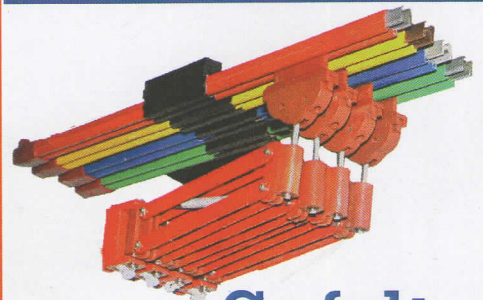


## MILL DUTY D.C. BRAKES

**ANAND SYSTEMS ENGINEERING PVT. LTD.**

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# Description of mill Duty D.C. Electro - Magnetic Brakes

Anand Systems Mill duty D.C. Electro magnetic Brake are suitable for 220 V. D.C. supply for a wide range of drum sizes from 100 mm to 800 mm.

Electromagnetic brake are used, when a load must be stopped rapidly to prevent the load from rotating due to the motor and load inertia at a select-predetermined time or at a selected point of travel or to prevent overtravelling.

To calculate the size of anand systems Electro-magnetic brake for a given application. It is necessary to take into consideration. The H.P. rating and speed in R.P.M. to obtain the required retarding torque. The calculations are made as.

$$\text{Torque in Kg M} = \frac{71620 \times \text{H.P.}}{\text{Speed in RPM} \times 100}$$

To obtain maximum efficiency the brake should be mounted directly on the motor shaft. The application involving arduous duty with more self sustaining load characteristic such as hoist motions of E.O.T. Crane, skip hoist equipments, overload factor must be taken in consideration. In applications of this nature it is usual to assess the brake torque required on the basis of 150-175% full load torque.

## 1. SALIENT FEATURES :

- a) The mill duty brakes are superior in construction to the usual heavy duty E.M. Brakes as the base is of fabricated construction, the arms are cast steel or fabricated construction. The pins are of hardened steel and lubrication is provided for brakes of 400 mm dia. and above as a rule.
- b) The brake shoes are designed for 70° angle which is in accordance with modern practice and this makes it easy for replacement of brake shoes without any major dismantling.
- c) The coils are either class "F" or class "H" and are liberally designed to allow for high ambient temperature prevailing in the steel plants.
- d) The magnet housing is of dust proof construction and the magnet system is of quick acting type which is achieved by use of economy resistor and forcing contactor. This enables the brake to operate on very high frequency of operation (600 to 720 per hour).

- e) Mill duty D.C. Electro Magnetic Brakes are manufactured in a wide range of Drum diameters from 100 mm upto 800 mm Preferred series and standard metric size dia meters are available. The torque range available in this series is from 200 kg. CM (for the smaller brake) upto 1,25,000 kg CM (for the largest brake). These torques correspond to 25% intermittent duty which is applicable to most of the medium duty cranes of steel plants. The ratings of 40% and 100% duty cycle are also given in the charts.

## 2. OPERATION.

- a) On energizing the coil, the operating magnet releases the brake and on deenergizing the powerful spring which sets the brake acts up on the brake shoes through the brake arms. The magnet armature is an integral part of one shoe arm whilst the other arm is directly coupled to the magnet field member by means of a steel tie-rod which passes through the spring and over the brake wheels
- b) The heavy coil spring exerts rapid and steady force on the brake shoes and brake drum through the arms and the maximum stress is well within safe limits. Equal travel and balanced movement on both shoes applies even and positive torque in either direction of rotation.
- c) Because the movement is almost directly exerted on the brake shoes, the Magnet designed for a very short stroke, with small air-gap and very high electro magnetic efficiency. Since the total movement generally responds to clearances between brake shoes and brake wheel, this takes place with remarkable speed and with smooth, quiet action in.
- d) Installation is easy and routine adjustment are few. Braking torque is set correctly at installation and requires no major adjustment except when shoe/linings are renewed.

