

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL****WESTERN ZONE BENCH AT PUNE****ORIGINAL APPLICATION NO. 179 OF 2024****IN THE MATTER OF:**

Surti Mohammed Aaqib

...APPLICANT

*Versus*

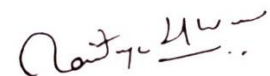
M/s A.R. Enterprise and Ors.

...RESPONDENT

**INDEX**

<b>S.No.</b>	<b>Particulars</b>	<b>Page</b>
1.	<b>Rejoinder on behalf of the Applicant to Affidavit-in-Reply filed by Respondent No. 1</b>	198-207
2.	<b><u>ANNEXURE A-9</u></b> Order of the Hon'ble Supreme Court in <b>State of Madhya Pradesh v. Kalyan Singh</b> reported in <b>AIR 2019 SC 312</b>	208-213
3.	<b><u>ANNEXURE A-10</u></b> Pollution Control Guidelines for Conversion of Boilers/Utilities from Natural Gas to Solid Fuels dated 7.06.2014 issued by the Gujarat Pollution Control Board	214-236

THROUGH


**MAITREYA PRITHWIRAJ GHORPADE****ADVOCATE**

COUNSEL FOR THE APPLICANT

Mobile: 7024102546

Email: [maitreya.ghorpade@gmail.com](mailto:maitreya.ghorpade@gmail.com)**Place: Pune****Date: 21.11.2024**

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL****WESTERN ZONE BENCH AT PUNE****ORIGINAL APPLICATION NO. 179 OF 2024****IN THE MATTER OF:**

Surti Mohammed Aaqib

...APPLICANT

*Versus*

M/s A.R. Enterprise and Ors.

...RESPONDENT

**REJOINDER ON BEHALF OF THE APPLICANT TO AFFIDAVIT-IN-REPLY  
DATED 11.11.2024 FILED BY RESPONDENT NO. 1**

1. It is submitted that the present application has been filed under Section 18(1) read with Section 14 and 15 of the National Green Tribunal Act, 2010 raising the substantial question regarding discharge of harmful exhaust emissions and non-compliance with mandated air pollution control measures ('APCM') by Respondent No. 1 M/s A.R. Enterprise in operation of 0.7 TPH steam boiler and 400U Thermic Fluid Heater at cloth processing unit located in Chandola region, Ahmedabad, in violation of the Consolidated Consent and Authorization ('CCA') dated 8.06.2023 issued by Gujarat Pollution Control Board ('GPCB').
2. That vide Affidavit-in-Reply dated 11.11.2024, Respondent No. 1 has filed their responses to the submissions made in the present Application.
3. At the outset, the Applicant denies each and every averment and conclusion made in said Affidavit which is contrary to and/or inconsistent with what has been submitted on record in the present Application. Furthermore, nothing stated in the present Rejoinder on behalf of the Applicant shall be construed as an admission for the want of any specific and para-wise denial or non-traverse unless and until the same is specifically admitted hereinafter.

4. That the following are the responses on behalf of the Applicant to the submissions made by the Respondent No.1 vide Affidavit dated 11.11.2024:

**I. PRESENT APPLICATION CANNOT HAVE ANY BEARING ON EXTANT CRIMINAL PROCEEDINGS INVOLVING APPLICANT'S FATHER**

5. It is submitted that Respondent No. 1 on **Pg. 62, Para 3.1.**, has stated that the present Application has been initiated in order to "pressurize" one Mr. Altaf Aslam Sagar into withdrawing criminal proceedings initiated against the father of the present Applicant. That the said Mr. Altaf Aslam Sagar is allegedly the son-in-law of the proprietor of Respondent No. 1.
6. However, the Applicant summarily rejects such contentions as being false, baseless, and untenable in law. The Applicant submits that not only has the Respondent No.1 failed to annexe any evidence in furtherance of such a serious allegation, including any proof of relation, but also submits that such an allegation is untenable in law, owing to the fact that the criminal proceedings initiated against the father of the Applicant are under Section 307 of the Indian Penal Code, 1860, which is a non-compoundable offence.
7. That therefore, any case registered under such Section 307 cannot be withdrawn by the complainant whatsoever, and accordingly, the present Application cannot be said to be initiated in order to pressurize one Mr. Altaf Aslam Sagar to withdraw the criminal proceedings, as such is entirely an untenable in law, and is liable to be rejected by this Hon'ble Tribunal. That in support of the said submissions, the Applicant relies on the order of the Hon'ble Supreme Court in **State of Madhya Pradesh v. Kalyan Singh** reported in **AIR 2019 SC 312** annexed and marked herewith as **ANNEXURE A-9.**

8. Furthermore, the Applicant rejects the submissions made by Respondent No. 1 on Para 3.1(c), Pg. 64, that litigation has been initiated by the Applicant raising “baseless” allegations about lack of water scrubber in the premises of Respondent No. 1 in order to harass and arm-twist the Respondent No. 1.
9. The Applicant submits that the failure to adhere to Air Pollution Control Measures mandated by Condition No. 4.2 of the CCA dated 8.06.2023 has been repeatedly observed by the GPCB, as is evident per the following documents:
  - A. GPCB Inspection Report dated 29.01.2024 annexed at **Annexure A-3, Pg. 25**
  - B. GPCB Show Cause Notice dated 12.04.2024 annexed at **Annexure A-4, Pg 37**
  - C. GPCB Inspection Report dated 15.05.2024 annexed at **Annexure A-5, Pg 38**
10. That therefore, the Applicant submits that no baseless allegations have been raised by the Applicant whatsoever, and each assertion made by the Applicant in the present Application has been done after sufficient application of mind and stands corroborated by the evidence above-mentioned.
11. Additionally, the Applicant submits that all the other litigations mentioned by the Respondent No. 1 do not have any bearing on the merits of the present Application. Furthermore, all the mentioned litigations have distinct juristic entities and legal personalities as party Respondents, and therefore, the existence of such litigation cannot be conflated with the present Application.
12. The Applicants submits that all the mentioned litigation will necessarily be adjudicated on their own merits, and if anything, the evidence of such litigations only buttresses the fact that both the Applicant and the father of the Applicant are interested in addressing environmental and health risks in their city posed by unauthorized operation of textile units in violation of environmental laws.

