

IEC 60034 Motor Duty Classes S1 to S10

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Why duty class matters

Motor nameplate rated power is defined at a specific thermal duty. Running the same motor at a different duty profile changes thermal loading. S1 continuous duty at 15 kW can deliver more short-time (S2) or intermittent (S3), and less continuously at heavier-than-rated duty. Selecting to correct class prevents under-utilisation and thermal failure.

Ten duty classes

Class	Name	Description	Use
S1	Continuous running	Constant load to thermal steady state	Fan, pump, conveyor
S2	Short-time	Defined time (10, 30, 60, 90 min) then cool	Sluice gate, dam gate
S3	Intermittent periodic	Load + rest cycles; starts do not affect T	Crane hoist, punch press
S4	Interm + starting	Like S3 with starting phase	Frequent-start conveyor
S5	Interm + electric braking	Like S4 with braking phase	Machine-tool, lift-truck
S6	Continuous periodic	Load + no-load, motor stays energised	Lathe, mixer, mill
S7	Cont + elec braking	S6 with braking	Reversing rolling mill
S8	Cont + load/speed change	Periodic load + speed changes	Two-speed pump-fan, lift
S9	Non-periodic variations	Continuous with non-periodic load/speed	VFD mixer, ship propulsion
S10	Discrete constant loads	Load sequence each to thermal steady state	Multi-stage boiler feed

Cyclic duration factor (CDF)

For S3, S6 and related, the load period as fraction of full cycle is the cyclic duration factor. A motor nameplated CDF 40% delivers rated shaft power during 40% of cycle time. Running at CDF 60% needs derating to ~85% of rated; CDF 100% (continuous) needs derating to ~70%.

Nameplate reading

Duty-class nameplate lists class code, load period or CDF, starts per hour, thermal class. Example "S3 40% 240 c/h" = intermittent periodic at 40% cyclic duration factor, 240 cycles per hour. "S1" alone with no

CDF = continuous, rated power indefinitely at rated ambient.

Selection examples

Centrifugal cooling pump = S1. Crane hoist = S3 40% or S4 (motor nameplate = max load, not average). Ballast pump on tanker = S2 60/90 min. Lift-truck traction = S5. Rolling-mill main drive = S7 with published CDF.

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