

TABLES OF SERVICE FACTORS

| Machine Type | Operating time per day (h) | | |
|---|----------------------------|------|-------|
| | <3 | 3-10 | 10-24 |
| Rolling mills | | | |
| Sheet metal shears | | | 1.8 |
| Sheet turning machines | | | 1.6 |
| Ingot slab mills | | | 2 |
| Block conveyors | | | 1.8 |
| Bloc pushers | | | 2 |
| Tape and wire reels | | | 1.4 |
| Descalers | | | 1.6 |
| Sheet mills | | | 1.8 |
| Plate mills | | | 2 |
| Cold rolling mills | | | 2 |
| Track-type tractors | | | 1.6 |
| Billet shears | | | 1.8 |
| Cooling beds | | | 1.4 |
| Transfer skids | | | 1.4 |
| Roller tables (light) | | | 1.4 |
| Roller tables (heavy) | | | 1.8 |
| Roller levellers | | | 1.6 |
| Trimming shears | | | 1.4 |
| End shears | | | 1.8 |
| Looplifters | | | 1.4 |
| Roller control gear | | | 1.4 |
| Generators frequency converters | | | |
| Generators | 0.9 | 1 | 1.25 |
| Welding generator | | | 2 |
| Compressors | | | |
| Reciprocating compressors (U 1:100) | 1.5 | 1.75 | 2 |
| Reciprocating compressors (U 1:100-200) | 1.25 | 1.4 | 1.6 |
| Turbo compressors | 1.25 | 1.4 | 1.6 |
| Blowers ventilators | | | |
| Rotary piston blowers | 1 | 1.25 | 1.4 |
| Blowers (axial and radial) | 0.9 | 1 | 1.25 |
| Cooling tower ventilators | 1 | 1.25 | 1.5 |
| Induced draught fans | 1 | 1.25 | 1.4 |
| Turbo-blowers | 0.9 | 1 | 1.25 |
| Pumps | | | |
| Centrifugal pumps (thin liquid) | 0.9 | 1 | 1.25 |
| Centrifugal pumps (viscous liquid) | 1 | 1.25 | 1.4 |
| Reciprocating pumps (U 1:100) | 1.4 | 1.6 | 1.8 |
| Reciprocating pumps (U 2:100-200) | 1 | 1.25 | 1.4 |
| Plunger pumps | | | 2 |
| Sludgers | 1 | 1.25 | 1.4 |
| Vacuum pump | - | - | 1.5 |
| Presses | | | |
| Folding presses | 1.4 | 1.6 | 1.8 |
| Briquetting presses | 1.6 | 1.8 | 2 |
| Eccentric presses | 1.4 | 1.6 | 1.8 |
| Forging presses | 1.4 | 1.6 | 1.8 |
| Brick moulding presses | 1.6 | 1.8 | 2 |

