

Steam Trap Selection — Float, Thermodynamic, Thermostatic, Bucket

cBallast · TI-P002-XX · Selection guide

The four working principles

Principle	What actuates it	Best for	Not for
Float (FT)	Density — hollow ball floats on rising condensate	Process heat exchangers variable load	Freeze risk
Thermodynamic (TD, disc)	Velocity — flash steam snaps disc shut	Steam mains, superheated, small, freeze tolerant	Low diff pressure <0.3 bar
Thermostatic (balanced-P or bimetallic)	Temperature — bellows/bimetal opens when condensate cools below sat	Radiator vent, tracer, low condensate	Applications needing immediate discharge
Inverted bucket (IB)	Buoyancy — bucket sinks when full	Corrosive, dirty steam, freeze-tolerant	Low diff, superheated (loses prime)

Selection matrix

Application	First choice	Second
Steam main drip pocket	TD	IB
Process heat exchanger variable	Float	IB
Steam tracer line	Balanced-P thermostatic	Bimetallic
Radiator / convector	Balanced-P thermostatic	Float
Autoclave / sterilizer	Bimetallic	Float
Turbine drip	TD	IB
Superheated steam separator	TD	Bimetallic
Condensate lift against back-P	Float with air vent (F&T)	IB

Sizing procedure

1) Calculate condensate load: $Q = m \times c_p \times dT / h_{fg}$ (steady-state); multiply 2-3× for start-up. 2) Determine differential P = supply at trap inlet minus back-P in condensate return. 3) Look up SOD capacity from manufacturer curve at actual diff P ; choose trap whose Safe Operating Discharge exceeds max condensate with 1.5-2 safety factor. 4) Verify pipe size (trap DN = pipe DN). 5) Check freeze / hammer conditions.

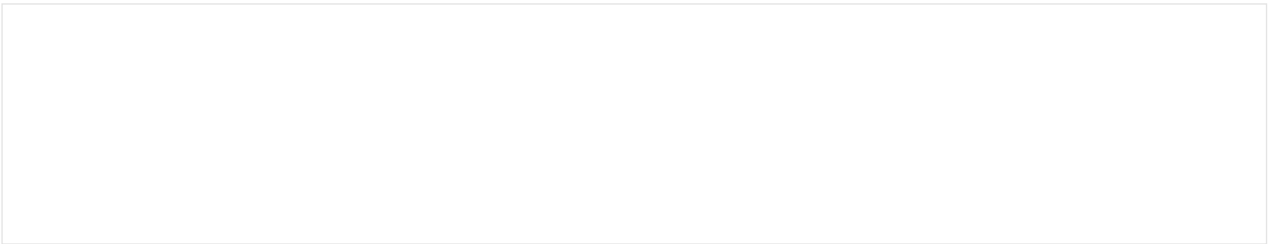
Failure modes

Failure	Symptom	Cause
Blown-through	Continuous live steam venting, condensate return abnormally hot	Worn seat, stuck open, debris
Waterlogged	Upstream cold, low heat transfer, condensate visible	Failed closed, plugged strainer, wrong size
Cycling	Rapid open-close TD or IB	Undersized, high diff-P oscillation

Water hammer

Loud banging in condensate return

Steam pockets, wrong lift geometry



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