General

Technical Section Y of the catalog contains useful information pertaining to the selection, mounting, alignment and control of clutches and brakes in general. Formulas, symbols and units are also identified. It is recommended that Section Y be reviewed before attempting to size a specific product for an application.

Brake Torque

The torque ratings are dependent upon the spring force, not a pressurizing media. However, a pressurizing media is required to compress the springs to release the brake. Minimum releasing pressures, as well as the maximum pressures which the releasing piston and cylinder can withstand, are given on the catalog pages.

Type CS brakes are unidirectional. Direction of rotation is important in their application and close attention must be given to both the forward and reverse torque requirements of the application.

Type CTE brakes develop slightly larger torque in the forward direction of rotation than in the reverse direction. If reverse torque is critical, brake selection should be based upon the reverse torque rating.

For all brake types, torque will decrease with lining wear, due to the longer piston travel required for engagement. Brake types CS and CTE have provision for periodical adjustment to maintain torque rating during the life of its lining.

Continuous Thermal Capacity

The spring-applied brakes covered in this section are generally not recommended for continuous slip applications. This type of application, requiring a spring-applied brake, is best handled by the caliper and water-cooled product lines (see Sections H and I).

Cyclic Thermal Capacity

Brake types CS and CTE were designed primarily for high cyclic stopping applications. Both brake types are capable of a maximum thermal capacity $\mathbf{P_c}$ of 0.012 HP/in² (0,0014kW/cm²).

Non-Cyclic Thermal Capacity

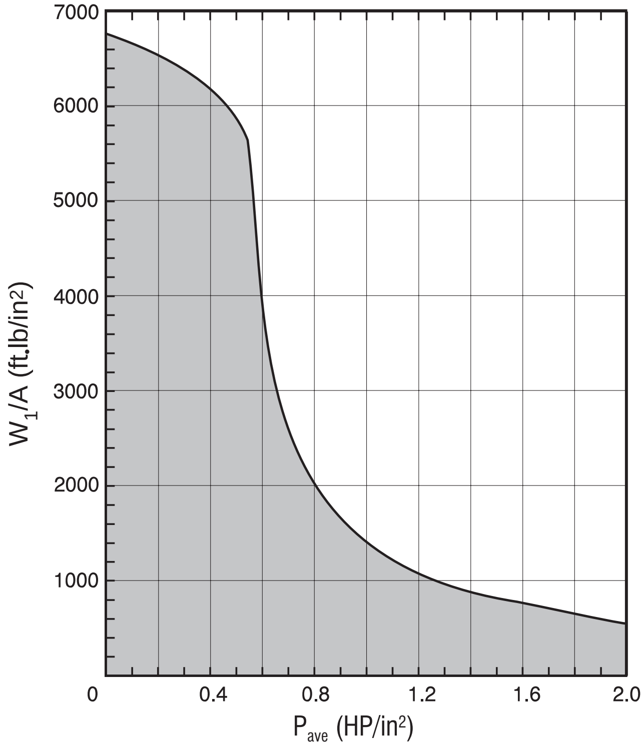
Non-cyclic thermal capacity is determined by the element's friction area, drum or disc mass, heat capacity and thermal conductivity. The properties of our standard solid discs and drums result in the limits indicated in the Non-Cyclic Energy Capacity Graph. An explanation on the use of this graph follows.

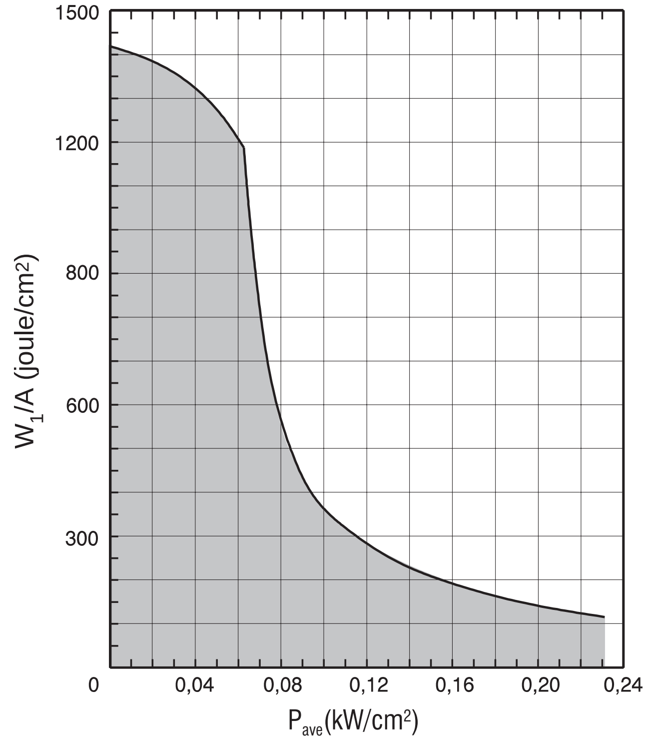
The thermal energy calculated for the load is adjusted to include the energy associated with accelerating or decelerating the components of the tentative clutch and/or brake selection. The adjusted thermal energy $\mathbf{W_t}$ is divided by the element's friction area **A**. Next, the average power loading $\mathbf{P_{ave}}$ is calculated from:

$$P_{ave} = \frac{P_t}{A}$$

The point ($\mathbf{W_t/A, P_{ave}}$) is plotted on the graph. If the point falls below the appropriate product limit line, the selection will handle the thermal load. If it does not, an element having a greater friction area is required.

Thermal Capacities
Non-Cyclic Energy Capacity for Types CS & CTE





Example

A cyclic stopping brake is required for use on a power press operating under the following conditions. Determine the brake size and allowable cyclic rate.

Brake shaft speed: 250 rpm

Stopping angle at crankshaft: 15°

Inertia referred to brake shaft: 50 lb·ft²

Press stroke: 4 in

Ram and die weight: 600 lb

Reduction between brake shaft and crankshaft: 6:1

Stopping angle at brake shaft q_d = 15°·6 =90°

$$t_d = \frac{\theta_d}{3 \cdot n} = \frac{90°}{3 \cdot 250} = 0.12 \text{ sec}$$

$$M_b = \frac{Wk^2 \cdot n}{25.58 \cdot t_d} = \frac{50 \cdot 250}{25.58 \cdot 0.12}$$

$$= 4100 \text{ lb·in}$$

Reverse brake torque required = 0.5·stroke·weight/reduction

= 0.5·4·600/6

= 200 lb·in

From required torques, select 6CSA200

Lining area = 20 in²

Brake drum WK² = 0.3 lb·ft²

Total WK² = 50 + 0.3 = 50.3 lb·ft²

$$W = \frac{Wk^2 \cdot n^2}{5873} = \frac{50.3 \cdot 250^2}{5873}$$

$$= 535 \text{ ft·lb}$$

$$P_c = \frac{W \cdot cpm}{33000}$$

$$cpm = \frac{Pc \cdot 33000}{W}$$

$$= \frac{0.012 \cdot 20 \cdot 33000}{535}$$

$$= 14$$