High Performance Converters:

Stall Speed, Stator Clutch Options and More

Presented by

Jeff Brown & Frank Biolsi
Now You're Torkin' Seminar 2002

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- How Does The Torque Converter Work?
- What Is Stall Speed?
- How Can I Determine The Stall Speed ofMy Converter?
- The Vehicle Is Running Stronger Than Ever. What Happened To The Converter?
- Torque Converter Selection
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Stall Speed Talk

Stall speed

Torque converter stall is a commonly used term but it is also commonly misunderstood. Stall is the speed at which the converter will hold back or limit the engine speed if transmission output is prohibited. By not allowing further gain, the increase in engine RPM "stalls."

The key point to remember is that Stall Speed is a balancing act. Stall Speed is always a balance between the engine's ability to produce power and the converter's ability to hold it back. A change to either side will alter the balance and change the resulting stall speed.

The speed at which stall occurs with a given converter is a function of engine peak torque. It is clear that the stall speed on a given converter will not be the same when coupled to a tame small block engine as it is when coupled to a high performance big block engine.

Why is proper stall speed important?

Proper selection of stall speed will make for quicker launch, better 60 ft. time and a better ET.

Selection of the right stall speed for your vehicle should be matched to the engine peak torque, engine torque curve and vehicle weight. In general, the desired stall speed would be 500/700 RPM below the engine RPM at peak torque. This speed allows a margin for application of the torque reserve on takeoff.

When selecting stall speed without having an accurate and precise engine peak torque rating, it is better to conservatively estimate the engine torque than it is to overestimate it. If you overestimate the torque output, the resulting stall speed will be lower than intended and is likely to make the vehicle slow off the line, increasing your ET.

How can I determine the stall speed of my converter?

Stall speed is most accurately measured if the vehicle is equipped with a Transbrake to lock the drive train.

Testing stall speed by holding the wheel brakes and running the engine against the locked brakes will usually result in wheel rotation before true stall speed is reached. The engine simply overpowers the ability of the brakes to hold the car. When rotation starts you are no longer at stall. This method, often called brake stall, is not as accurate or consistent as observing engine RPM with transmission output completely prohibited.

An alternative method of measurement is to launch at wide-open throttle and observe the engine RPM reached at launch. This is commonly referred to as flash stall. Here again, inconsistencies caused by wheel spin and the short time allowed for RPM observation makes use of this method questionable.

Use extreme caution when performing stall tests. Fluid temperature in the converter rises very rapidly when the converter is forced hold back engine power. A 10 second maximum stall time with several minutes of operation for cool down before conducting another test, are strongly recommended.

Does stall speed affect normal street driving?

Generally speaking, normal driving is not adversely affected by converters with stall speeds up to approximately 3000 RPM. The vehicle will begin to roll normally and acceleration will be favorably influenced when higher stall speed converters are used. A very high stall speed converter (above 3000 RPM) would not be satisfactory for street use.

Is stall speed the only consideration in selecting a converter?

While stall speed is very important it is by no means the only consideration when selecting a converter. Torque multiplication at launch and high-end efficiency are equally important. Selection of components and assembly tolerance choices will not only affect stall speed, but will influence converter efficiency. A higher stall speed might be obtained at the expense of looseness at low speeds and loss of performance at higher speeds after launch. You want a converter that produces the right stall without sacrificing performance down the street or down the strip.

The vehicle is running stronger than ever, what happened to the converter?

Engine output is what really determines stall speed for a given converter. For this reason the converter you have been using may not be adequate when you improve the performance of your engine. This is particularly true when using an improved camshaft. Improving heads, carburetion, installing turbos or manifolds will also affect stall speed.

If you increase the available power put into the same converter, the stall speed will be higher. That new higher stall may be nowhere near the optimum stall speed for the new engine configuration, to the point where the overall performance may not only remain unchanged but could actually suffer. Remember that you want to have stall speed matched to the particular engine and vehicle combination.

K Factor and Stall Speed Worksheet

The Basics

Stall Speed or Torque Converter Stall -
The speed at which the converter will hold back or limit the engine speed if transmission output is prohibited.

Engine Torque -
A measurement of the force capability an engine, conventionally stated in foot pounds.

Torque measurements used for stall calculations must be in Newton Meters

K Factor -
A relative expression of a converter's ability to hold back or "stall" an engine.

The Rule

Stall speed is dependant on the combination of K Factor and Engine Torque

The higher the **K Factor** - the higher the **Stall Speed** for a given **Engine Torque**
(the **higher** the K factor the more it **Slips**)

The lower the **K Factor** - the lower the **Stall Speed** for a given **Engine Torque**
(the **lower** the K factor the more it **Holds**)

The higher the **Engine Torque** - the higher the **Stall Speed** for a given **K Factor**

The Math

To Determine the required K Factor:
Divide desired **Stall Speed** by the square root of the **Engine Torque (Nm)**

$$\text{K Factor} = \frac{\text{Stall Speed (RPM)}}{\sqrt{\text{Engine Torque (Nm)}}}$$

