General

Power rating capability is determined by engine design. Combined capability and durability of all engine components determine how much power can be produced in a particular application.

The power output of a basic engine model can be varied within its design ranges by changing the engine fuel setting or speed setting. Both of these settings affect the engine's maximum fuel rate and the power output capability.

Some of the application conditions considered by an engine manufacturer in determining a rating for an application are:

- Load factor
- Duty cycle
- Operating hours
- Historical experience

The same basic engine model can have different ratings for different industries and applications. Usually, they are grouped into the following categories:

- Industrial
- Truck
- Off-highway
- Power generation
- Petroleum
- Marine

Also, within these groupings, are ratings for continuous and intermittent service. Continuous ratings are for continuous use without interruption or load cycling. Intermittent ratings apply to about one hour operation followed by one hour operation at or below the continuous rating.

Engine Clutches

The CB element is usually recommended for engine clutch applications. Selections are based on the horsepower transmitted by the clutch. In some cases, it may be much lower than the engine's horsepower rating due to other engine driven auxiliary loads. Extra loads imposed by a cooling fan, alternator, air compressor or hydraulic pumps may represent a significant proportion of total engine power available.

Selections for Engines Without Torque Converters

Clutch selection is based upon the power transmitted, clutch rpm, the appropriate service factor, 110 psi (7,6 bar) actuating air pressure and clutch engagement at engine idle.

Recommended Engine Clutch Service Factors

Drive	SF
Compound - Drilling Rig	1.8
Generator	1.5
Metal Shredder	2.2
Rotary Table - Drilling Rig	1.5

Torque loss due to centrifugal effect must be taken into account. Follow procedure given in Section B. The peripheral speed of our standard semi-steel spiders and drums should not exceed 8500 fpm (43 mps). If it does, a dual element and/or ductile iron components should be considered. Single elements are preferred because of smaller overhung loads and ease of alignment.

The Power Capacity Table can be used to make a selection for single CB clutch elements having a 1.8 service factor and an operating pressure of 110 psi (7,6 bar). Find the horsepower value that is equal or greater than that which must be transmitted in the appropriate rpm line and read the clutch size in the column heading. For dual elements, double the power values in the table.

Selections for Engines With Torque Converters

The selection procedure for engines with torque converters is the same as that discussed above for direct drives, but with one other major consideration. Under the stall conditions, i.e. converter output shaft at zero speed, the clutch must be able to transmit the torque multiplication of the converter.

rpm	HP Capacity Table (110 psi and 1.8 SF) for Clutch Sizes:										
	12CB350	14CB400	16CB500	18CB500	20CB500	22CB500	24CB500	26CB525	28CB525	30CB525	32CB525
1000	147	216	362	440	520	587	688	803	884	967	1054
1050	153	223	371	449	529	595	693	804	879	954	1033
1100	158	229	379	456	536	599	695	798	866	932	
1150	163	235	385	462	539	600	693	787	846		
1200	167	241	390	465	540	597	685	769			
1250	171	245	394	466	538	591	674	744			
1300	175	249	395	465	533	581	657				
1350	179	253	395	462	525	567	635				
1400	182	256	394	456	514	549	607				
1450	185	258	390	448	499	527					
1500	187	259	385	437	481						
1550	189	259	378	423	459						
1600	191	259	369	407							
1650	192	258	358	388							
1700	193	256	345								
1750	193	253	329								
1800	193	249	312								
1850	192	245									
1900	191	239									
1950	189	232									
2000	187	225									
2050	184	216									
2100	181	206									
2150	177	195									

