Burner Heat Input, Load and Turndown

Heat input per burner, burner load and turndown ratio, and the boiler firing range with a given number of burners in service.

Method: Definitions of burner load and turndown

Input parameters

Unit system: SI

Parameter	Value	Unit
Total boiler heat input (same GCV or NCV basis as the burner ratings)	80.000	MW
Burners in service	4.0000	
Burner maximum rating	20.000	MW
Burner minimum stable firing	6.0000	MW

Calculated results

Parameter	Value	Unit
Heat input per burner	20.000	MW
Burner load, share of maximum	100.00	%
Burner turndown ratio	3.3333	
Lowest boiler firing with these burners	24.000	MW
Highest boiler firing with these burners	80.000	MW

Formula and method

$$\dot{Q}_b = \frac{\dot{Q}}{n} \qquad \lambda = \frac{\dot{Q}_b}{\dot{Q}_{max}} \qquad TD = \frac{\dot{Q}_{max}}{\dot{Q}_{min}} \qquad \dot{Q}_{lo} = n\,\dot{Q}_{min} \qquad \dot{Q}_{hi} = n\,\dot{Q}_{max}$$

Variables

$\dot{Q}$	total heat input	W
n	burners in service	–
$\dot{Q}_{max}$	burner maximum rating	W
$\dot{Q}_{min}$	burner minimum stable firing	W
$\dot{Q}_b$	heat input per burner	W
λ	burner load	–
TD	turndown ratio	–
$\dot{Q}_{lo}$	lowest boiler firing	W
$\dot{Q}_{hi}$	highest boiler firing	W

Method and standards

Definitions of burner load and turndown; equal sharing between burners in service.

Assumptions and limits

- Equal load on all burners in service.
- The boiler heat input and the burner ratings must be on the same calorific basis: burner makers often rate on net (NCV) input, while boiler input is often quoted on gross (GCV).

References

- Definitions of burner load and turndown

Report details

Report reference	FCC-Y6NN-D2MA (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/boilers-power-plant/combustion/burner-heat-input

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.