**II. THE PRESENT APPLICATION IS MAINTAINABLE BEFORE THIS HON'BLE TRIBUNAL**

13. It is submitted that the Respondent No. 1 vide **Para 3.2, Pg 64**, has alleged that the Applicant has failed to point out any enactment specified in Schedule I out of which a substantial question relating to environment is arising. However, the Applicant rejects such assertions as being false, baseless, and misleading this Hon'ble Tribunal.
14. The Applicant submits that **Para 8 Pg. 6** of the present Application clearly specifies that the Respondent No. 1 has violated the conditions imposed in the CCA dated 8.06.2023 which has in fact been issued to Respondent No. 1 by the GPCB under the provisions of the Air (Prevention and Control of Pollution) Act, 1981, which is a Schedule I enactment.
15. Furthermore, the Applicant states that the submissions made in the present Application have been done on well-founded concerns regarding the Respondent No.1's continued non-compliance mandating installation of air pollution control measures, viz., installation of water scrubber, as was mandated by the Condition No. 4.2 of the CCA dated 8.06.2023.
16. The Applicant has made specific allegations concerning the Respondent's failure to install and maintain water scrubbers, which directly contravenes environmental regulations and harms local environment. Thus, the invocation of Section 14 is well within the scope of the National Green Tribunal Act, 2010, as the substantial question raised clearly pertains to air pollution impacting the environment, caused due to the continued non-compliance with mandated air pollution control measures in violation of the CCA dated 8.06.2023.

17. Furthermore, Section 15 of the National Green Tribunal Act, 2010, allows this Hon'ble Tribunal to order relief and compensation to victims of environmental damage caused due to violations of the Air Act, 1981. That as is evident per the **Prayer Clause 4, Pg 11**, the Applicant has sought for imposition of Environmental Damage Compensation ('EDC') as per the provisions of Section 15 of the National Green Tribunal Act, 2010, in adherence with the Polluter Pays Principle enshrined in Section 20 of the National Green Tribunal Act, 2010.

### **III. GPCB GUIDELINES MANDATE WATER SCRUBBER INSTALLATION**

18. It is submitted that the Respondent No. 1 vide **Para 4.10, Pg 67**, has stated that *"as per the applicable norms of GPCB a water scrubber is required to be installed only where the boiler capacity exceeds 1 tonne and it utilizes lignite as fuel."* Accordingly, Respondent No. 1 contends that Respondent No. 1 is not required to install a water scrubber. However, no documents have been submitted on record by Respondent No. 1 evidencing the alleged 'GPCB norms'.
19. That the Applicant rejects such contentions as being false, misleading, and untenable in law. The Applicant relies on Condition No. 4.2 of the CCA dated 8.06.2023, as well as the GPCB Inspection Reports dated 29.01.2024 and 15.05.2024, which clearly evidence that the GPCB has observed the a failure to install water scrubber amounts to violation of the CCA conditions.
20. Furthermore, the Applicant relies on the 'Pollution Control Guidelines for Conversion of Boilers/Utilities from Natural Gas to Solid Fuels (Coal, Lignite, Agro Fuels etc)' dated 7.06.2014 issued by the GPCB, wherein the GPCB has clearly mandated installation of cyclone + water scrubber at all units with Steam Generation capacity of less than 1 TPH. Relevant extracts of the Guidelines:

*10.0 INSTALLATION AND OPERATION OF AIR POLLUTION CONTROL MEASURES:*

*10.1 Industry falling in critically polluted areas shall have to achieve norms of PM as 100 mg/Nm<sup>3</sup> in stack emission and for that industry shall upgrade APCM.*

*10.2 **The applicant shall be required to provide following minimum APCM based on type of fuel and its consumption, fuel property like CV equivalent (NCV of fuel), equivalent ash content, equivalent moisture content etc. the industry may add to the APCM prescribed below, if need be so.***

*Table-1*

<i>Steam Generation Capacity (in TPH)</i>	<i>Type of APMC</i>
<b><i>Less than 1</i></b>	<b><i>Cyclone + Water Scrubber</i></b>
<i>1 to 8</i>	<i>Multi Cyclone + Bag Filter + Water Scrubber</i>
<i>8 and More</i>	<i>ESP + Water Scrubber</i>

*(emphasis supplied)*

A copy of the 'Pollution Control Guidelines for Conversion of Boilers/Utilities from Natural Gas to Solid Fuels (Coal, Lignite, Agro Fuels etc) dated 7.06.2014 issued by the GPCB is annexed and marked herewith as **ANNEXURE A-10.**

21. Furthermore, it is important to note that in addition to the boiler, Respondent No. 1 also operates a 400 U Thermic Fluid Heater (TFH), which also uses wood as fuel. Both the steam boiler and the TFH are connected to a common stack, further compounding the potential for combined emissions that may exceed acceptable limits.
22. It is submitted that the absence of proper and effective APCM for both steam boiler and the TFH amplifies the risk of untreated emissions, leading to a failure in addressing the cumulative environmental impact of these operations. This raises significant concerns regarding the adequacy of the Respondent No. 1's air pollution control measures
23. Therefore, the submissions made regarding non-requirement of installation of water scrubber by Respondent No. 1 are liable to be rejected by this Hon'ble

Tribunal, as they are evidently contrary to the GPCB Guidelines of 2014, and the failure to install water scrubber for several months in violation of the CCA dated 8.06.2023 is liable to be penalized by this Hon'ble Tribunal.

#### **IV. AIR QUALITY SAMPLE INCONCLUSIVE EVIDENCE**

24. Additionally, Respondent No. 1 has submitted on Para 4.6, Pg 66, that the *"analysis of air sample collected by GPCB during its inspection...reveals that the prescribed parameters are met with."* However, the Applicant rejects the said submissions as being misleading.
25. It is submitted that that the air quality measurements referenced in the GPCB Inspection Report dated 29.01.24 cannot be considered conclusive evidence of the Respondent No.1's adherence to environmental norms. That the conditions under which the air samples were taken have not been clearly specified, and it is not indicated whether the samples were collected during full-load operations of the boiler, when emissions would likely exceed permissible limits.
26. The Applicant submits that Steam Boilers operating at part load or idle conditions may result in lower emissions, which could potentially fall within prescribed limits. Therefore, a comprehensive analysis that accounts for the operational load of the boiler at the time of testing is necessary to draw definitive conclusions regarding environmental compliance.
27. Accordingly, the Applicant prays that the submissions made by the Respondent No. 1 in Affidavit-in-Reply dated 11.11.2024 are liable to be rejected, and further that this Hon'ble Tribunal may impose EDC on Respondent No. 1 for the total duration of days wherein the water scrubber was not installed i.e., from the date of CCA dated 8.06.2023 to the date of installation of water scrubber.



Pass any other orders as this Hon'ble Tribunal may deem fit and proper in the facts and circumstances of the instant case.

*Aaqib I*  
**APPLICANT**

THROUGH

*Maitreya Ghorpade*

**MAITREYA PRITHWIRAJ GHORPADE**

**ADVOCATE**

COUNSEL FOR THE APPLICANT

Mobile: 7024102546

Email: [maitreya.ghorpade@gmail.com](mailto:maitreya.ghorpade@gmail.com)



**VERIFICATION**

I, Surti Mohammed Aaqib I, R/o 4051 Behind Old Anjuman School, Gollimda, Astodia Road, Ahmedabad - 380001 do hereby verify that the contents of the present Rejoinder abovementioned are true to my personal knowledge and nothing material has been concealed therefrom.

Date: 21/11/24

Place: Ahmedabad.