## 3. ELECTRO MAGNET.

Brake magnets are series-wound or shunt-wound according to the service for which the brakes are to be used. If the nature of the work is such that the brake action must be independent of the motor, a shunt-wound brake is necessary. The action of a series-wound brake depends directly upon the current taken by the driving d.c. motor.

For shunt-wound brake operating on 220 volts D.C. a series resistor (economy resistor) is supplied with each brake in the coil is energized on full voltage (220 V) so as to ensure the quick opening (release) of the brake after which the economy resistor is introduced into circuit by a timer/contacter arrangement which is an integral part of the rectifier unit.

Sufficient force would still be developed by the magnet to hold the brake in open (released) position and at the same time the heating of the brake coil is greatly reduced.

This ensures that the coil operates well within the temperature limits for the type of insulation used and gives long life, and reliability.

The coils are designed to operate at 85% to 110% of the rated voltage, which is the normal practice for all control gear. The maximum braking torque specified in the rating chart corresponds to 25% intermittent duty i.e. total "on" time of 2.5 minutes in maximum cycle of 10 minutes which can be repeated indefinitely. The brake coils and economy resistor are matched suitably to give the desired performance at the specified intermittent duty factor.

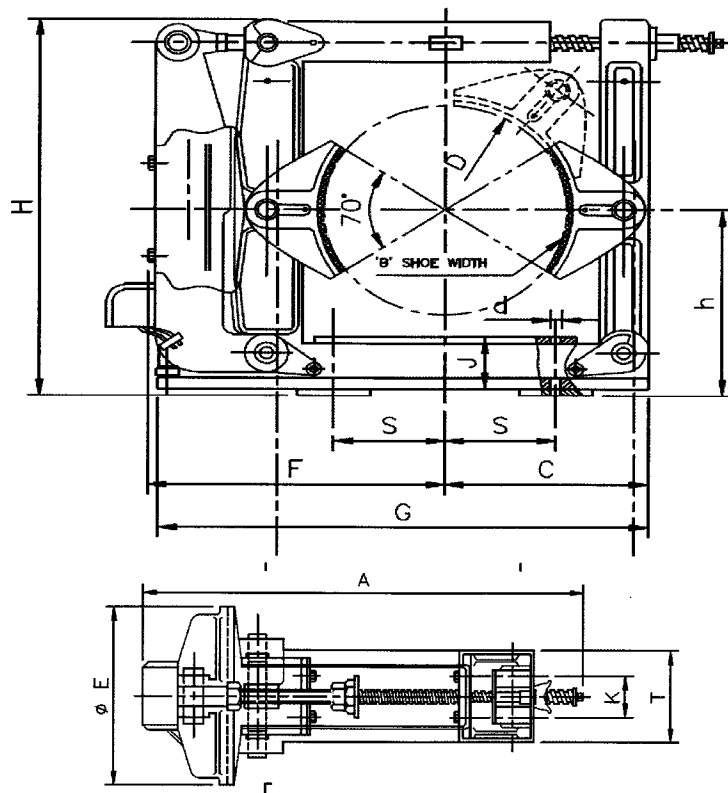
## TORQUE RATINGS OF ANAND SYSTEMS MILL DUTY D.C BRAKES 100 TO 800MM DIA.