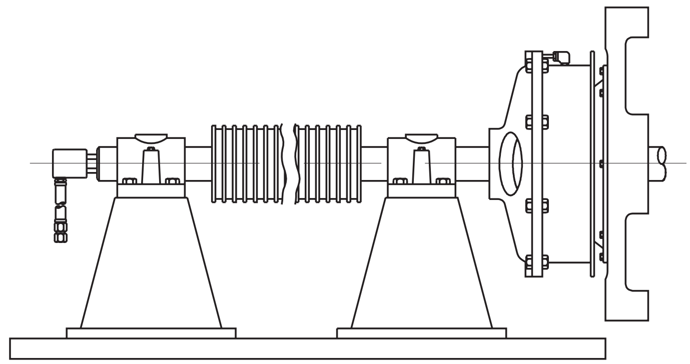
rpm	kW Capacity Table (7,6 bar and 1,8 SF) for Clutch Sizes:										
	12CB350	14CB400	16CB500	18CB500	20CB500	22CB500	24CB500	26CB525	28CB525	30CB525	32CB525
1000	110	161	270	328	388	438	512	599	659	721	786
1050	114	166	277	335	394	443	517	599	655	711	770
1100	118	171	283	340	399	446	518	595	645	695	
1150	121	175	287	344	402	447	516	586	630		
1200	125	179	291	346	402	445	511	573			
1250	128	183	293	347	401	441	502	555			
1300	131	186	295	347	397	433	489				
1350	133	188	295	344	391	423	473				
1400	136	190	293	340	383	409	452				
1450	138	192	291	334	372	392					
1500	139	193	287	326	358						
1550	141	193	282	315	342						
1600	142	193	275	303							
1650	143	192	267	289							
1700	143	191	257								
1750	144	189	245								
1800	144	186	232								
1850	143	182									
1900	142	178									
1950	141	173									
2000	139	167									
2050	137	161									
2100	135	154									
2150	132	146									

Engine Clutch Arrangements

For direct engine drive applications, the standard arrangement (Forms CB408 and CB427) uses an external flange drum mounted to the engine flywheel. The clutch element and its spider are fastened to a separate bearing supported jackshaft as shown in the figure.

When the clutch mounts on an engine stub shaft or on the output shaft of a torque converter, then the standard gap mounting arrangements (Forms CB406 and CB407) are used.

