# FEM CLASSIFICATION 2

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

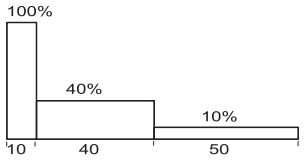
- the type of duty (load spectrum)(k)
- average daily operated time (Tm)

## I ) type of duty (load spectrum)

### I.a ) Approximate determination

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

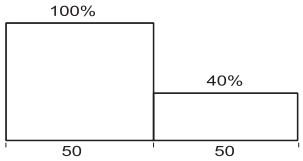
Load %




Operating time %

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

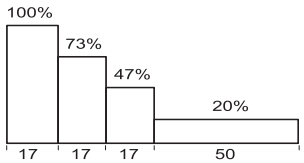
Load %




Operating time %

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

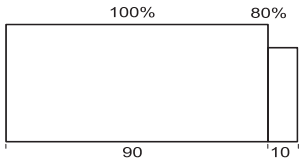
Load %




Operating time %

VERY HEAVY
(0.8 < k < ou = ظ 1 )
Usually almost full load.
Very heavy fixed load.

Load %




Operating time %

### 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 by using the following formula :

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

since the life of the mechaniVS is inversely proportional to the third power 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 operated time

# FEM CLASSIFICATION 2

## II ) Daily operated time (Tm)

Tm is the daily operated 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.

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

| GROUPE | 1 Bm | 1 Am | 2m | 3m | 4m |
|---|---|---|---|---|---|
| Duty factor | 25% | 30% | 40% | 50% | 60% |
| Number of starts per hour | 150 | 180 | 240 | 300 | 360 |
| | Operating time with full load for 250 day/year | | | | |
| | 400 | 800 | 1600 | 3200 | 6300 |

## V ) FEM / ISO / HMI

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