*Aaqib I*  
**APPLICANT**

SIGNED  
 BEFORE ME

*Nikita Y. Parghi*  
 NIKITA Y. PARGHI  
 NOTARY  
 GOVT. OF INDIA

21 NOV 2024

SR. No. 2641/2024

21 NOV 2024

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
WESTERN ZONE BENCH AT PUNE  
ORIGINAL APPLICATION NO. 179 OF 2024

NOTIFIED BY MS  
*Aravind*  
ADVOCATE  
Name C. M. Aravind  
Bar No. ....

**IN THE MATTER OF:**

Surti Mohammed Aaqib

...APPLICANT

*Versus*

M/s A.R. Enterprise and Ors.

...RESPONDENT

**AFFIDAVIT**

I, Surti Mohammed Aaqib I, R/o 4051 Behind Old Anjuman School, Gollimda, Astodia Road, Ahmedabad - 380001, do hereby solemnly affirm and state as under:

1. That I am the Applicant in the above titled Original Application and am conversant with the facts and circumstances described in the present case and as such, I am competent to swear this affidavit.
2. That the contents of the accompanying Rejoinder are true and correct and nothing material has been concealed therefrom.

*Surti Mohd Aaqib*  
DEPONENT

**VERIFICATION**

Verified on this 21 NOV 2024 of 21 NOV 2024 that the contents of the above-mentioned affidavit are true and correct and nothing material has been concealed therefrom.

*Aravind*  
DEPONENT

SOLEMNLY AFFIRMED  
BEFORE ME

*N Y Parthi*  
NIKITAY. PARGH  
NOTARY  
GOVT. OF INDIA

21 NOV 2024



**NON-REPORTABLE**

IN THE SUPREME COURT OF INDIA

CRIMINAL APPELLATE JURISDICTION

**CRIMINAL APPEAL NO. 14 OF 2019**

[Arising out of SLP (Crl.) No. 5632 of 2014]

State of Madhya Pradesh

.. Appellant

Versus

Kalyan Singh &amp; Ors.

.. Respondents

**J U D G M E N T****M. R. Shah, J.**

Leave granted.

1. Being aggrieved and dissatisfied with the impugned judgment and order dated 29.7.2018 passed by the High Court of Madhya Pradesh in Miscellaneous Criminal Case No. 6075 of 2013, by which the High Court has quashed the criminal proceedings pending against the present Respondent herein by Crime No. 23 of 2013 for the offences under Sections 307, 294

Signature Not Verified

Digitally signed by  
VISHAL ANAND  
Date: 2019.01.04  
16:26:41 IST  
Reason: 

Section 34 of the IPC registered at the Police Station

Maharajpur, District Gwalior, the State of Madhya Pradesh has preferred the present appeal.

2. That the Respondent No. 5 herein-the original Complainant one Birbal Sharma filed a complaint against Respondent Nos. 1 to 4 herein-the original Accused for the offences under Sections 307, 294 read with Section 34 of the IPC. That the said complaint was registered as Crime No. 23 of 2013 at the Police Station Maharajpur, District Gwalior. It appears that the original Accused filed an application for bail which came to rejected by the learned Sessions Court and, thereafter, the original Accused approached the High Court by filing the Miscellaneous Criminal Case No. 6075 of 2013 under Section 482 of the Cr.PC and requested to quash the criminal proceedings on the ground that the accused and the original Complainant have settled the dispute amicably. That the original Complainant submitted his affidavit stating that he has amicably settled the subject-matter of the crime with the original Accused and that he has no objection for dropping the criminal proceedings. That, by the impugned judgment and order, the High Court in exercise of power under Section 482 of the Cr.PC

has quashed the criminal proceedings against the original Accused which were for the offences under Sections 307, 294 read with Section 34 of the IPC, solely on the ground that the original Complainant and Accused have settled the dispute and the original Complainant does not want to prosecute the accused and, therefore, there is no change of recording conviction against the accused persons. At this stage, it is required to be noted that the said application was opposed by the State observing that the offences alleged against the accused are non-compoundable offences and, therefore, even if there is any settlement between the Complainant and the Accused, the complaint cannot be quashed. However, despite the above, the High Court quashed the criminal proceedings against the original Accused on the ground that there is a settlement between the Complainant and the original Accused and the original Complainant does not want to prosecute the accused further.

2.1 Feeling aggrieved and dissatisfied with the impugned judgment and order passed by the High Court quashing the criminal proceedings against the accused for the offences under

Sections 307, 294 read with Section 34 of the IPC, the State of Madhya Pradesh has preferred the present appeal.

3. We have heard Shri Ms. Swarupama Chaturvedi, learned Advocate appearing on behalf of the State of Madhya Pradesh, Ms. Malini Poduval, learned Advocate appearing on behalf of the original Accused and perused the impugned judgment and order passed by the High Court.

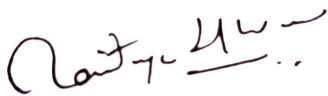
3.1 It is required to be noted that the original Accused was facing the criminal proceedings under Sections 307, 294 read with Section 34 of the IPC. It is not in dispute that as per Section 20 of the Cr.PC offences under Sections 307, 294 read with Section 34 of the IPC are non-compoundable. It is also required to be noted that the allegations in the complaint for the offences under Sections 307, 294 read with Section 34 of the IPC are, as such, very serious. It is alleged that the accused fired twice on the complainant by a country-made pistol. From the material on record, it appears that one of the accused persons was reported to be a hardcore criminal having criminal

antecedents. Be that as it may, the fact remains that the accused was facing the criminal proceedings for the offences under Sections 307, 294 read with Section 34 of the IPC and that the offences under these sections are not non-compoundable offences and, looking to the serious allegations against the accused, we are of the opinion that the High Court has committed a grave error in quashing the criminal proceedings for the offences under Sections 307, 294 read with Section 34 of the IPC solely on the ground that the original Complainant and the accused have settled the dispute. At this stage, the decision of this Court in the case of ***Gulab Das and Ors. V. State of M.P.*** (2011) 12 SCALE 625 is required to be referred to. In the said decision, this Court has specifically observed and held that, despite any settlement between the Complainant on the one hand and the accused on the other, the criminal proceedings for the offences under Section 307 of the IPC cannot be quashed, as the offence under Section 307 is a non-compoundable offence. Under the circumstance, the impugned judgment and order passed by the High Court quashing the criminal proceedings

against the original Accused for the offences under Sections 307, 294 read with Section 34 of the IPC cannot be sustained and the same deserves to be quashed and set aside.

4. In view of the above and for the reasons stated above, the present appeal is allowed. The impugned judgment and order passed by the High Court in Miscellaneous Criminal Case No. 6075 of 2013 is hereby quashed and set aside. Consequently, the criminal proceedings being Crime No. 23 of 2013 under Sections 307, 294 read with Section 34 of the IPC registered at Police Station Maharajpur, District Gwalior be proceeded further in accordance with law and on its own merits.

TRUE COPY



.....J.  
(D. Y. CHANDRACHUD)

.....J.  
(M. R. SHAH)

New Delhi,  
January 4, 2019.

