

DIRECTIONS ISSUED FOR BRICK KILNS IN DELHI-NCR

PRESENTATION BY
JATINDER SINGH KAMYOTRA
kamyotra@yahoo.co.in

CPCB DIRECTIONS

- Central Pollution Control Board (CPCB) issued an order in winter 2015 directing all brick kilns in NCR to convert from natural draft to induced draft
- What is induced draft?: Installation of fan....no mention of change in brick setting to zigzag
- CPCB clarified this in its subsequent order in November, 2016. Here they have clearly mentioned that conversion from Natural to Induced (with rectangular kiln shape and zig-zag brick setting)

CPCB DIRECTIONS DATED 21.11.2016

Reason:

- High pollution levels during last week of October 2016 and first week of November 2016 exceeding levels of PM 2.5 several times the National Ambient Air Quality Standards.
- Problem of pollution further aggravated due to meteorological conditions caused by the onset of winter leading to minimal dispersion of pollutants and high ground level concentration.

Directions:

- All brick kilns operating without permission and valid consent from SPCBs, not meeting prescribed norms and siting guidelines and not converted from natural draft to induced draft brick kilns (with rectangular kiln shape and zig-zag brick setting), be closed down till March 31, 2017.

Graded Response Action Plan

- CPCB prepared a Graded Response Action Plan (GRAP) to combat different levels of air pollution in Delhi-NCR from various sources including brick kilns.
- Plan examined and agreed by EPCA and subsequently accepted by Hon' ble Supreme Court.
- As per the GRAP, based on the National Air Quality Index actions to be taken by implementing agency for pollution control from various sources including action by SPCBs in case of brick kilns.

AQI category	Concentration of pollutant	Action to be taken
Severe	PM _{2.5} > 250ug/m ³ or PM ₁₀ > 430ug/m ³	Close brick kilns, Hot Mix plants, Stone Crushers (SPCBs and SPs and DCs)
Moderate to Poor	PM 2.5: 61- 90 ug/m ³ PM 10: 101-250 ug/m ³ PM 2.5: 91- 120 ug/m ³ PM 10: 251-350 ug/m ³	Close/stringently enforce all pollution control regulations in brick kilns and industries

CPCB DIRECTIONS DATED 07.03.2017

In view of the GRAP, modified directions issued by CPCB to SPCBs on 7.3.2017 to permit restart of operations of brick kilns having valid consent to operate and comply with the consent conditions.

Further action shall be taken by SPCBs against brick kilns operating in NCR as per the Graded Response Action Plan in accordance with the prevailing Air Quality Index.

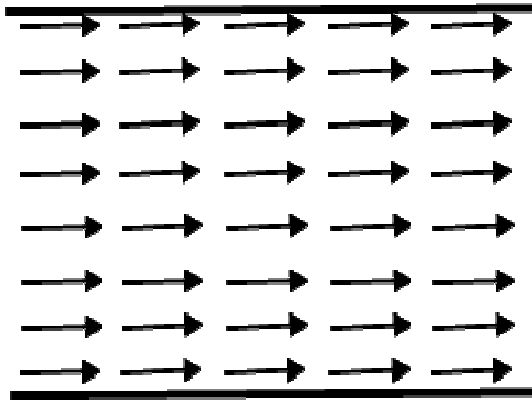
MoEF&CC vide notification dated January 12, 2017 entrusted the responsibility of implementation of GRAP to Environment Pollution (Prevention & Control) Authority (EPCA).

