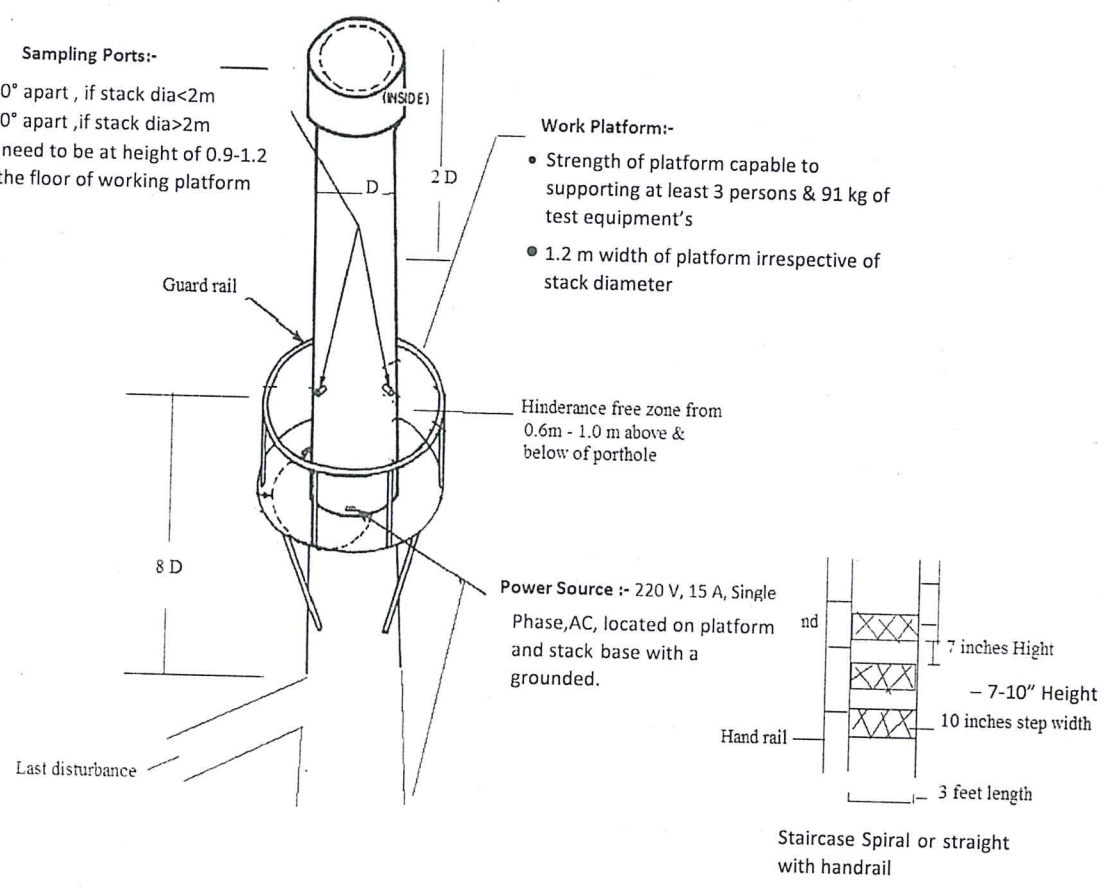
3. **Dimension of Sampling port:** It shall be a standard flanged pipe of 100 mm diameter (4 inches) with 150 mm bolt circle diameter (number of screw holes for bolts are evenly distributed). Easily removable blind flange shall be provided to close the port when not in use. A flanged pipe is used as a port, shall extend outward from exterior stack wall not less than 50 mm and not more than 200 mm. Port need to be at height of 0.9- 1.2 m above the floor of working platform.

4. **Access to platform:** Safe and easy access to the work platform should be provided via step stairways having guardrails. Spiral stairways are preferred. Width of step should be at least 10 inches with length preferably 3 feet. Height between two steps could be from 7-10 inches. No opening of stairs should be located within 1 meter of any port. Monkey ladders are not permissible / acceptable.



5. **Working platform:** A safe guardrail should be provided on the platform. It has to be on half of the circumference for one porthole; otherwise entire circumference platform has to be made about 0.9 to 1.2 m below the centre of portholes. Width should not be less than 1.2 m irrespective of diameter of stack. The guard rails should be at a safe height keeping in mind the insertion of sampling apparatus in the ports.
6. **Platform loading:** The work platform should be rigid, safe and strong enough to support at least three men (Average 80 Kg each) and 91 Kg of test equipment (stack monitoring kit, etc.). If the stack exists through a building roof, the roof may suffice as the work platform, provided the minimum test sites requirements are met.
7. **Clearance Zone:** All around the port, obstruction free, and clearance zone shall be provided at each port. The zone shall extend 0.6- 1.0 m above, below to either side of the port. The zone shall extend outward from the exterior wall of the stack to a distance of at least 3 m.
8. **Power Supply:** - Power supply shall be as follows:
 - a) Platform- one 220 volts, 15-amp, single phase AC circuit with a grounded, two receptacle weather proof outlets.
 - b) Stack base- one 220 volts, 15-amp, single phase AC circuit with a grounded, two receptacle weather proof outlets.
9. **Vehicle Access and Parking:** Vehicle access and parking space must be provided within the premises/near stack, since various equipments are transported up to stack.
10. **Additional Requirement:**
 - The sampling platforms, guard rails etc., shall be free from any corrosion and should be regularly painted and checked for corrosion. Corroded parts should be replaced immediately.
 - There shall be no leakage around the sampling port (specially needed for stacks emitting corrosive chemicals).

