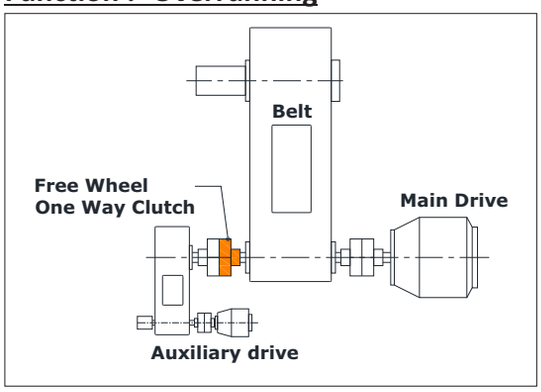
Selection Procedure

1) Calculate the torque of the Clutch.

$$\text{Torque (Nm)} : \frac{\text{Input Power (kw)} \times 9550}{\text{Speed of Shaft (RPM)}}$$

2) Determine the mode operation (Overrunning, Indexing, Backstopping).
3) Determine the service factor (Refer the table).
4) Calculate the design torque (Torque x Service Factor).
5) Bore size and installation method.
6) Determine the max. overrunning speed and cycle time of operation.
7) Calculate the static torque reverse motion from the maximum load expected and multiply it by the
service factor (Back - stopping).
8) Select nearest equal / higher side torque referring catalogue table torque
and specify the name of model & bore size.
9) *Specify direction of inner race drive.
*Please consult NMTG for proper selection.
*This is required for your fitment purpose.

Function :- Overrunning



A) Calculated the Torque on the Clutch according to the following formula:

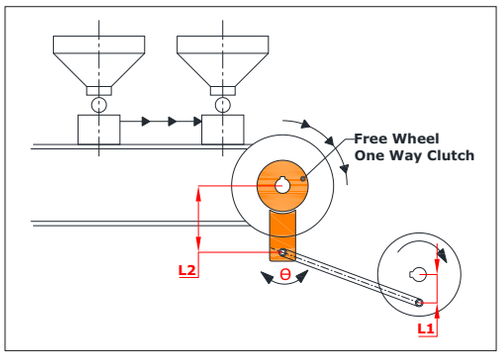
$$\text{Torque (Nm)} : \frac{\text{Input Power (kw)} \times 9550}{\text{(N) Speed of Shaft(RPM)}} \times \text{S.F}$$

T : Loaded Torque on Clutch (Nm)
kw: Input Power (kw)
N : Speed of Clutch Shaft Rotation (RPM)
S.F : Service Factor - (Refer Page No. - 7)

- Also Select Clutch by considering following:

1) Design torque requirement and service factor.
2) Maximum overrunning speed.
3) Bore and installation method.

Function :- Indexing



A) When detailed load condition is to be calculated, apply Formula (1) and when it is not, apply Formula (2) and check the torque on the clutch.

B) Select the clutch by:
1) Design Torque Requirement
2) Maximum Indexing Cycles N
3) Feeding Angle Θ
4) N x Θ
5) Bore size and Installation Method.

Formula (1) :

$$\text{Torque } T_{Nm} : \frac{J \times \theta \times N^2}{10380} + T_B$$

T : Loaded Torque on Clutch (Nm)
J : Inertia of Load (kgf.m^2) on Clutch Shaft
θ : Feeding Angle (deg) on Clutch Shaft
N : Indexing Cycles per minute (c/min.)
TB : Brake Torque calculated on Clutch Shaft (Nm)

Formula (2) :

$$\text{Torque } T_{Nm} : \frac{9550 \times kw}{n} \times S.F$$

T : Loaded torque on Clutch (Nm)
kw : Transmitted Power (kw)
n : Speed of Crank Shaft (r/min):
S.F : Service Factor - (Refer Page No. 7)

Service Factor

INDEXING		
Speed	Degree/Load cycle	Service Factor
> 150 strokes/min	-	3
> 100 strokes/min	> 90°	2.5
< 100 strokes/min	> 90°	2