| Brake Type         | Drum Dia. (mm) | Duty Cycle | Maximum Braking Torque Kg. Cm. | Minimum Braking Torque Kg. Cm. |
|--------------------|----------------|------------|--------------------------------|--------------------------------|
| DCM 100            | 100            | 25%        | 200                            | 100                            |
|                    |                | 40%        | 160                            | 80                             |
|                    |                | 100%       | 100                            | 50                             |
| DCM 150<br>DCM 160 | 150<br>160     | 25%        | 1300                           | 500                            |
|                    |                | 40%        | 1000                           | 500                            |
|                    |                | 100%       | 700                            | 320                            |
| DCM 200            | 200            | 25%        | 1600                           | 600                            |
|                    |                | 40%        | 1250                           | 600                            |
|                    |                | 100%       | 1000                           | 400                            |
| DCM 250            | 250            | 25%        | 4170                           | 2800                           |
|                    |                | 40%        | 3500                           | 2800                           |
|                    |                | 100%       | 2200                           | 800                            |
| DCM 300<br>DCM 315 | 300<br>315     | 25%        | 5000                           | 3000                           |
|                    |                | 40%        | 4200                           | 3000                           |
|                    |                | 100%       | 2500                           | 1000                           |
| DCM 400            | 400            | 25%        | 15000                          | 7500                           |
|                    |                | 40%        | 12000                          | 6000                           |
|                    |                | 100%       | 5500                           | 2750                           |
| DCM 500            | 500            | 25%        | 25000                          | 12500                          |
|                    |                | 40%        | 19000                          | 9500                           |
|                    |                | 100%       | 8500                           | 4250                           |
| DCM 600            | 600            | 25%        | 50000                          | 25000                          |
|                    |                | 40%        | 35500                          | 17500                          |
|                    |                | 100%       | 15500                          | 7800                           |
| DCM 700            | 700            | 25%        | 80000                          | 40000                          |
|                    |                | 40%        | 57500                          | 28750                          |
|                    |                | 100%       | 28000                          | 14000                          |
| DCM 800            | 800            | 25%        | 125000                         | 62500                          |
|                    |                | 40%        | 91000                          | 45500                          |
|                    |                | 100%       | 44000                          | 22000                          |

NOTE: 1. Coils are shunt wound. Class 'B' insulated according to requirement.

2. Shunt wound coils are generally supplied with matching economy resistor suitable for 220V D.C. supply.

3. Brakes are suitable for 720 operations per hour maximum at an ambient temperature of 55°C unless otherwise specified.



| BRAKE TYPE  | DRUM DIA. D | A    | B   | C   | d  | E <sup>φ</sup> | F   | G    | h   | H    | J   | K   | L   | M   | N     | S   | (App.) Wt. in kg. |
|-------------|-------------|------|-----|-----|----|----------------|-----|------|-----|------|-----|-----|-----|-----|-------|-----|-------------------|
| DCM 100     | 100         | 391  | 70  | 125 | 13 | 145            | 240 | 260  | 100 | 272  | 6   | 40  | 4   | 65  | 8×8   | 110 | 16                |
| DCM 150/160 | 150/160     | 440  | 70  | 180 | 13 | 190            | 305 | 330  | 150 | 385  | 6   | 50  | 6   | 80  | 10×10 | 155 | 36                |
| DCM 200     | 200         | 571  | 90  | 190 | 17 | 190            | 335 | 400  | 170 | 450  | 8   | 60  | 6   | 90  | 11×11 | 185 | 41                |
| DCM 250     | 250         | 600  | 110 | 245 | 21 | 245            | 430 | 500  | 200 | 510  | 10  | 70  | 8   | 105 | 12×12 | 220 | 70                |
| DCM 300     | 300/315     | 753  | 140 | 285 | 21 | 245            | 465 | 590  | 240 | 602  | 12  | 80  | 8   | 120 | 14×14 | 265 | 94                |
| DCM 400     | 400         | 948  | 180 | 300 | 25 | 355            | 504 | 780  | 320 | 660  | 90  | 90  | 250 | 300 | 520   | 340 | 240               |
| DCM 500     | 500         | 1111 | 200 | 375 | 25 | 450            | 575 | 915  | 400 | 823  | 115 | 100 | 315 | 375 | 640   | 375 | 364               |
| DCM 600     | 600         | 1312 | 240 | 450 | 38 | 522            | 675 | 1080 | 475 | 950  | 140 | 126 | 380 | 420 | 780   | 450 | 600               |
| DCM 700     | 700         | 1512 | 280 | 505 | 38 | 600            | 770 | 1215 | 550 | 1108 | 180 | 150 | 430 | 495 | 890   | 505 | 960               |
| DCM 800     | 800         | 1628 | 320 | 585 | 38 | 688            | 853 | 1420 | 600 | 1255 | 200 | 180 | 480 | 580 | 1020  | 585 | 1360              |

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