MoEFCC Initiative

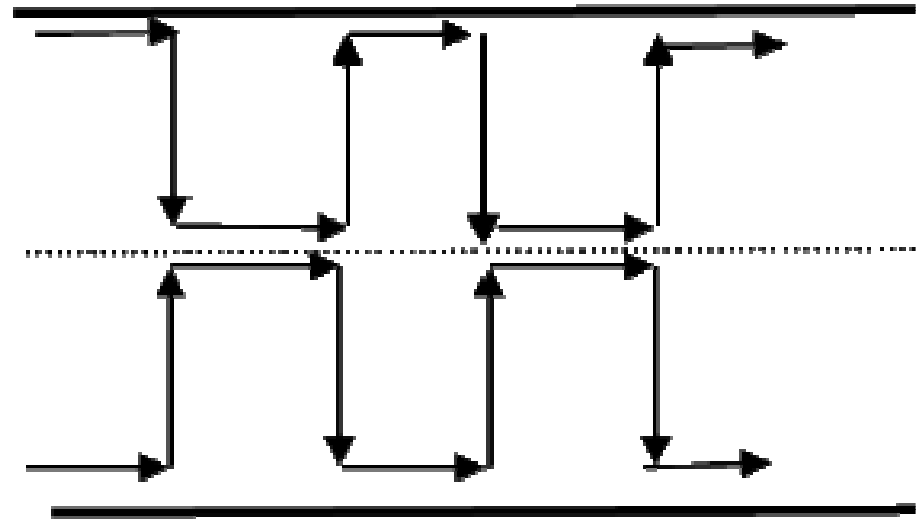
Emission Standards:

- Earlier the standard varied from 1000 mg/Nm³ for smaller kiln to 750 mg/Nm³ for medium and larger kilns.
 - Small Kilns – Kilns producing less than 15000 bricks per day
 - Medium Kilns – Kilns producing between 15000 to 30000 bricks per day
 - Large Kilns – Kilns producing more than 30000 bricks per day
- In October 2015 draft notification standards were reduced irrespective of size of the kiln as below;
 - For Natural Draft – 500 mg/Nm³
 - For Induced Draft – 250 mg/Nm³
 - But it also instructed all the kiln to convert to induced draft in next five years to comply with the emission standard of 250 mg/Nm³
- The modified draft standards for brick kilns (August 2016) emission standards have been fixed at 250 mg/Nm³ for all kilns and existing kilns were time frame of three years to convert into zigzag. No NEW FCBTK

Two types of air flow in brick kilns



Straight Line Air Flow



Zigzag Air Flow

Traditional FCBTK is combination of natural draught created by the chimney and straight line air flow



**Natural Draught
(Chimney)**

+



Straight Line Air Flow

= FCBTK

FCBTK induced is combination of induced draught created by fan and straight line air flow

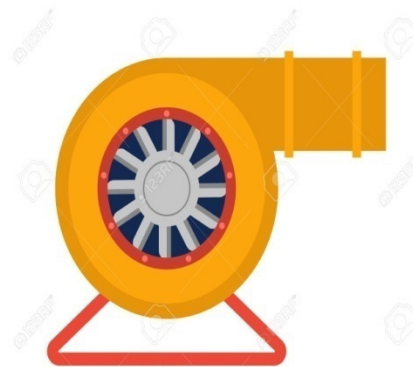


Chimney

+



Straight Line Air Flow



Fan

**= FCBTK
(Induced)**

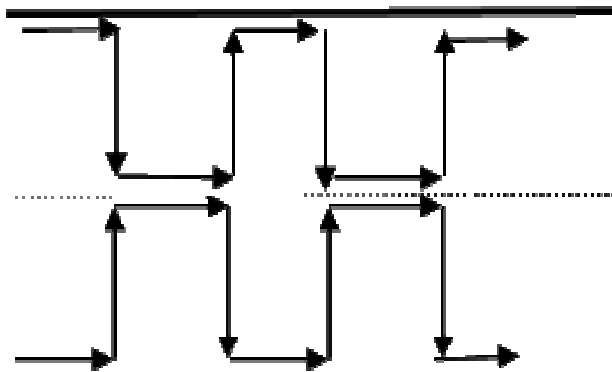
Natural Zigzag kilns (Zigzag brick setting with chimney)



+



**Natural
= Zigzag
kilns**



Zigzag air flow

Chimney

Induced Zigzag kilns (Zigzag brick setting with fan)

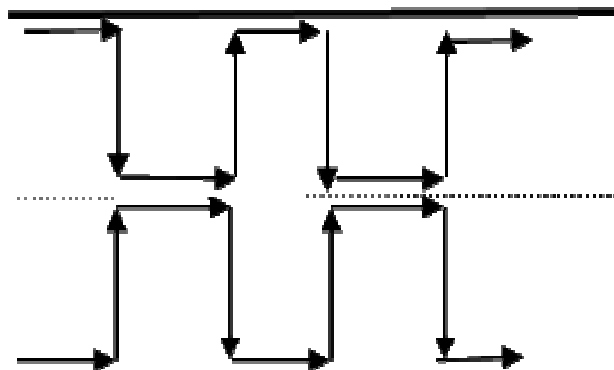


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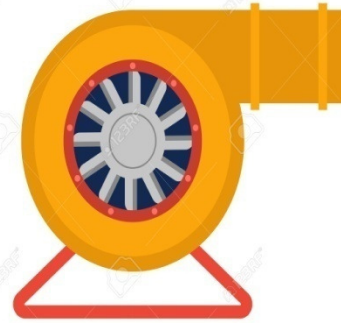


