Selection of Load Factor

The Load Factor is rated for the characteristics of the driven machine.

The tabulated ratings are based on a running time of 10 hours per day with uniform load.
For your reference, please see method (1) and (2) shown below.

(1) Recommended Load Factor by the Driven Application.

[Load Factor] U: Uniform load M: Moderate shock H: Heavy shock

Table B-1 Reducer Load Factor

Daily duty	~3 hours/day			~10 hours/day			~24 hours/day		
	U	M	H	U	M	H	U	M	H
Load Factor	0.80	1.00	1.35	1.00	1.20	1.50	1.20	1.35	1.60

Table B-2 Recommended Load Classifications

Type of APPLICATION	Type of LOAD
*Aerator	
Agitators.	
pure liquids	U
liquids & solids	M
liquids-variable density	M
Blowers	
centrifugal	U
lobe	M
vane	U
Brewing & Distilling	
bottling machinery	U
brew kettles, cont. duty	U
cookers-cont. duty	U
mash tubs-cont. duty	U
scale hopper, frequent starts	M
Can Filling Machines	U
*Cane Knives	M
Car Dumpers	H
Car Pullers	M
Clarifiers	U
Classifiers	M
Clay Working Machinery	
brick press	H
briquette machine	H
clay working machinery	M
pug mill	M
Compressors	
centrifugal	U
lobe	M
reciprocating, multi-cylinder	M
reciprocating, single-cylinder	H
Conveyors-Uniformly Loaded or Fed	
apron	U
assembly	U
belt	U
bucket	U
chain	U
flight	U
oven	U
screw	U
Conveyors-Heavy Duty Not Uniformly Fed	
apron	M
assembly	M
belt	M
bucket	M
chain	M
flight	M
*live roll	
oven	M
reciprocating	H
screw	M
shaker	H
Cranes (Except for Dry Dock Cranes)	
main hoists	
*bridge travel	
*trolley travel	
Crusher	
ore	H
stone	H
**sugar	M
Dredges	
cable reels	M
conveyors	M
cutter head drives	H
jig drives	H
maneuvering winches	M
pumps	M
screen drive	H
stackers	M
utility winches	M
*Dry Dock Cranes	
Elevators	
bucket - uniform load	U
bucket - heavy load	M
bucket - cont.	U
centrifugal discharge	U
escalators	U
freight	M
gravity discharge	U
*man lifts	
*passenger	
**Extruders (Plastics)	
blow molders	M
coating	U
film	U
pipe	U
pre-plasticizers	M
rods	U
sheet	U
tubing	U
Fans	
centrifugal	U
*cooling towers	
induced draft	U
*forced draft	
induced draft	M
large (mine, etc.)	M
large (industrial)	M
light (small diameter)	U
Feeders	
apron	M
belt	M
disc	U
reciprocating	H
screw	M
Food industry	
beet slicer	M
cereal cooker	U
dough mixer	M
meat grinders	M
Generators (not welding)	U
Hammer mills	H
Hoists	
heavy duty	H
medium duty	M
skip hoist	M
Laundry Washers	
reversing	M
Laundry Tumblers	M
Line Shaft	
driving processing equipment	M
light	U
other line shafts	U
Lumber Industry	
barkers-hydraulic-mechanical	H
burner conveyor	M
chain saw & drag saw	H
chain transfer	H
craneway transfer	H
de-barking drum	H
edger feed	M
gang feed	H
green chain	M
live rolls	H
log haul-locline	H
log haul-well type	H
log turning device	H
main log conveyor	H