| Machine Type | Operating time per day (h) | | |
|--------------------------------------|----------------------------|------|-------|
| | <3 | 3-10 | 10-24 |
| Conveyor plant | | | |
| Conveyors | | | 1.8 |
| Slatted conveyors | 1 | 1.4 | 1.6 |
| Belt conveyors (bulk materials) | 0.9 | 1 | 1.25 |
| Slatted conveyors (piece goods) | 1 | 1.25 | 1.4 |
| Pocket belt conveyors | 0.9 | 1 | 1.25 |
| Reels | 1 | 1.4 | 1.6 |
| Bucket chain conveyors | 1 | 1.25 | 1.4 |
| Rotary conveyors | 1 | 1.25 | 1.4 |
| Elevators | 1 | 1.25 | 1.4 |
| Bucket type flour elevators | 0.9 | 1 | 1.25 |
| Lifts | 1.4 | 1.6 | 1.8 |
| Apron conveyors | 1 | 1.25 | 1.4 |
| Screw conveyors | 1 | 1.25 | 1.4 |
| Steel belt conveyors | 1 | 1.25 | 1.4 |
| Redler conveyors | 1 | 1.25 | 1.4 |
| Textile machines | | | |
| Winders | 1 | 1.25 | 1.4 |
| Printing and dyeing machines | 1 | 1.25 | 1.4 |
| Tanning vats | 1 | 1.25 | 1.4 |
| Calenders | 1 | 1.25 | 1.4 |
| Opening machines | 1 | 1.25 | 1.4 |
| Weaving looms | 1 | 1.25 | 1.4 |
| Rubber and plastics machinery | | | |
| Extruders | | | 1.6 |
| Calenders | | | 1.6 |
| Kneading machines | | | 1.8 |
| Mixers | | | 1.6 |
| Rolling plant | | | 1.8 |
| Excavators | | | |
| Chain bucket excavators | 1.6 | 1.8 | 1.8 |
| Travelling gear (caterpillar) | 1.25 | 1.4 | 1.6 |
| Travelling gear (rails) | 1 | 1.25 | 1.4 |
| Suction pumps | 1.25 | 1.4 | 1.6 |
| Bucket wheels | 1.25 | 1.4 | 1.6 |
| Cutter heads | 1.4 | 1.8 | 2 |
| Slewing gear | 1 | 1.25 | 1.4 |
| Winches | 1 | 1.25 | 1.4 |
| Paper machines | | | |
| Couch presses | | | 1.8 |
| M. G. cylinders | | | 2 |
| Beating engines | | | 1.6 |
| Pulp grinders | | | 1.8 |
| Calenders | | | 1.6 |
| Wet presses | | | 1.8 |
| Opening machines | | | 1.8 |
| Agitators | | | 1.8 |
| Suction presses | | | 1.6 |
| Suction couch rolls | | | 1.8 |
| Drying cylinders | | | 2.0 |



| Machine Type | Operating time per day (h) | | |
|----------------------------------|----------------------------|------|-------|
| | <3 | 3-10 | 10-24 |
| Wood processing machines | | | |
| Debarking drums | 1.4 | 1.6 | 1.8 |
| Planers | 1 | 1.25 | 1.4 |
| Frame saws | 1 | 1.25 | 1.4 |
| Food machinery | | | |
| Fillers | 0.9 | 1 | 1.25 |
| Kneading machines | 1 | 1.25 | 1.4 |
| Packaging machines | 0.9 | 1 | 1.25 |
| Sugar cane crushers | | | 1.6 |
| Sugar cane cutters | | | 1.6 |
| Sugar cane mills | | | 1.8 |
| Sugar beet cutters | | | 1.6 |
| Sugar beet washing plant | | | 1.6 |
| Mining. stones | | | |
| Crushers | | | 2 |
| Rotary kilns | | | 1.6 |
| Mine ventilators | | | 1.8 |
| Vibrators | | | 1.6 |
| Foundry plant | | | |
| Blast furnace blowers | | | 1.4 |
| Converters | | | 2 |
| Inclined blast furnace elevators | | | 1.8 |
| Slag crushers | | | 1.8 |
| Cranes | | | |
| Luffing gear | 0.9 | 1 | 1.25 |
| Traversing gear | 1.25 | 1.4 | 1.6 |
| Hoists | 1 | 1.25 | 1.4 |
| Slewing gear | 1 | 1.25 | 1.4 |
| Winches | 0.9 | 1 | 1.25 |
| Mills | | | |
| Hammer mills | | | 2 |
| Ball mills | | | 2 |
| Suspended roller mills | | | 2 |
| Impact mills | | | 2 |
| Rad mills | | | 2 |
| Roller mills | | | 2 |
| Chemical plant | | | |
| Agitators (thin liquid) | 0.9 | 1 | 1.25 |
| Agitators (viscous liquid) | 1 | 1.25 | 1.4 |
| Centrifuges (thin) | 1 | 1.25 | 1.4 |
| Centrifuges (viscous) | 1.4 | 1.6 | 1.8 |
| Metal working | | | |
| Press brakes | | | 1.6 |
| Sheet straighteners | | | 1.8 |
| Hammers | | | 1.8 |
| Shears | | | 1.6 |
| Forging presses | | | 1.8 |
| Stamping machines | | | 1.8 |