= Induced
Zigzag
kilns

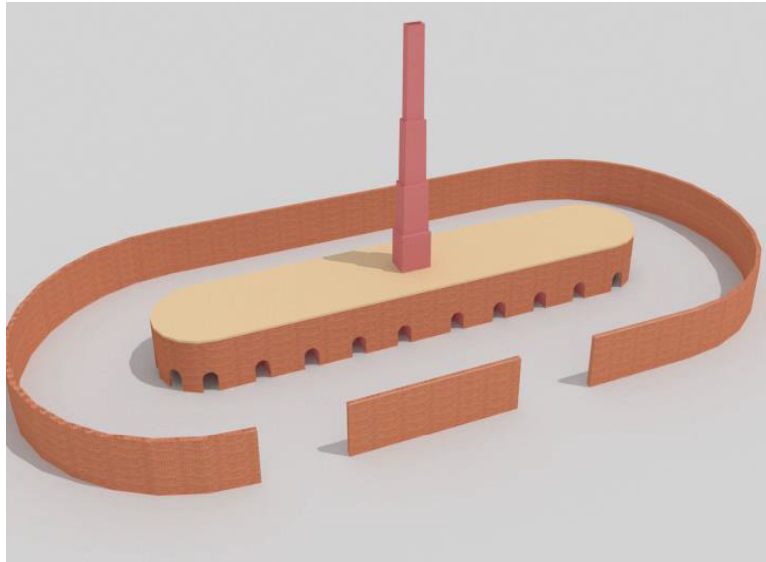
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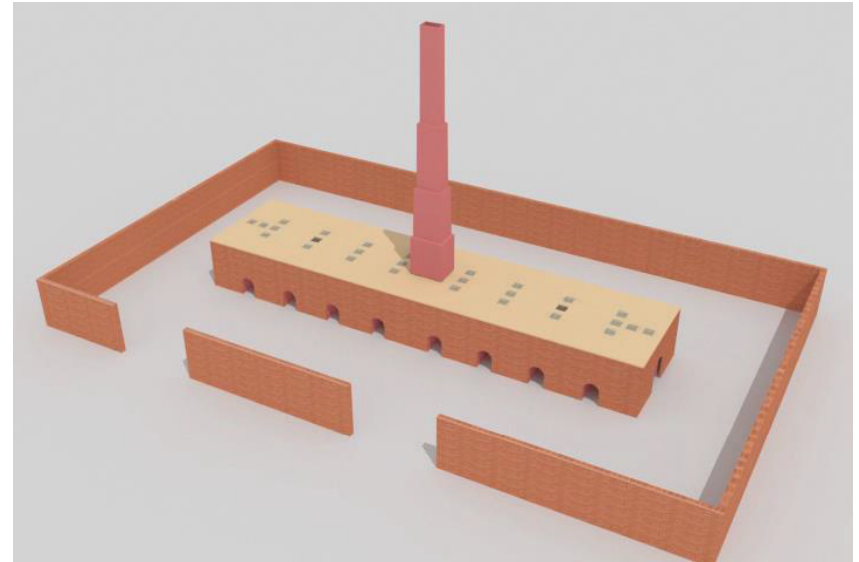
Zigzag air flow