off bearing rolls	M
planer feed chains	M
planer floor chains	M
planer tilting hoist	M
re-saw merry- go-round conveyor	M
roll cases	H
slab conveyor	H
small waste-conveyor-belt	U
small waste-conveyor-chain	M
sorting table	M
tipple hoist conveyor	M
tipple hoist drive	M
transfer conveyors	M
transfer rolls	M
tray drive	M
trimmer feed	M
waste conveyor	M
Machine Tools	
bending roll	M
punch press-gear driven	H
*notching press-belt driven	
plate planers	H
tapping machine	H
other machine tools	
main drives	M
auxiliary drives	U
Metal Mills	
draw bench carriage & main drive	M
forming machines	H
*pinch, dryer & scrubber rolls, reversing	
slitters	M
table conveyors-non-reversing group drives	M
individual drives	H
*table conveyors-reversing	
wire drawing & flattening machine	M
wire winding machine	M
Mills, Rotary Type	
**ball	M
**cement kilns	M
**dryers & coolers	M
kilns	M
**pebble	M
**rod , plain & wedge bar	M
tumbling barrels	H
Mixers	
concrete mixers, cont.	M
concrete mixers, intermittent	M
constant density	U
variable density	M
Oil Industry	
chillers	M
*oil well pumping	
paraffin filter press	M
rotary kilns	M
Paper Mills	
agitators (mixers)	M
barker-auxiliaries-hydraulic	M
barker-mechanical	M
barking drum	H
beater & pulper	M
bleacher	U
calendars	M
calendars-super	H
converting machine, except cutters, platers	M
conveyors	U
couch	M
cutters-platers	H
cylinders	M
dryers	M
Paper Mills	
felt stretcher	M
felt whipper	H
jordans	H
log haul	H
presses	U
pulp machine reel	M
stock chests	M
suction roll	U
washers & thickeners	M
winders	U
*Printing Presses	
Pullers	
barge haul	H
Pumps	
centrifugal	U
proportioning	M
reciprocating single acting, 3 or more cylinders	M
double acting, 2 or more cylinders	M
*single acting, 1 or 2 cylinders	
*double acting, single cylinder	
rotary-gear type	U
rotary-lobe, vane	U
Rubber & Plastics Industries	
**crackers	H
laboratory equipment	M
**mixing mills	H
**refiners	M
**rubber calendars	M
**rubber mill (2 on line)	M
**rubber mill (3 on line)	U
**sheeter	M
*tire building machines	
*tire & tube press openers	
**tubers & strainers	M
**warming mills	M
Sand Muller	M
Screens	
air washing	U
rotary-stone or gravel	M
traveling water intake	U
Sewage Disposal Equipment	
bar screens	U
chemical feeders	U
collectors, circuline or straightline	U
dewatering screws	M
grit collectors	U
scum breakers	M
slow or rapid mixers	M
sludge collectors	U
thickeners	M
vacuum filters	M
Slab Pushers	M
*Steering Gear	
Stokers	U
Sugar Industry	
**cane knives	M
**crushers	M
**mills	H
Textile Industry	
batchers	M
calendars	M
cards	M
dry cans.	M
dryers	M
dyeing machinery	M
*knitting machines	
looms	M
mangles	M
nappers	M
pads	M
*range drives	
slashers	M
soapers	M
spinners	M
tenter frames	M
washers	M
winders	M
*Windlass	