ANNEXURE A-10

---

**Pollution Control Guidelines  
for  
Conversion of Boilers/ Utilities  
from  
Natural Gas to Solid Fuels  
(Coal, Lignite, Agro Fuels etc)**

---

**Office Order No. GPCB/ANK-C992/215695 Dated 7-6-14**



**Gujarat Pollution Control Board  
Paryavaran Bhavan,  
Sector 10A Gandhinagar -382010  
Website: [www.gpcb.gov.in](http://www.gpcb.gov.in)**

**May, 2014**

*Clean Gujarat Green Gujarat  
ISO-9001-2008 & ISO-14001-2004 Certified Organisation*

## CONTENTS

<b>1.</b>	<b>Foreword</b>	<b>2</b>
<b>2.</b>	<b>Abbreviations</b>	<b>3</b>
<b>2.</b>	<b>Background</b>	<b>4</b>
<b>3.</b>	<b>Deliberations of the committee</b>	<b>4</b>
<b>4.</b>	<b>Boiler system</b>	<b>5</b>
<b>5.</b>	<b>Classification of combustion technology</b>	<b>6</b>
<b>6.</b>	<b>Types and properties of fuel</b>	<b>7</b>
<b>7.</b>	<b>Storage and Handling of fuel</b>	<b>13</b>
<b>8.</b>	<b>Fuel feed mechanism</b>	<b>14</b>
<b>9.</b>	<b>Combustion chamber and flue gas</b>	<b>15</b>
<b>10.</b>	<b>Installation of air pollution control measures</b>	<b>17</b>
<b>11.</b>	<b>Ash and Slag management</b>	<b>21</b>
<b>12.</b>	<b>Other requirement</b>	<b>21</b>
<b>13.</b>	<b>Annexure –I Constitution of the committee</b>	<b>23</b>



## GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Phone: (079) 23232152

Fax: (079) 23222784

Website : [www.gpcb.gov.in](http://www.gpcb.gov.in)

### Foreword

Combustion of Fossil fuel/Bio-fuel in Boilers is one of the proven methods for production of steam, required for the process in various types of industry. The running of Boiler with fuels of proper specification at a higher efficiency is the key to reduce the SO<sub>x</sub>, NO<sub>x</sub>& the PM levels in the stack which are the key air pollutants.

With increase in the price of natural gas, the Board is getting proposals/ applications for the fuel conversion from natural gas to Solid fuels like coal, lignite, agro-waste, briquettes, imported coal etc. from industries of various regions of Gujarat.

Simultaneous conversion of the large numbers of industries may result in to the impetus in the ambient pollution load if not taken care appropriately right from planning stage to execution & operation phases.

This has resulted in to need to frame a guideline for the design & operation of the solid fuel based utilities & their Air Pollution Control Devices (APCD).

Principles followed to frame this guideline were:

- i. Optimization of the fuel to be used
- ii. Optimization of the combustion
- iii. Application of suitable BAT for the Air Pollution Control Devices (APCD) and operations thereof.

Vigorous consultation was carried out with experts from academia, Retd. Officers from Chief Boiler Inspectorate, boiler manufactures, APCD manufacture & various officers of GPCB at head office and regional offices for their valuable inputs to make this guideline effective.

We hope, this will be useful to all the stakeholders to control the air pollution especially flue gas emission from the industries & will prove to be effective decision making tool. It is however, made explicitly clear that prior permission of the GPCB under the Air Act,1981 is a must for change of fuel in boilers/ utilities.

**(Hardik Shah)**  
**Member Secretary**

## Abbreviations

Apcd	Air pollution control devices
Apcm	Air pollution control measures
Bat	Best available technology
C	Carbon
Cems	Continuous emission monitoring system
Cepi	Comprehensive environmental pollution index
CO <sub>2</sub>	Carbon dioxide
Cv	Calorific value
Daf	Dry ash free
Fc	Fixed carbon
Gcv	Gross calorific value
Gpcb	Gujarat pollution control board
H <sub>2</sub>	Hydrogen
Msw	Municipal solid waste
N <sub>2</sub>	Nitrogen
Ncv	Net calorific value
No <sub>x</sub>	Nitrogen oxides
Npc	National productivity council
O <sub>2</sub>	Oxygen
Plc	Programmable logic controller
Pm	Particulate matter
Rav	Reduced air volume
S	Sulphur
So <sub>x</sub> ,	Sulphur oxides
Tfh	Thermic fluid heater
Vm	Volatile matter

## **1.0 Background**

Most of the industries in the state of Gujarat, using fossil fuel as their energy input, are located in urban areas with deteriorating ambient air quality in the urban areas, due to various factors such as industrialization, traffic density, burning of MSW etc., it is becomes all the more important to restrict new sources of air pollution. This is the very basic of promoting cleaner fuels. However, with increase in price of cleaner fuel like natural gas in unreasonable proportion, the industries have found it inevitable to turn back to using cheaper fuel like Coal, lignite & other solid fuels for their survival. With increase in the price of natural gas the Board is getting applications for the fuel conversion from natural gas to Solid fuel like coal, lignite, agro-waste, briquettes, imported coal etc. from industries of various regions of Gujarat.

As some of the regions of Gujarat State are covered under critically polluted areas and also for the economical scale of operation there is a need to form a committee and make a policy for the conversion of Natural Gas based Boiler/Utility to Solid fuel based Boiler/Utility, which would at the same time address the issues related to Air pollution in both, the areas covered under the CEPI and rest of the areas without CEPI. This has lead to formation of a committee that would prepare guideline for this purpose. For the said purpose, the Gujarat Pollution Control Board (GPCB) has constituted a Committee vide letter No: GPCB/ANKLESHWAR-C-992/167193, dated 05/12/2013 (Annexure - I), which also had consultative meetings with industries and academia to have their inputs.

## **2.0 Deliberations of the Committee:**

Committee held three meetings with the experts consisting of persons from academia, boiler manufacturers, professionals associated with the operations of boilers and institutes like the National Productivity Council (NPC). The meetings of the committee were held on 09/12/2013, 18/12/2013, 31/12/13, 06/01/2014, 26/03/2014 and 15/04/2014 at GPCB, Gandhinagar. The committee discussed at length the information with regard to fuel type, fuel consumption, boiler capacity and related required APCM and came out with this guideline.

### 3.0 Boiler System

The heating surface is any part of the boiler metal that has hot gases of combustion on one side and water on the other. Any part of the boiler metal that actually contributes to making steam is heating surface. The amount of heating surface of a boiler is expressed in square meters. The larger the heating surface a boiler has, the more efficient it becomes. The quantity of the steam produced is indicated in tons of water evaporated to steam per hour. Maximum continuous rating is the hourly evaporation that can be maintained for 24 hours.