Shape of the two kilns

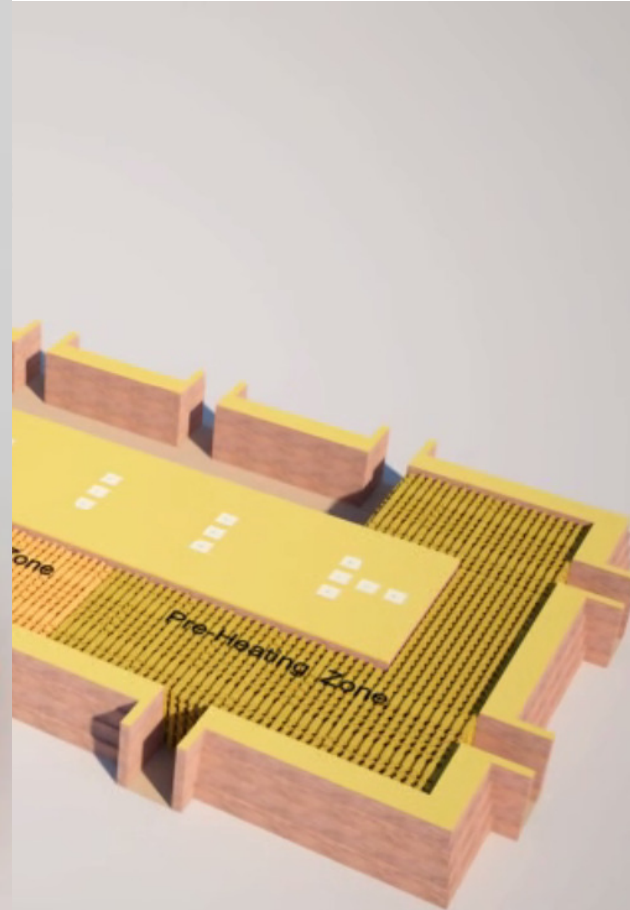
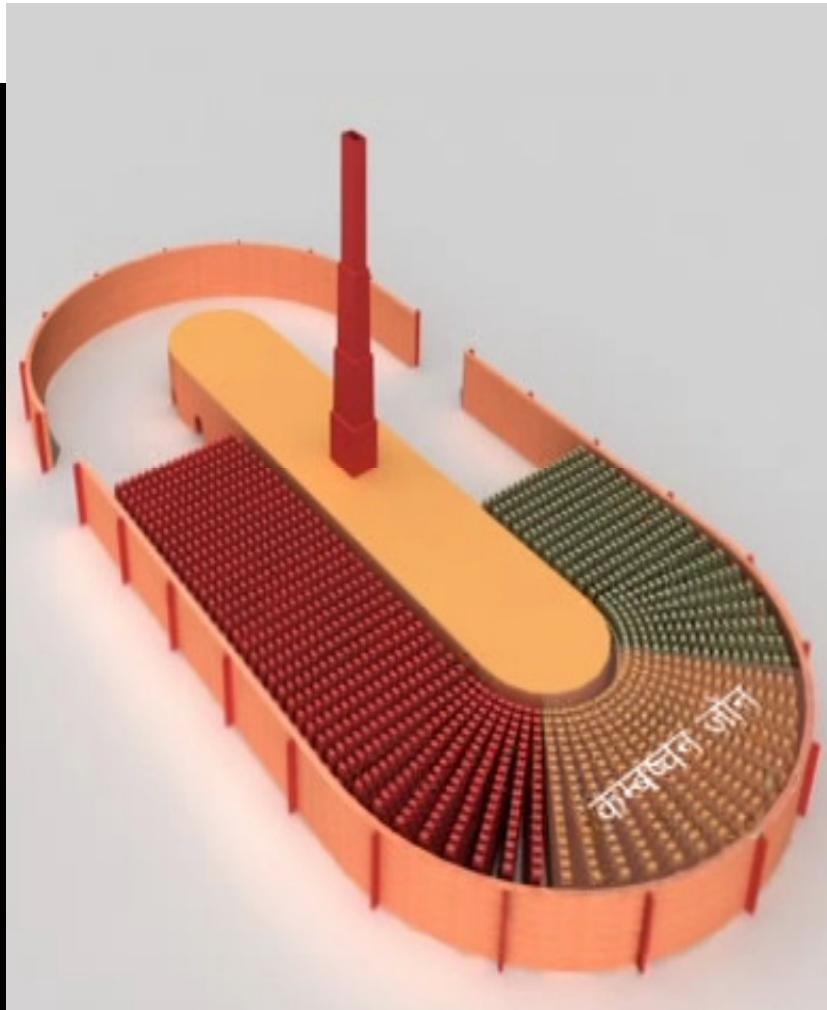


