LOW-NOx BURNERS
Low NOx burners - rules of operation

- tertiary air
- secondary air
- inner
- outer
- coal & primary air

\[ \lambda = 0.4 \quad \lambda = 0.7 \quad \lambda \text{ gradually increases to } 1.2 \]
Pulverized coal concentrator
Near-burner area of low-NOx combustion

Figure 7: A low NOx burner
Conventional and Rapid Ignition burners (RI)
Development of low-NOx Babcock-Hitachi (NR) burners
LOW NO\textsubscript{x} SWIRL BURNERS

Pulverized coal swirl burners

**Standard**
- Pulv. coal pipe
- Core air
- Pulv. coal & air
- Secondary air
- Swirl generator

**Low-NO\textsubscript{x}**
- Pulv. coal pipe
- Core air
- Pulv. coal & air
- Second. air
- Tertiary air
- Swirl gen.
- Flame stabilizer
- Concentrator

Pulverized coal swirl burners
LOW-NOX SWIRL BURNER DS TYPE
LOW-NOX SWIRL BURNER DS TYPE

1. turbulence generator
2. outer burner’s tube
3. burner’s casting
4. igniter
5. flame holder
6. inner burner’s tube
7. oil lance
8. pulverized coal
9. core air
10. secondary air
11. tertiary air

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LOW NOX JET BURNER - LNCFS TYPE
Progress in development of low-NOx swirl burners

![Graph showing NOx emissions vs excess of air for different burners: Conventional, WS burner, and DS burner.](image)
LOW NOX JET BURNER - DS TYPE
Low-NOx swirl burner of Babcock-Hitachi used as low-NOx jet burner