The boiler system comprises of: feed water system, steam system and fuel system. The **feed water system** provides water to the boiler and regulates it automatically to meet the steam demand. Various valves provide access for maintenance and repair. The **steam system** collects and controls the steam produced in the boiler. Steam is directed through a piping system to the point of use. Throughout the system, steam pressure is regulated using valves and checked with steam pressure gauges. The **fuel system** includes all equipment used to provide fuel to generate the necessary heat. The equipment required in the fuel system depends on the type of fuel used in the system.

The water supplied to the boiler that is converted into steam is called **feed water**. The two sources of feed water are: (1) **Condensate** or condensed steam returned from the processes and (2) **Makeup water** (treated raw water) which must come from outside the boiler room and plant processes. For higher boiler efficiencies, the feed water is preheated by economizer, using the waste heat in the flue gas.

### 4.0 BOILER TYPES AND CLASSIFICATIONS:

There are virtually infinite numbers of boiler designs but generally they fit into one of two categories:

**Fire tube** or "fire in tube" boilers; contain long steel tubes through which the hot gasses from a furnace pass and around which the water to be converted to steam circulates. Fire tube boilers, typically have a lower initial cost, are more fuel efficient

and easier to operate, but they are limited generally to capacities of 25 tons/hr and pressures of 17.5 kg/cm<sup>2</sup>.

**Water tube** or "water in tube" boilers in which the conditions are reversed with the water passing through the tubes and the hot gasses passing outside the tubes. These boilers can be of single- or multiple-drum type. These boilers can be built to any steam capacities and pressures, and have higher efficiencies than fire tube boilers.

**Packaged Boiler:** The packaged boiler is so called because it comes as a complete package. Once delivered to site, it requires only the steam, water pipe work, fuel supply and electrical connections to be made for it to become operational. Package boilers are generally of shell type with fire tube design so as to achieve high heat transfer rates by both radiation and convection.

## 5.0 CLASSIFICATION OF COMBUSTION TECHNOLOGY

### I. GRATE FIRING TECHNOLOGY

#### A. Stationary Grate

Manual feeding

Mechanical feeding

#### B. Dumping Grate

Pneumatic spreading

#### C. Inclined water cooled Grate

Stationary water cooled grate

Vibrating water cooled grate

#### D. Travelling Grate (TG)

Pneumatic spreader stocker

Mechanical spreader stocker

#### E. Moving Grate (MG)

Gravity feed

#### F. Reciprocating Grate (RG) / Pulsating Grate (PG) – Air

Cooled / Water cooled

Drop feed with Multiple screw feeders

## II. FLUIDIZED BED COMBUSTION

Over Bed Feeding

Under Bed Feeding

### 6.0 Types & properties of Fuels:

#### 6.1 Coal:

Coal is classified into three major types namely anthracite, bituminous, and lignite. However, there is no clear demarcation between them. Coal is further classified as semi-anthracite, semi-bituminous, and sub-bituminous. Anthracite is the oldest coal from a geological perspective. It is a hard coal composed mainly of carbon with little volatile content and practically no moisture. Lignite is the youngest coal from a geological perspective. It is a soft coal composed mainly of volatile matter and moisture content with low fixed carbon. Fixed carbon refers to carbon in its free state, not combined with other elements. Volatile matter refers to those combustible constituents of coal that vaporize when coal is heated. The common coals used in for example Indian industry are bituminous and sub-bituminous coal. The gradation of Indian coal based on its calorific value is as follows:

Grade	Calorific Value Range (in kCal/kg)
A	Exceeding 6200
B	5600 – 6200
C	4940 – 5600
D	4200 – 4940
E	3360 – 4200
F	2400 – 3360
G	1300 – 2400

Normally D, E and F coal grades are available to Indian industry.

- The chemical composition of coal has a strong influence on its combustibility.
- Physical properties of coal include the heating value, moisture content, volatile matter and ash. The heating value of coal varies from coal field to coal field.
- The typical GCVs for various coals are given in the Table below.

**GCV for various coal types:**

<b>Parameter</b>	<b>Lignite (Dry Basis)</b>	<b>Indian Coal</b>	<b>Indonesian coal</b>	<b>South African coal</b>
<b>GCV (kCal/kg)</b>	4,500	* 4,000	5,500	6,000

\*GCV of lignite on 'as received basis' is 2500 –3000

**6.2 Bagasse:**

Bagasse is the waste product left after crushing of cane and extraction of juice in cane sugar mills. It is a seasonal product, as the crushing campaign lasts from 6 to 10 months in a year; the plant is longer near the equator and gets progressively shorter away from it. Cane is a tropical crop that extends across the globe. Bagasse forms 24–30% of the cane weight. Bagasse burning has been an integral part of the sugar cycle from the beginning. Steam and power requirements of these widespread rural factories have been adequately met with bagasse-based cogeneration and off-season purchase of grid power. Traditionally the bagasse burning has been carried on inefficiently in sugar mills as there was always excess bagasse left with no great market value, and it is too bulky to transport or store. Burning was a way of disposal of this bulk. In the last couple of decades, there has been a sea change in this scenario with the enhanced possibilities of production of paper, certain value-added chemicals, and cogenerated power. Encouragement of its use for distributed power and green power even in small quantities has helped in adopting cogeneration in sugar factories in a big way. Bagasse has now attained its rightful place as a good, consistent and bulk waste fuel in tropical countries that provides good market value. Bagasse burning is also environmentally friendly as combustion temperature is low due to the quenching effect of the fuel moisture and no fuel sulphur to pollute with sulphurous gases. It is now burnt efficiently in vastly improved boilers at increasingly higher pressures and temperatures at low NO<sub>x</sub> and SO<sub>x</sub>.

### Properties of Bagasse

C	47.0 (%)
H <sub>2</sub>	6.5 (%)
N <sub>2</sub>	44.0 (%)
O <sub>2</sub>	2.5 (%)
S	Traces

### 6.3 Rice Husk:

Rice husk is very uniform in size usually <3 mm, requiring no particular fuel preparation. Together with its CV of ~3500 kcal/kg, rice husk is an attractive fuel except for its seasonality. It requires a lot of space for storage. It is normal, therefore, to adopt multi fuel firing to take care of off-season. Captive power plants of 5–20 MW, attached to the rice mills, have been erected in a number of locations instead of transporting husk over longer distances. Rice husk has ~15 to 20% ash and is highly abrasive, as the ash contains silica to the extent of 90%. It is very dry, containing only ~7 to 9% moisture and not compressible for baling purposes. It has ~20% FC and 80% VM, requiring a normal furnace volume and adequate surface area. Husk demands a high ignition temperature and adequate time for combustion either on grate or on bed. VM leaves the fuel at ~500°C. Stoker firing is a good and simple firing system for rice husk. Its low fan power, simple operation, and seamless 1:4 turndown make it ideally suited for husk. Bubbling fluidized bed combustion is also an alternative, as husk has a good 15–20% ash to create its bed material and is sufficiently heavy to stay in the bed, unlike a light material such as bagasse. The higher fan power is offset by better combustion efficiency of 2–4%. Silica in ash is mostly in crystalline form. Only ~20% is in the amorphous form, and recovering silica in amorphous form has several high-end uses, which can be achieved only on controlled combustion of rice husk, limiting the firing temperatures to ~860°C. For this reason, the husk is pulverized in special mills and burnt in suspension to obtain ash with the desired properties. Analyses and properties of rice husk are given in following Tables.

