

DUTY CLASSIFICATION	2
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According to FEM classification, two fundamental criteria must be taken into account:

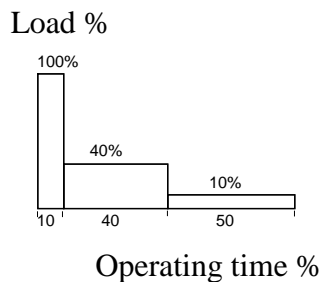
- Type of duty (load spectrum)(k)
- Average daily operated time (Tm)

I) Type of Duty (load spectrum)

I.a) Approximate determination

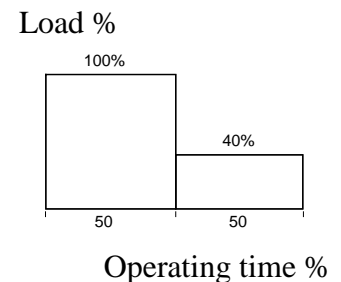
LIGHT

(k < or = 0.5)
Occasional full load.
Usually light load.
Small fixed load.



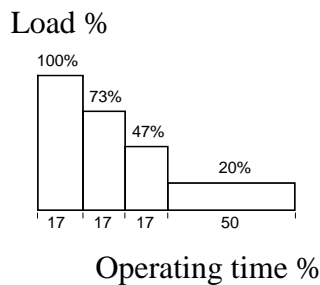
HEAVY

(0.63 < k < or = 0.8)
Repetitive full load.
Usually average load.
Heavy fixed load.



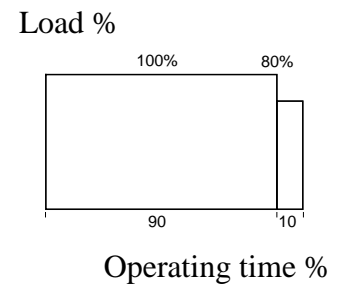
MEDIUM

(0.5 < k < or = 0.63)
Occasional full load.
Usually light load.
Average fixed load.



VERY HEAVY

(0.8 < k < or = 1)
Usually almost full load.
Very heavy fixed load.



I.b) Strict determination

For an exact classification into groups the cubic mean value k referred to the load to be lifted is required. It is calculated using the following formula:

$$k = \sqrt[3]{\left(\left(\frac{C1}{Cm} \right)^3 \cdot \left(\frac{T1}{Tm} \right) + \left(\frac{C2}{Cm} \right)^3 \cdot \left(\frac{T2}{Tm} \right) + \left(\frac{C3}{Cm} \right)^3 \cdot \left(\frac{T3}{Tm} \right) + \dots \right)}$$

Since the life of the mechanism is inversely proportional to the cube of the load.

Symbols:

- C1, C2, C3, ... useful or partial load
- T1, T2, T3, ... daily operating time under useful or partial load
- Tm = T1+T2+T3+... average daily operating time

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II) Daily Operating Time (T_m)

T_m is the total daily operating time with load and without load

III) Determination of the FEM Classification

Class of duty (load spectrum)		Average daily operating time in hours					
service	k	< 0.5 h	< 1 h	< 2 h	< 4 h	< 8 h	< 16 h
light	k < 0.5	-	1 Cm	1 Bm	1 Am	2m	3m
medium	0.5 < k < 0.63	1 Cm	1 Bm	1 Am	2m	3m	4m
heavy	0.63 < k < 0.8	1 Bm	1 Am	2m	3m	4m	5m
very heavy	0.8 < k < 1	1 Am	2m	3m	4m	5m	-

IV) FEM Classification Checking

It is necessary to check the duty factor and the number of starts per hour.

$$\text{Duty factor} = \frac{\text{(lifting time + lowering time)}}{\text{(lifting time + idle time + lowering time + idle time)}}$$

GROUP	1 Bm	1 Am	2m	3m	4m
Duty factor	25%	30%	40%	50%	60%
Number of starts per hour	150	180	240	300	360
Life of mechanisms under full load 250 hours/year					
	400	800	1600	3200	6400

V) FEM / ISO / ASME

Group FEM	1Bm	1Am	2m	3m	4m
Group ISO	M3	M4	M5	M6	M7
Group ASME	H2	H3	H4	H5	H5