SIZE SELECTION - CLUTCH TORQUE

The basic relationship between TORQUE, MOTOR POWER Pin kW and SPEED : $M = \frac{9550 \times P}{RPM}$ = Nm provides a torque value for normal full load running of a machine. The Clutch must, however, have a reserve of torque for intermittent over-loads and a factor of safety must be allowed so that torque is based on $M = \frac{K \times 9550 \times P}{RPM}$ = Nm where K is the safety over-load factor and M the static torque of the Clutch. For electric motor drives (3 phase squirrel cage) the pull out torque of the motor is usually about 2.5 × Full Load Torque and this factor of 2.5 may be used for K for many machines driven by electric motors and give an adequate reserve of clutch torque. The factor can, of course, be safely reduced, say to 1.5 for such loads as centrifugal pumps or light conveyors where only small overloads can occur. A higher factor for K may, however, be necessary if the machine requires the full overload torque *before it attains full speed.*

The reason for this is that at the instant of engagement and during acceleration of the machine the Clutch is developing less than its normal static torque since it is actually slipping until it has brought the machine up to the same speed as the driving shaft. The speed/torque curves appearing on each data sheet enable a suitable safety factor to be adopted.

Special consideration must be given when dealing with :

(a) Machines which incorporate flywheels to deal with high peak torque, i.e. presses and guillotines.

(b) Machines with high inertias which need to be started and stopped very frequently. For this duty the heat dissipation during each start must be calculated to ensure that it comes within the thermal capacity of the Clutch.

For these applications we suggest that details are passed to our local engineer or head office in order that a suitable size can be recommended.

BRAKE TORQUE

The selection of a Brake to stop a machine in a given time may be determined from the following formula : $Ma = \frac{J\,n}{9.55t}$ where Ma = Torque in Nm to stop the machine in time t seconds.

J = Weight of rotating masses x effective radius squared expressed kgm^2. n = initial speed in RPM. It will be noted from the speed/torque curves that the Brake Torque will automatically increase as the machine is slowed down. If M is therefore taken as the value at the initial speed then the Brake will have a reserve of torque for the job. As in the case of Clutches, we suggest that details are passed to us for size recommendation where machines have high energy or inertias, i.e. Centrifuges, or where the machine is started and stopped very frequently.

SELECTION TABLE

Allowing for 250% torque overloads after Clutch has brought load to full speed.

	SHAFT SPEED AT CLUTCH IN R.P.M.																	
Motor kW	100	200	300	400	500	600	700	800	900	1000	1250	1440	1750	2000	2500	2800	3000	4000
0.015	250	250	250	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
0.037	365	250	250	250	250	250	250	175	175	175	175	175	175	175	175	175	175	175
0.06	400	365	250	250	250	250	250	250	250	250	250	175	175	175	175	175	175	175
0.09	400	400	365	250	250	250	250	250	250	250	250	250	250	175	175	175	175	175
0.12	600	400	365	365	365	250	250	250	250	250	250	250	250	250	250	175	175	175
0.18	600	400	400	400	365	365	365	250	250	250	250	250	250	250	250	250	250	175
0.25	600	600	400	400	400	365	365	365	365	365	250	250	250	250	250	250	250	250
0.37	800	600	600	400	400	400	400	400	365	365	365	365	250	250	250	250	250	250
0.55	800	800	600	600	600	400	400	400	400	400	365	365	365	365	250	250	250	250
0.75		800	600	600	600	600	600	400	400	400	400	400	365	365	365	365	365	250
1.1		800	800	600	600	600	600	600	600	600	400	400	400	400	365	365	365	365
1.5			800	800	800	600	600	600	600	600	600	600	400	400	400	400	400	365
2.2				800	800	800	800	600	600	600	600	600	600	600	400	400	400	400
3.0							800	800	800	800	800	600	600	600	600	600	600	400
5.5											800	800	800	800	600	600	600	600
7.5												800	800	800	800	600	600	600
9.3													800	800	800	800	800	600
11.0														800	800	800	800	800

CLUTCH SIZE

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