**Properties of Rice Husk and Ash:**

Husk bulk density	100–300
Husk particle density (kg/m <sup>3</sup> )	600–600
Bulk density (kg/m <sup>3</sup> )	1250–1500
Particle density (kg/m <sup>3</sup> )	2300–2800
Ash softening temperature (°C)	>1400
Ash fusion temperature (°C)	>1600
Theoretical air (kg/kg or lb/lb)	2.85
Theoretical CO <sub>2</sub> (%)	20.6
H <sub>2</sub> O in flue gas (kg/kg or lb/lb)	0.77
H <sub>2</sub> in fuel (%)	3.0
Bulk density with 48% M in stacked condition (kg/m <sup>3</sup> and lb/ft <sup>3</sup> )	200.0 and 12.5
Loose condition (kg/m <sup>3</sup> and lb/ft <sup>3</sup> )	120.0 and 7.5
Angle or repose degrees	45–50 variables

**6.4 Wood:**

Wood is a complex vegetable tissue composed mainly of carbohydrates, and in common with all types of vegetation, it has a relatively low heating value in comparison with coal and oil. Heating value of different woods should have been nearly the same, but for the presence of varying amounts of resins, gums, and other substances, which creates a wide variation. For the same reason, any similar formula for estimation of GCV does not work with wood. Wood was the prime fuel till the early nineteenth century when coal and, later on, oil started displacing it. In the meanwhile the energy need and production has gone up dramatically. Progressive reduction of forests; better uses for wood, namely, furniture, paper, rayon, and so on; and enormous demand for energy that could be satisfied only by fossil fuels have combined to make wood and its products waste fuels today. In fact, wood-based steam generation is confined to Scandinavia, Canada, the United States, and certain South American countries, where forests are still abundant.

### **Properties of Wood on Dry Ash Free (DAF) Basis**

VM (%)	80-85
H <sub>2</sub>	5.9-6.0
Theoretical air (Kg/1,000 kcal)	1.235
Theoretical CO <sub>2</sub> (%)	20.25
GCV(DAF)(Kcal/kg)	4830

- Moisture content of freshly cut wood varies from 30 to 50%, which reduces to 18–25% after a year of drying. There is a loss of fuel value in the meantime.
- Woods with <50% moisture burn well. Owing to rain, snow, or transportation by water, moisture content can go to as high as 70%. At more than ~65% moisture, the combustion is not self-sustaining, as the heat produced is not sufficient to dry the moisture. Support fuel such as oil is then needed.
- Ash in wood is less at <2.5%.
- There is practically no nitrogen or sulfur, eliminating the fear of fuel NO<sub>x</sub> formation and corrosion.
- The moisture content depends on the type, handling, storage, and age of wood.
- Generally, wood logs can be taken as containing ~40% moisture, sawdust, and chips 15–25%, and wood refuse from seasoned wood 15% moisture.

### **6.5 Agro fuels:**

Agro fuels, or bio fuels, or vegetable fuels, as they are variously called, are essentially wastes generated by various crops. Fuels such as wood and bagasse are also agro fuels, but because of their relatively large availability, they have been used as regular fuels for a long time and generation of steam and power for a few decades now. The distinction between agro/bio fuels and biomass has to be clearly understood. Agro fuels form only a part of biomass, which is a comprehensive term embracing all organic matter formed, directly or indirectly, by virtue of photosynthesis. Besides agro fuels like crop, forest, agro-industrial residues and purpose-grown trees, biomass includes aquatic plants and even animal wastes.

Nature of Agro fuels with increasing energy costs and growing concern toward the environment, there is a heightened interest in harnessing the various agro fuels, although the steam and power they generate on a stand-alone basis is rather modest as of now. The main drawback of agro fuels is their limited and seasonal availability coupled with limited transportability due to their bulky nature. However, with low or no S and very low N<sub>2</sub>, bio fuels are ecologically friendly. The disadvantage turns to favour, as small power plants can be put up, distributed over a wide area and close to small communities provided they are built with fuel flexibility. Based entirely on agro fuels, the benefit of carbon credits also accrue.

Alternatively the boilers are equipped to fire multiple agro fuels so that one or the other fuel can be burnt in each season. Power plants of only 5–30 MW are popular from the view of fuel collection. Often fuels are co fired in limited quantities in large boilers.

It is important to remember that no agro fuel can have, on a DAF basis, a GCV <13,500 kcal/kg (7,500 Btu/lb) or air requirement <1.21 kg/1,000 kcal (6.8 lb/10,000 Btu) of GCV, which is the minimum for cellulose (C<sub>6</sub>H<sub>10</sub>O<sub>5</sub>).

Agro fuels are very friendly both from the ease of burning and from environmental compliance views. Also the ash in fuels is very low, typically <10%,

### **General Range of Properties of Agro fuels**

<b>Parameter</b>	<b>Range</b>	<b>Remarks</b>
VM (DAF) (%)	72.0–90.0	
H <sub>2</sub> (DAF) (%)	5.6-5.8	
M (%)	10.0	
Theoretical CO <sub>2</sub> (%)	20.2–20.75	
<i>f</i> -factor	1.015–1.005	For CO <sub>2</sub> calculation

GCV (DAF) (kcal/kg)	4500–5500	4000 ± 300 as received
GCV (DAF) (Btu/lb)	8000–10000	7200 ± 550 as received
Theoretical air (kg/kcal)	1.22/1000	Actual GCV
Theoretical air (lb/Btu)	6.85/10000	

## 7.0 Storage and Handling of fuel:

- 7.1 Uncertainty in the availability and transportation of fuel necessitates storage and subsequent handling.
- 7.2 The main goal of good coal storage is to minimize carpet loss and the loss due to spontaneous combustion.
- 7.3 Preparing a hard solid surface for coal to be stored
- 7.4 Preparing standard storage bays of concrete and brick industry, coal handling methods range from manual and conveyor systems. It would be advisable to minimize the handling of coal so that further generation of fines and segregation effects are reduced.
- 7.5 The fuel storage house shall be suitable to store the fuel required for 10-15 days continuous operation of the boiler.
- 7.6 Completely closed / covered dust free system shall be provided for storage & conveyance of solid fuel. The openings of fuel storage house shall be provided with proper shutters and flexi-curtains such that no dust shall go out in the plant.
- 7.7 Fuel Storage area must be covered with roof and wind breaking walls. The boundary walls shall have the height of more than the height of coal stack.
- 7.8 Approach roads (for movement of vehicles and handling of coal) must be paved and sprinkling system (with fine mist) shall be provided at solid fuel as well as at ash storage and handling areas to prevent fugitive emission.
- 7.9 De-dusting arrangement shall be made while loading and unloading of fuel as well as ash.
- 7.10 High pressure water atomizer nozzles shall be installed all along the conveyer and feeding system of fuel as well as at ash discharge point / conveyance. One such nozzle at every 3meter distance shall be provided.