OVERRUNNING						
Driving Machine		**Working condition**				
		Starting torque not higher than normal smooth	Starting torque up to 2 times running torque. Moderate load variations.	Starting torque 2 to 3 times running torque. Load variation.	Starting torque 2 to 3 times running torque. Load variation.	High starting torque. High load torque variations.
DC - motor		1.3	1.5	1.8	1.8	-
AC - motor with soft start or hydraulic						
Asynchronous motor with direct start	**Speed reduction between motor & freewheel < 20**	-	2.5	3	3	4
	Speed reduction between motor & freewheel > 20	-	1.5	2.5	2.5	3.5

BACKSTOPPING						
Driving Machine	**Driven Machine**					
	Elastic conveyor belts with risk of	Pump drives with more than 5	Pump drives with more than 5 meters Shaft	Fans	Other machines	
					No overloads	Dynamic overloads
Motors with hydraulic coupling	1.3	1.6	1.6	0.5	1	1.5
Asynchronous motors with direct start	1.6	1.6	1.6	0.5	1	1.5
Steam or Gas turbine	-	1.6	1.6	0.5	1	1.5
Internal combustion engine	1.6	1.6	1.6	0.5	1	1.5
Note : These values do not cover a motor start in the wrong direction.						

Hold back / Backstopping Selection Procedure (For Heavy Duty Application):

A : Belt Conveyor (for Short Inclined Yard Conveyor):

1) Calculate the Power to move an Empty Belt & Idlers

$$P1 = 0.06 \times f \times w \times v \times \frac{\ell + \ell_O}{367} \text{ (kW)}$$

2) Calculate the Power to move a loaded Belt horizontally

$$P2 = f \times qt \times \frac{\ell + \ell_O}{367} \text{ (kW)}$$

3) Calculate Power to move the load vertically

$$P3 = \frac{h \times qt}{367} \text{ (kW)}$$

4) Calculate the Back-stop Power

$$Pr = P3 - 0.7 (P1 + P2) \text{ (kw)}$$

5) Calculate the Back-stop Torque

$$T = \frac{9550 \times Pr}{n} \times S.F$$

6) Select the proper Clutch which satisfies the Calculated Back-stop torque

Note:

f = Friction Coefficient of Roller : 0.03 (normally used)

w = Weight of moving parts of conveyor on unload condition (kg/m)

T = Torque (Nm)

V = Velocity of conveyor (m/min.)

qt = Max. load (tons/hour)

h = Total lift (m)

ℓ = Horizontal distance between head pulley and tail pulley (m)

ℓO = Modificant coefficient for **ℓ** : 49 m (Normally used)

n = Shaft revolution per minute where clutch is mounted (RPM)

B : Bucket Elevator:

1) Calculate backstop torque

$$T (Nm) = \frac{9.8 (H+D) \times Qt \times D \times 1000}{120 \times V} \times S.F$$

2) Select the Proper Clutch which satisfies the Calculated Back-stop torque

Note:

H = Total Lift (m)

D = Pitch Circle Diameter of head Sprocket (m)

Qt = Possible maximum load (tons/hour)

V = Velocity of conveyor (m/min)

SF = Service Factor (Refer Page No. - 7)

Use the values from the table below.						
Width of Belt (mm)	400	450	500	600	750	900
Estimated weight (kg/m)	22.4	28	30	35.5	53	63
Width of Belt (mm)	1050	1200	1400	1600	1800	2000
Estimated weight (kg/m)	80	90	112	125	150	160

C : Belt Conveyor (for Long Long Yard Conveyor):

$$T = \frac{7020 \times H}{n} \times s.f$$

$$T = \frac{9550 \times kW}{n} \times s.f$$

Note:

kW = Electric power

H = Horse Power

s.f = Service factor

Hold back / Backstopping Selection Procedure (For Heavy Duty Application):

Service Factor:

Motor Stalled Torque	
Maximum Stalled Torque or Breakdown torque % of Normal Motor Rating	Service Factor
175%	1.17
200%	1.33
250%	1.67
300%	2

Fatigue Loading	
Service Condition	Service Factor
For backstopping 3 - 10 times per day	1.5
For backstopping over 10 times per day	2