Remarks: * Refer to factory. ** To be selected on basis of 24hr. service only.

Note: Table above contains reference value. Names and mechanical characteristics of the actual machine may differ from the table above.

Selection of Load Factor

(2) Recommended Load Factor Modifications for Frequent Start-Stop Operation

Please see table B-3 and B-4.

Table B-3 Number of Starts-Stops and Load Factor

Number of starts-stops [times/hour]	~3 hours/day			~10 hours/day			~24 hours/day		
	I	II	III	I	II	III	I	II	III
~10	0.80	1.00	1.20	1.00	1.10	1.35	1.20	1.25	1.50
~200	0.85	1.10	1.30	1.10	1.30	1.50	1.25	1.50	1.65
~500	0.90	1.20	1.40	1.15	1.45	1.60	1.30	1.60	1.75

$$\text{The ratio of Moment of Inertia (The ratio of GD}^2\text{)} = \frac{\text{Total Moment of Inertia (GD}^2\text{) as seen from the motor shaft}}{\text{Moment of Inertia (GD}^2\text{) of motor}}$$

Load Factor
1: Allowable ratio of Moment of Inertia (GD^2) ≤ 0.3
2: Allowable ratio of Moment of Inertia (GD^2) ≤ 3
3: Allowable ratio of Moment of Inertia (GD^2) ≤ 10

Note: 1. The number of starts-stops includes brake or clutch operation times.
2. Consult us when starting under loaded conditions.
3. Consult us when start-stop frequency exceeds 500 times/hour. Brake for high frequency use may be necessary.

Table B-4 MOTOR THERMAL RATING (C × Z)

Motor Power [kW]	Allowable C × Z				Motor moment of inertia kg·m²		Motor GD²	kgf·m²
	(35%ED)	(35%ED~50%ED)	(50%ED~80%ED)	(80%ED~100%ED)	Standard	With brake	Standard	With brake
0.1	3200	3000	2000	1200	0.00033	0.00035	0.0013	0.0014
0.2	2200	2800	2800	2500	0.00050	0.00055	0.002	0.0022
0.25	2200	2800	2800	2500	0.00050	0.00055	0.002	0.0022
0.4	1800	2200	1500	1500	0.00065	0.00068	0.0026	0.0027
0.55	1800	2200	1500	1500	0.00101	0.00111	0.00405	0.00445
0.75	1400	1400	800	500	0.00120	0.00130	0.0048	0.0052
1.1	1400	1400	800	500	0.00185	0.00208	0.0074	0.0083
1.5	1200	1200	500	400	0.00213	0.00235	0.0085	0.0094
2.2	1000	900	400	200	0.00333	0.00373	0.0133	0.0149
3.0	1000	900	400	200	0.00700	0.00810	0.0281	0.0325
3.7	800	800	800	700	0.00848	0.00958	0.0339	0.0383
5.5	300	300	200	150	0.01143	0.01253	0.0457	0.0501
7.5	400	350	300	300	0.02675	0.03025	0.1070	0.121
11	200	200	150	150	0.03750	0.04100	0.1500	0.164

C × Z calculated by below steps (1) ~ (3) must be less than allowable C × Z listed in Table B-4.

(1) Caluculate C from formula below.

[SI units] $C = \dfrac{J_M + J_L}{J_M}$

J_M; Moment of inertia of motor [kg·m²]
J_L; Total moment of inertia (excluding motor) at motor shaft [kg·m²]

[Gravitational units] $C = \dfrac{GD_M^2 + GD_L^2}{GD_M^2}$

GD_M^2; GD^2 of motor [kgf·m²]
GD_L^2; Total GD^2 (excluding motor) at motor shaft [kgf·m²]

Continues to the next page.

(2) Caluculate Z (number of startup times/hour).

(a) Assume that one operating period consists of "on time t_a [sec]" and "off time t_b [sec]" and the motor is started n_r [times/cycle].

$$Z_r = \frac{3600n_r}{t_a + t_b} \text{ [times/hr]}$$

(b) When inching, ni [times/cycle] is included in 1 cycle (t_a+t_b), the number of inching times per hour Z_i, and then included in the number of starts.

$$Z_i = \frac{3600n_r}{t_a + t_b} \text{ [times/hr]}$$

(c) Calculate Z [times/hr] by (a) and (b).

$$Z = Z_r + \frac{1}{2} Z_r = \frac{3600n_r}{t_a + t_b} \cdot \left(n_r + \frac{1}{2} n_i\right) \quad \text{[times/hr]}$$

(3) Calculate C multiplied by Z.

Use the C obtained in step (1) and Z in step (2).

(4) Obtain the duty cycle %ED and check with table above.

$$\%ED = \frac{t_a}{t_a + t_b} \times 100$$