**7.11** Applicable and suitable measures mentioned in the “Guidelines of GPCB for Coal handling” shall be followed as available on the GPCB website.

## **8.0 Fuel Feed Mechanism:**

- 8.1** Coal Fired boilers to use coal of low sulphur (<1%) and with suitable size (5-25 mm in combustion chamber or 0-50 mm in the yard as received). Bio fuels do not have the issue of NO<sub>x</sub> & SO<sub>x</sub> due to absence of Sulphur & lower combustion temperature (<1000<sup>0</sup>C).
- 8.2** The fuel shall be crushed to the size of 15 – 25 mm with the help of crusher. The crusher shall be provided with dust extraction system. The dust extraction system will extract the dust generated during crushing of fuel and maintain the crushing area dust free.
- 8.3** Fuel shall be fired uniformly and in less quantity at a time such that the bed thickness does not exceed about 6 to 9 inches (and not in big heaps). Depending on high/low steam demand, the frequency of firing could be increased or decreased (say 4 to 5 times / hour during higher steam demand, or say 2 to 3 times /hr. during lower steam demand).
- 8.4** All boilers/ utilities using coal or bio fuel shall fire with auto feeding arrangement and to be controlled with pressure or temperature.
- 8.5** Every time the fuel is fired, the damper should be set to “High” position for a minute or two (this would suck more combustion air required for burning volatile matter & thereby reduce soot / black smoke formation), and then it should be set back to “Low” position, till the next firing. (Setting could be made after a few trails). This damper adjustment should be done by the boiler operator throughout the boiler operation as a part of his regular duty like firing fuel for achieving optimised combustion at all time & thereby preventing pollution.
- 8.6** Multipoint fuel feeding to ensure uniform spread of fuel (coal/bio fuel) to ensure efficient combustion at controlled temperatures.

- 8.7 “Secondary air opening” to be kept full open at the time of firing for one or two minutes. Later, the opening "Must" be reduced till next firing. (Setting by trial & error).
- 8.8 Fire bed shall be cleaned at appropriate time to avoid build-up of “fire bed thickness”, if not, this would reduce the primary air supply successively & result into improper combustion.
- 8.9 Soot deposits in tubes shall be cleaned from time to time with proper tool. Build-up of deposits effects the steam generation adversely, and result into higher fuel gas temp. & higher stack loss.
- 8.10 The economiser shall be kept properly insulated.
- 8.11 Good quality feed water should be used for boiler & appropriate chemicals should be added, as directed by boiler supply, for avoiding tube deposits, else it would reduce steam generation.
- 8.12 CO<sub>2</sub> % shall be checked frequently (say once a day initially) to ensure proper boiler operation & take corrective actions, if required, immediately.
- 8.13 During operation of the boiler, the fuel stored in fuel storage house shall be loaded to a grizzly hopper, top opening of which is generally at 150 mm above ground level to facilitate easy loading of the fuel.

## **9.0 Combustion Chamber and flue gas:**

### **9.1 Fully automatic, efficient and Complete Combustion of fuel in boiler**

The fuel from hopper shall be fed in the boiler furnace with screw / rotary feeders. The Boiler shall be equipped with fully automatic Water/air Cooled Oscillating Grate for complete and efficient combustion of any type of solid fuel. The inclined water/air cooled oscillating grate shall be cooled by force circulation of boiler feed water/air, which shall maintain the lower bed temperature to reduce the ash fusion tendency. The heat absorbed by grate in this circulating water is put back to Pressurized De-aerator Tank. The primary under grate, combustion air shall be distributed, compartment wise along the length of grate in the proportion required for complete and efficient combustion of fuel. The gentle oscillations of the

oscillating grate moves fuel on inclined grate surface along length. The fuel burns completely during this movement.

### **9.2 Spray and tray type De-aeration of Boiler Feed Water**

The dissolved oxygen in boiler feed water shall be completely removed in a spray and tray type de-aerator tank. In pressurized de-aerator tank boiler feed water temperature shall be maintained at approx. 105 Deg C at which the solubility of oxygen in water is very low and water shall be further to be passed through multiple trays for removal of oxygen and other gases from water.

### **9.3 Fully automatic, continuous modulation control for steam generation.**

The heat released by fuel after combustion on oscillating grate shall be absorbed in water walled, membrane type furnace, followed by heat recovery economizer. Typical flue gas outlet temperature, at economizer outlet shall be  $160 \pm 10$  Deg C.

The fully automatic continuous modulation control for steam generation shall include;

- a. Steam Drum Water Level Auto. Control – to maintain steady water level in steam drum
- b. Furnace Draft Auto control – to maintain negative pressure in furnace.
- c. Combustion Air Auto. Control – to maintain controlled excess air for combustion.
- d. Economizer Inlet temperature Auto control – to maintain temperature above dew point.
- e. Fuel feeding Auto control – to maintain steam pressure at load variations.

**Oxygen in flue gas shall be continuously monitored to control the excess air; typically oxygen in flue gas will be below 7.5% by volume.**

#### **9.4 Fully automatic, online cleaning of boiler on flue gas side**

Steam operated soot blowers shall be provided for automatic and online cleaning of boiler on flue gas side.

### **10.0 INSTALLATION AND OPERATION OF AIR POLLUTION CONTROL MEASURES:**

**10.1** Industry falling in critically polluted areas shall have to achieve norms of PM as  $100 \text{ mg/Nm}^3$  in stack emission and for that industry shall upgrade APCM.

**10.2** The applicant shall be required to provide following minimum APCM based on **type of fuel and its consumption, fuel property like CV equivalent (NCV of fuel), equivalent ash content, equivalent moisture content etc. the industry may add to the APCM prescribed below, if need be so.**

**Table-1**

<b>Steam generation capacity (in TPH)</b>	<b>Type of APCM</b>
<b>Less than 1</b>	<b>Cyclone + Water Scrubber</b>
<b>1 to 8</b>	<b>Multi cyclone + Bag Filter+ Water Scrubber</b>
<b>8 and more</b>	<b>ESP+ Water Scrubber</b>

**10.3** All the APCM viz. dust collectors, cyclones, multi cyclones, water scrubbers, bag filter and ESP shall be designed tailor made and applicant shall submit all the detailed design parameters considered by the equipment manufacturer based on the fuel to be utilized in Boilers and other utilities.

**10.4** The APCM shall be approved by the schedule-I environmental auditor, which shall look in to feasibility of the change in fuel, with respect to this guidelines.

**10.5** The unit shall install on line continuous emission monitoring system (CEMS) and link it with the server of GPCB for real time data transfer for boiler more than 8 TPH capacity or equivalent capacity of TFH.