FCBTK – oval and bigger



Zig-Zag – Rectangular and comparatively smaller

Combustion Zone



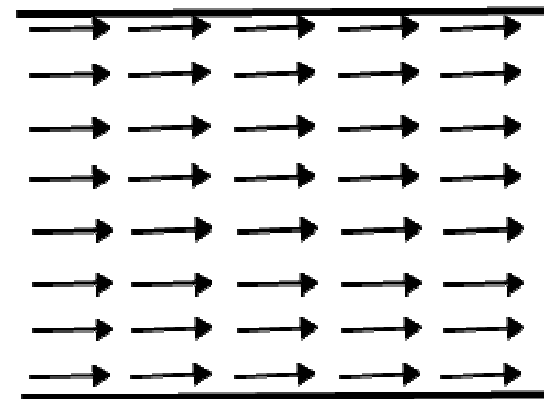
Straight line air flow

Characteristics

- Narrow combustion zone → insufficient time for complete combustion of volatiles in the fuel → volatiles escapes with the flue gases
- Major portion of the hot air flows in the upper part of kiln while large part of the solid fuel lies at the bottom of the kiln which gets less air for combustion → Incomplete combustion
- Non-uniform temperature distribution across kiln cross-section → Non-uniform baking of bricks → poor product quality
- Inefficient heat recovery from hot fired bricks → heat losses

Problems

- Incomplete combustion and heat losses resulting in wastage of fuel
- Poor product quality
 - ~ 60% class-I bricks
- High air pollution



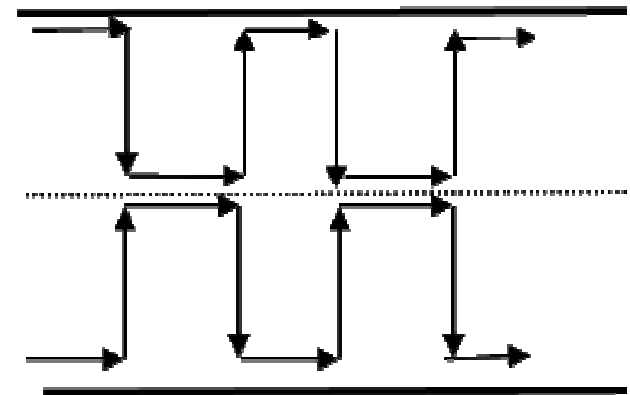
Zigzag air flow

Characteristics

- Zigzag air flow → Increase in air flow path length and turbulence
 - Sufficient time for combustion of fuel
 - Better heat exchange between air and bricks
 - Uniform temperature distribution across kiln cross-section
- Longer combustion zone
 - Improves combustion efficiency
 - Better control over maintaining temperature in combustion zone
- Zigzag brick setting also helps in settling of particulates from flue gases in the kiln itself

Advantages

- Significant improvement in combustion efficiency and reduction in fuel consumption
- Improved product quality
 - 80-90 % class-I bricks
- Substantially reduced air pollution



Comparison between different technologies

Parameters	FCBTK – Natural Draught (Traditional, Fixed chimney, natural-draught, straight-line brick setting)	FCBTK – Induced Draught (Fixed chimney, induced-draught, straight-line brick setting)	Zigzag – Natural Draught (Fixed chimney, natural-draught, zigzag brick setting)	Zigzag – Induced Draught (Fixed chimney, induced-draught, zigzag brick setting)
Fuel Feeding process	Periodic feeding of large lumps of coal at every 30 – 45 minutes.	Periodic feeding of large lumps of coal at every 30 – 45 minutes.	Continuous feeding of powdered or very small lumps of fuel.	Continuous feeding of powdered or very small lumps of fuel.
Green brick Setting	Straight-line brick setting in columns	Straight-line brick setting in columns	Zigzag brick setting in chambers.	Zigzag brick setting in chambers.
Overall Kiln Shape	Oval and comparatively bigger	Same as FCBTK	Rectangular and comparatively smaller	Same as Natural Draft Zig-Zag
Combustion zone	Short length of combustion zone.	Short length of combustion zone.	Long length of combustion zone	Long length of combustion zone

