Steam Blowing: Disturbance (Cleaning Force) Factor

Disturbance factor of a steam blow, the ratio of ṁ²v during the blow to that at maximum continuous rating at the same point, with IF97 specific volumes.

Method: Disturbance factor K = (ṁ²v)_blow/(ṁ²v)_MCR (momentum flux ratio); specific volumes from IAPWS-IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Blowing steam flow	60.000	t/h
Blowing pressure at the point (absolute)	15.000	bar
Blowing temperature (superheated)	350.00	°C
Blowing steam	Superheated, at the temperature above	
MCR steam flow	100.00	t/h
MCR pressure at the point (absolute)	66.000	bar
MCR temperature	485.00	°C

Calculated results

Parameter	Value	Unit
Specific volume while blowing	0.18658	m³/kg
Specific volume at MCR	0.050026	m³/kg
Disturbance factor	1.3427	

Notes for this case

- A factor above 1 means the blow cleans harder than full-load operation will disturb; the target value is set by the turbine supplier.

Formula and method

$$K = \frac{\dot{m}_b^2 v_b}{\dot{m}_{MCR}^2 v_{MCR}}$$

Variables

$\dot{m}_b$	Blowing steam flow	kg/s
p_b	Blowing pressure at the point (absolute)	Pa
T_b	Blowing temperature (superheated)	K
state_b	Blowing steam: superheated or dry saturated	-
$\dot{m}_{MCR}$	MCR steam flow	kg/s
p_{MCR}	MCR pressure at the point (absolute)	Pa
T_{MCR}	MCR temperature	K
v_b	Specific volume while blowing	m³/kg
v_{MCR}	Specific volume at MCR	m³/kg
K	Disturbance factor	-

Method and standards

Ratio of the momentum flux (ṁ²v, proportional to the dynamic pressure in a given bore) during the blow to that at MCR at the same point, with IAPWS-IF97 specific volumes.

Assumptions and limits

- Same location and bore.
- Blowing steam superheated, or dry saturated when chosen; wet steam is not covered.

References

- Disturbance factor K = (ṁ²v)_blow/(ṁ²v)_MCR (momentum flux ratio); specific volumes from IAPWS-IF97

Report details

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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/boilers/steam-blowing-disturbance-factor

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.