- If anticorrosive lining is done inside the chimney, the same shall be extended to the projected portion of the sampling port, monolithically. It has been observed that due to improper lining at the port, the chimney life is reduced considerably.
- The sampling port shall be air tight and no moist air shall be allowed to enter the chimney.
- The platform shall not accumulate free-standing water, if necessary, drainage is to be provided.
- The tops of handrails should be far enough below the centre line of the access ports so that they do not interfere with the insertion and removal of the sampling apparatus.



Typical Sampling Provision

Responsibilities of Board officials for ensuring Safety of monitoring person & implementation of these guidelines:

1. Regional Officers and Group In charges must ensure the sampling infrastructure at stack as per these guidelines before issuing Consent to Establish and Consent to Operate.
2. The structural integrity and condition of stack/platform and its access must be inspected and assessed by a person/organisation empanelled under section 6, Rule 3C of Rajasthan Factories Rules, 1951 or by
 - i. A person having Degree in Civil or Structural Engineering or equivalent having minimum of 15 years experience in the design of construction or testing or repairs of structures; and
 - ii. Knowledge of non-destructive testing, various codes of practice that are current and the effect of the vibrations and natural forces on the stability of the buildings; and
 - iii. Ability to arrive at a reliable conclusion with regard to the safety of the structure or the building.
3. Such assessment report shall be asked from industry/site operator at the time of issuance of consent and subsequently every year.
4. Monitoring team should ask to see evidence of the inspection of structural integrity before they ascend to the work area.
5. The inspecting official shall inspect stack monitoring facilities during inspection and record their observations in the I/R with comments on adequacy and safety, as per these guidelines.
6. If monitoring team finds that the sampling facilities are inadequate to proceed for monitoring, on the spot deficiency memo must be issued to the site operator as per **Annexure-1**.
7. If once the monitoring has been started and the monitoring team observes the need of improvement/deficiencies in the monitoring infrastructure, on-the-spot deficiency memo shall be issued to the site operator as per **Annexure-2**.
8. Regional Officers and Lab In charges must provide Personal Protective Equipment's (PPEs) like safety goggles, helmet, safety shoe, gloves and masks to the persons carrying out the monitoring.
9. As height is a risk factor, safety belt must be provided to the monitoring person.
10. As high heat is generated at stack, monitoring persons should be adequately hydrated.
11. Monitoring person must only start work at the monitoring position if weather and environmental conditions are safe and stable.
12. First aid should be available with the monitoring team.



Rajasthan State Pollution Control Board
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RSPCB Helpline No. - 0141-2716877

Annexure-1

To,

Subject: On the spot deficiency memo.

Reference: Inspection / visit of your industry on date.....for conducting stack emission quality monitoring.

Sir,

This is to inform you, that your industry has been inspected/visited on.....for conduction stack emission monitoring but monitoring could not be carried out due to inadequate infrastructure facility with the stack. The details of the same are as under:

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Therefore, you are advised to provide adequate infrastructural facilities for stack emission quality monitoring as per enclosed guidelines within a period of 15 days from the date of issue of this notice and submit photographic evidence to this office. In case of non-compliance, action under the provisions of the Air (Prevention and Control of Pollution) Act, 1981 may be initiated without any further notice.

Monitoring Officials of the Board
(Name and Designation)

Received by:

Name & Signature:

Designation & Organization:



162

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Annexure-2

To,

Subject: On the spot deficiency memo.

Reference: Inspection / visit of your industry on date..... for conducting stack emission quality monitoring.

Sir,

This is to inform you, that your industry has been inspected/visited on.....for conduction stack emission monitoring was conducted but following deficiencies have been observed in the stack monitoring facility that needs improvement. The details of the same are as under:

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Therefore, you are advised to provide adequate infrastructural facilities for stack emission quality monitoring as per enclosed guidelines within a period of 15 days from the date of issue of this notice and submit photographic evidence to this office. In case of non-compliance, action under the provisions of the Air (Prevention and Control of Pollution) Act, 1981 may be initiated without any further notice.

Monitoring Officials of the Board
(Name and Designation)

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