- 10.6 If Boilers is of more than 8 TPH capacities, the unit shall install online CO<sub>2</sub> analyzer/ online CO<sub>2</sub> monitoring system and the combustion efficiency of the Boiler should be checked regularly.
- 10.7 The Bag filter shall conform to following minimum requirements for better efficiency and results:
- a) High temperature resistant bags like glass fiber bags shall be used.
  - b) Manometer for indicating differential pressure shall be provided.
  - c) GPS based alarm and buzzer system shall be installed for abnormal pressure difference.
  - d) Pulse jet system shall be regularly checked for its efficient working.
  - e) Reliable and efficient spark arrester should be installed prior to bag filter in case of biomass fired boilers.
  - f) The differential pressure across bag filter shall not exceed 125mmWC or as per the design criteria supplied by the Bag Filter manufacturer. Recording facility should be available.
  - g) Knocker or vibrators (pneumatic or electromagnetic) should be provided on hopper and to be operated automatically through sequential timer.
  - h) Bag filter shall be properly insulated to avoid acid condensation due to cooling of flue gas temperature. Inlet flue gas temperature should be maintained above the acid dew point condensation temperature.
  - i) Bag filter shall be preceded by cyclone/ multi cyclone for coarser particles and Economizer/ buffer/ quencher/ heat recovery system to avoid carry-over of spark in to the bag filter.
  - j) If coal of higher sulphur content is used Bag filter shall followed by scrubber and lime injecting system (lime injection shall be done in the boiler furnace along with coal) should install boiler furnace.
  - k) If fuel has high sulphur content (more than 0.1%) wet alkaline scrubber shall be provided in addition to (f) above.
- 10.8 In case of ESP, minimum 3 fields shall be provided.
- 10.9 Control of SO<sub>x</sub> through one of the processes mentioned below (for coal fired boilers).

- Wet Limestone Process
  - Semi-wet Flash Absorption Process
  - Spray Drying-cum-Absorption Process
  - Sodium Alkali Process
  - Ammonia Process
- 10.10 Control of particulate matter by installing efficient ESP/Bag filters.
- 10.11 Control of NO<sub>x</sub> with latest combustion grate technology, dynamically Air/Water cooled grate system (for multi fuel boilers & less than 20 TPH capacity).
- 10.12 PLC controlled operations.
- 10.13 Boiler efficiency shall be minimum 75 % and record for the same shall be maintained.
- 10.14 Boilers having capacity of 3 TPH or more shall be provided **with Online monitoring system** and **auto fuel feeding system** with conveyer/screw belt.
- 10.15 The cyclone bottom opening should be kept air tight & leak proof; else, it would reduce cyclone efficiency. The dust collected should be taken out from time to time (say once per shift) & appropriately disposed avoiding secondary pollution.
- 10.16 Cyclone, multi cyclone, bag filter and ESP shall be provided with rotary air valve for auto collection/discharge of fine dust.
- 10.17 Material of construction of wet scrubber should be S.S. 316 or equivalent to with stand against corrosion and acid effect. All water circulation pipe and pump should be S.S. 316 or acid and corrosion proof.
- 10.18 Sufficient water storage tank and filter arrangement to be provide for removing micro dust from circulating water.
- 10.19 Air pressure line of adequate capacity shall be provided for efficient working of air pulse jet system.
- 10.20 Energy meter for APCM shall be provided and record for the same should be maintained.
- 10.21 In bag filter technical by-pass can be allowed only heavy duty bypass damper arrangement in case if the by-pass is provided by manufacturer itself and can

operate with electro pneumatic system in case of high temperature or low temperature gas (due point temperature acid formation), RAV not operating. By-pass gas should pass through only cyclone or multicyclone before connected to chimney. In any case manual by-pass system is not allowed.

10.22 Auto by-pass system should display on control panel.

**a) Stack/chimney requirements:**

- i.** Stack height shall not be less than 33 meters in any case.
- ii.** The Stack height requirement based on sulphur dioxide emissions by using the equation – stack height =  $14(Q)^{0.3}$  [where, Q is the emission rate of SO<sub>2</sub> in kg/hr.]
- iii.** By using simple Gaussian plume model to maintain ambient air quality requirements for all concerned parameters, in the receiving environment.

**The required stack height shall be the maximum of the above three (i, ii & iii) considerations. In any case stack height should not be less than 11 meters.**

- b)** If boilers to be connected with other utility's common chimney, the diameter of chimney should be square root of both chimney diameter. Sampling point should be provided as per GPCB requirement.
- c)** Sufficient space should be provided between boiler/utilities and chimney to install APCM.
- d)** Chimney should be provided with strong ladder and platform to take sample.
- e)** Approach road between boilers/utilities should be provided without any obstacles.
- f)** 230 V electrical points with weather proof plug and switch to be provided near chimney for sampling instrument.

10.23 Maintenance record i.e. regular cleaning, replacing damage part or changing the instrument should be maintained compulsory for all air pollution control devices.

10.24 The policy may be made more stringent based on the prevailing environmental scenario of in respective areas.

10.25 Since the reduction in emission is also related to better operation of the boiler, minimum loss of heat & steam, optimum speed of ID & FD fans, adequate area of the combustion chamber, proper balance of steam generation and transmission surface areas, a Standard Operating system shall be developed for each boiler by applicant and should be displayed at the boiler house.

### **11.0 Ash & Slag management**

11.1 Water locking arrangement shall be provided for removal of ash/slag from the combustion chambers.

11.2 Where appropriate, options may be explored for recycling of ash/slag either within the facility or outside. Depending on the soluble fraction of the slag, as approved by concerned authority, slag can be used for utilization of metals, as road construction material etc.

11.3 Dry slag and ash (residues from combustion processes, boiler dust, residues from treatment of combustion gases etc.) shall be placed in closed bags, containers etc. to prevent diffused emissions.

11.4 The ash after complete combustion of fuel on water cooled oscillating grate shall be automatically discharged. It shall be removed outside the furnace through water quenched conveyors; hence ash discharge is at low temperatures. Also, as this ash is wet there is no dusting of ash in the boiler house.

11.5 Medium and Large scale industries, having coal / other solid fuel consumption about 50 MT/day shall provide silo with fully enclosed, dust proof conveyor, alarm system and pneumatic valve for ash handling.

### **12.0 Other requirement:**

12.1 Proper sign boards shall be placed at all concerned areas.

12.2 In case of emergency, protocol to be followed shall be established and all operating staff shall be trained, accordingly. Inter-locking systems and alarm systems shall be provided at all reasonably possible areas.

- 12.3 Adequately qualified and trained staff shall be deputed for the operation; no unskilled personnel shall be engaged for operation of the boilers.
- 12.4 The boiler shall incorporate all safety measures so as to provide complete protection to the operator and the unit against all possible operational/ machinery failures.
- 12.5 Dedicated back-up power facility shall be provided with arrangement to automatically start functioning immediately in case of power failures.
- 12.6 The whole equipment, not necessarily combustion chamber, may be painted with two coats of heat resistant (aluminium) paint.
- 

TRUE COPY

*Anty-44*