Typical Spider Engine-Mounted Application

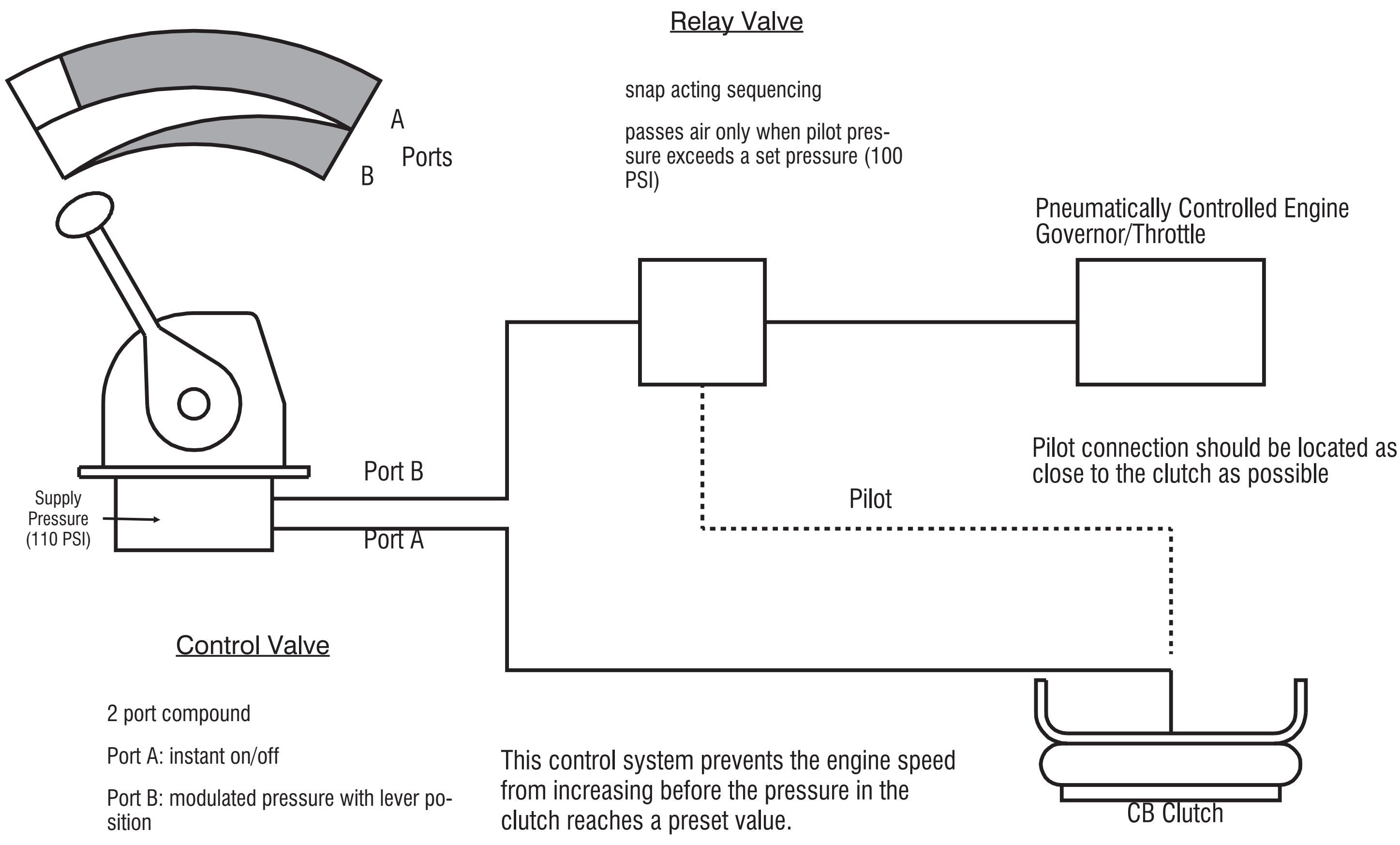


Clutch Engagement Speed

The recommended clutch engagement speed is 3000 fpm (15,2 mps) at the friction couple. If the speed at engine idle exceeds this value, then the idle speed should be changed.

Engine Clutch Control

To ensure clutch engagement at engine idle, the control shown below is recommended.



This control system prevents the engine speed from increasing before the pressure in the clutch reaches a preset value.

Example

A 200 HP, 1200 rpm engine is required to drive a generator.

A clutch is required to connect the engine to the generator.

$$M_c = \frac{HP \cdot 63025}{n} \cdot SF$$

$$= \frac{200 \cdot 63025}{1200}$$

$$= 15750 \text{ lb·in}$$

Try 12CB350 rated 13300 lb·in at 75 psi.

$$M_e = \frac{p_o - p_p - p_c}{75} \cdot M_r$$

$$= \frac{110 - 2 - 17}{75} \cdot 13300$$

$$= 16140 \text{ lb·in}$$

Spider peripheral speed

$$v = 0.262 \cdot N \cdot D$$

$$= 0.262 \cdot 1200 \cdot 18$$

$$= 5660 \text{ fpm}$$

Therefore, the 12CB350 selection is suitable.

Example

A 332 HP, 1200 rpm engine is used as a direct drive in a compound. What size clutch is required?

For the Power Capacity Table, running across the 1200 rpm line, a 16CB500 clutch is selected.

Example

A torque converter is being considered for the application in second example. The converter will have a torque multiplication factor of 3. Operating within its efficiency range, the maximum horsepower output is 332 and the maximum output speed is 1000 rpm. What size clutch is required?

Stall torque at converter output shaft

$$= \frac{332 \cdot 63025}{1200 \cdot 3}$$

$$= 52300 \text{ lb·in}$$

A 16CB500 element at 110 psi is capable of:

$$\frac{110}{75} \cdot 35200 = 51600 \text{ lb·in}$$

The 16CB500 torque is light, therefore, try an 18CB500.

Referring to the Engine Selection Guide, the 18CB500 element at 1000 rpm is capable of 445 HP.

The clutch selection would be an 18CB500.