Comparison between different technologies

Parameters	FCBTK – Natural Draught (Traditional, Fixed chimney, natural-draught, straight-line brick setting)	FCBTK – Induced Draught (Fixed chimney, induced-draught, straight-line brick setting)	Zigzag – Natural Draught (Fixed chimney, natural-draught, zigzag brick setting)	Zigzag – Induced Draught (Fixed chimney, induced-draught, zigzag brick setting)
Percentage of Quality bricks produced	Only 60% of the bricks are fired at desired temperature, Thus only 60% of Class 1 bricks produced	Slightly better temperature distribution in the brick setting and increase in the percentage of class-I bricks.	Temperature distribution is even throughout the kiln which helps in getting about 80% – 90% of the fired bricks of class-I quality	Same as Natural Draft Zig-Zag
Draught creation	Natural due to difference in air temperature at the top and the bottom of the kiln	Fan is used for creating the draft in the kiln, slightly better control on seasonal draught creation than that in Natural FCBTK	Natural due to difference in air temperature at the top and the bottom of the kiln	Fan is used for creating the draft in the kiln, slightly better control on seasonal draught creation than that in Natural FCBTK

Comparison between different technologies

Parameters	FCBTK – Natural Draught (Traditional, Fixed chimney, natural-draught, straight-line brick setting)	FCBTK – Induced Draught (Fixed chimney, induced-draught, straight-line brick setting)	Zigzag – Natural Draught (Fixed chimney, natural-draught, zigzag brick setting)	Zigzag – Induced Draught (induced-draught, zigzag brick setting)
Distribution of Hot & Cold air	Cold air in the brick cooling zone mainly flows along the bottom; hot air in the brick pre-heating zone mostly flows at the top.	Compared to natural draught FCBTK, increase in flow speed of air and hot gases through the brick setting. Slightly Better temperature distribution in the kiln.	Zigzag setting results in repeated change in direction of flow. Less temperature difference between bottom and top of brick setting.	Same as Natural Draft Zig-Zag
Time for Air Fuel mixing	Insufficient time for proper mixing of air and fuel.	Same as FCBTK	Sufficient time for proper mixing of air and fuel. As length of air travel is increased.	Same as Natural Draft Zig-Zag

Comparison between different technologies

Parameters	FCBTK – Natural Draught (Traditional, Fixed chimney, natural-draught, straight-line brick setting)	FCBTK – Induced Draught (Fixed chimney, induced-draught, straight-line brick setting)	Zigzag – Natural Draught (Fixed chimney, natural-draught, zigzag brick setting)	Zigzag – Induced Draught (induced-draught, zigzag brick setting)
Fuel combustion	Incomplete combustion of Fuel.	Slightly better than FCBTK due to better availability of air	Sufficient time for heating of fuel to reach ignition temperature. Near complete combustion of fuel.	Same as Natural Draft Zig-Zag
Pollution potential	Highly Polluting	Some reduction in air pollution (SPM, CO, etc) due to better availability of air in the combustion zone	Very less un-burnt carbon, SPM and CO emissions. Less consumption and wastage of fuel.	Same as Natural Draft Zig-Zag

Stack emission from straight line brick setting kilns



Normal FCBTK



Induced FCBTK

Stack emission from Zig Zag kilns



Induced Zig Zag



Natural Zig-Zag

Different technologies for brick production

Parameters	FCBTK - Natural	FCBTK – Induced with straight line brick setting	Zig Zag - Natural	Zig Zag - Induced
Capital Cost	40 – 50 lakh	40 – 50 lakh	40 – 50 lakh	40 – 50 lakh
Production Capacity (per day)	30000 - 40000	40000 - 50000	30000 - 40000	40000 – 50000
Coal consumption (tonnes per 1 lakh bricks)	14 - 15	12-14	10-12	10-12
Emission CO2 (gm/Kg of fired bricks)	131	No Data	105	105
Emission SPM (mg/NM3) - CPCB	517-1375 (North)	No Data	155	419-430
Emission Black Carbon (gm/Kg of fired bricks)	1.18	No Data	0.22	0.24
Percentage of quality bricks	60 - 65	60 - 70	80 - 90	80 – 90

STATUS OF NOTIFICATION OF BRICK KILN STANDARDS

Finalization of standards under consideration by MoEF&CC

THANK YOU