| Drive machine | f_2 |
|--|-------|
| Electric motors | 1 |
| Steam turbines | |
| Internal-combustion engines with 4-6 cylinders | 1.1 |
| Water turbines | |
| Internal combustion engines with 1-3 cylinders | 1.25 |

| Starts per hour | f_3 | | |
|-----------------|----------------------|---------|------|
| | Service factor f_1 | | |
| | 0.9-1 | 1.2-1.6 | 1.8 |
| Up to 5 | 1 | 1 | 1 |
| 6-25 | 1.2 | 1.12 | 1.06 |
| 26-60 | 1.3 | 1.2 | 1.12 |
| >60 | 1.5 | 1.3 | 1.2 |

| Hours of life | f_4 |
|---------------|-------|
| 5.000 | 0.75 |
| 12.500 | 0.85 |
| 25.000 | 1 |
| 50.000 | 1.112 |
| 75.000 | 1.2 |
| 100.000 | 1.25 |

Abbreviations

- P_M Driving power (motor, turbine, etc.) (kW)
- P_A Effective power of machine driven (kW)
- P_N Rating of gear box according to rating tables (kW)
- N_1 Driving speed (of motor, turbine, etc.) (min^{-1})
- N_2 Driving speed of machine (min^{-1})
- i_N Rated speed
- f_1 Service factor of machine driven
- f_2 Service factor of engine (motor, turbine, etc.)
- f_3 Service factor in accordance with start frequency
- f_4 Service factor in accordance with hours of life
- f_w Thermal factor
- t Ambient temperature ($^{\circ}\text{C}$)
- P_{G1} Max. thermal capacity without additional cooling (kW)
- P_{G2} Max. thermal capacity with fan cooling (kW)
- P_{G3} Max. thermal capacity with built-in cooler (kW)
- P_{G4} Max. thermal capacity with fan and built-in cooler (kW)
- ED Ref operating time per hour (%)

| Operating time per hour ED (%) | THERMAL FACTOR f_w | | | | | | | | | | | | | | |
|--------------------------------|----------------------|-----|------|------|------|------|---|------|------|------|---|-----|------|------|------|
| | Ambient temperature | | | | | | Ambient temperature with fan cooling ($^{\circ}\text{C}$) | | | | Ambient temperature with built-in-cooler ($^{\circ}\text{C}$) | | | | |
| | 1.12 | 1 | 0.88 | 0.75 | 0.63 | 1.12 | 1 | 0.9 | 0.8 | 0.7 | 1.12 | 1 | 0.9 | 0.8 | 0.7 |
| 100 | 1.12 | 1 | 0.88 | 0.75 | 0.63 | 1.12 | 1 | 0.9 | 0.8 | 0.7 | 1.12 | 1 | 0.9 | 0.8 | 0.7 |
| 80 | 1.35 | 1.2 | 1.06 | 0.9 | 0.76 | 1.35 | 1.2 | 1.08 | 0.96 | 0.84 | 1.35 | 1.2 | 1.08 | 0.96 | 0.84 |
| 60 | 1.6 | 1.4 | 1.25 | 1.06 | 0.9 | 1.6 | 1.4 | 1.25 | 1.12 | 0.98 | 1.6 | 1.4 | 1.25 | 1.12 | 0.98 |
| 40 | 1.8 | 1.6 | 1.4 | 1.2 | 1 | 1.8 | 1.6 | 1.44 | 1.28 | 1.12 | 1.8 | 1.6 | 1.44 | 1.28 | 1.12 |
| 20 | 2 | 1.8 | 1.6 | 1.35 | 1.12 | 2 | 1.8 | 1.6 | 1.44 | 1.26 | 2 | 1.8 | 1.6 | 1.44 | 1.20 |

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