OR

To Determine a resulting Stall Speed:
Multiply the **K Factor** by the square root of the **Engine Torque (Nm)**

$$\text{Stall Speed (RPM)} = \text{K Factor} \times \sqrt{\text{Engine Torque (Nm)}}$$

Conversion
If engine torque is known in ft. lbs multiply by 1.3558 to get Newton Meters
Example: 100 ft lbs. X 1.3558 equals 135.58 Nm

Stall Speed Based on Engine Torque and "K" Factor

		K Factors												
		122	128	130	131	148	160	170	180	203	205	220	237	240
Torque ft. lbs.	**Torque N.M.**	**Stall Speeds**												
250	338.95	2246	2357	2393	2412	2725	2946	3130	3314	3737	3774	4050	4363	4419
275	372.85	2356	2472	2510	2530	2858	3089	3283	3476	3920	3958	4248	4576	4634
300	406.74	2460	2581	2622	2642	2985	3227	3429	3630	4094	4134	4437	4780	4840
325	440.64	2561	2687	2729	2750	3107	3359	3569	3778	4261	4303	4618	4975	5038
350	474.53	2658	2788	2832	2854	3224	3485	3703	3921	4422	4466	4792	5163	5228
375	508.43	2751	2886	2931	2954	3337	3608	3833	4059	4577	4622	4961	5344	5412
400	542.32	2841	2981	3027	3051	3447	3726	3959	4192	4727	4774	5123	5519	5589
425	576.22	2929	3073	3121	3145	3553	3841	4081	4321	4873	4921	5281	5689	5761
450	610.11	3013	3162	3211	3236	3656	3952	4199	4446	5014	5064	5434	5854	5928
475	644.01	3096	3248	3299	3324	3756	4060	4314	4568	5152	5202	5583	6014	6091
500	677.90	3176	3333	3385	3411	3853	4166	4426	4687	5285	5337	5728	6171	6249
525	711.80	3255	3415	3468	3495	3949	4269	4536	4802	5416	5469	5869	6323	6403
550	745.69	3331	3495	3550	3577	4041	4369	4642	4915	5543	5598	6008	6472	6554
575	779.59	3406	3574	3630	3658	4132	4467	4747	5026	5668	5724	6143	6617	6701
600	813.48	3480	3651	3708	3736	4221	4563	4849	5134	5790	5847	6275	6760	6845
625	847.38	3551	3726	3784	3813	4308	4658	4949	5240	5909	5967	6404	6899	6986
650	881.27	3622	3800	3859	3889	4394	4750	5047	5344	6026	6086	6531	7036	7125
675	915.17	3691	3872	3933	3963	4477	4840	5143	5445	6141	6202	6655	7170	7260
700	949.06	3758	3943	4005	4036	4559	4929	5237	5545	6254	6315	6777	7301	7394
725	982.96	3825	4013	4076	4107	4640	5016	5330	5643	6364	6427	6897	7430	7525
750	1016.85	3890	4082	4145	4177	4719	5102	5421	5740	6473	6537	7015	7557	7653
775	1050.75	3955	4149	4214	4246	4797	5186	5511	5835	6580	6645	7131	7682	7780
800	1084.64	4018	4216	4281	4314	4874	5269	5599	5928	6686	6751	7245	7805	7904
825	1118.54	4080	4281	4348	4381	4950	5351	5686	6020	6789	6856	7358	7926	8027
850	1152.43	4142	4345	4413	4447	5024	5432	5771	6111	6891	6959	7468	8046	8147
875	1186.33	4202	4409	4478	4512	5098	5511	5855	6200	6992	7061	7577	8163	8266
900	1220.22	4262	4471	4541	4576	5170	5589	5938	6288	7091	7161	7685	8279	8384
925	1254.12	4320	4533	4604	4639	5241	5666	6020	6374	7189	7260	7791	8393	8499
950	1288.01	4378	4594	4666	4701	5312	5742	6101	6460	7285	7357	7896	8506	8613
975	1321.91	4436	4654	4727	4763	5381	5817	6181	6544	7381	7453	7999	8617	8726
1000	1355.80	4492	4713	4787	4824	5450	5891	6260	6628	7475	7548	8101	8727	8837
1025	1389.70	4548	4772	4846	4883	5517	5965	6337	6710	7568	7642	8201	8835	8947
1050	1423.59	4603	4830	4905	4943	5584	6037	6414	6791	7659	7735	8301	8942	9055
1075	1457.49	4658	4887	4963	5001	5650	6108	6490	6872	7750	7826	8399	9048	9162
1100	1491.38	4711	4943	5020	5059	5716	6179	6565	6951	7840	7917	8496	9153	9268
1125	1525.28	4765	4999	5077	5116	5780	6249	6639	7030	7928	8006	8592	9256	9373
1150	1559.17	4817	5054	5133	5173	5844	6318	6713	7108	8016	8095	8687	9358	9477
1175	1593.07	4869	5109	5189	5229	5907	6386	6785	7184	8102	8182	8781	9459	9579
1200	1626.96	4921	5163	5244	5284	5970	6454	6857	7260	8188	8269	8874	9560	9681
1225	1660.86	4972	5216	5298	5339	6032	6521	6928	7336	8273	8354	8966	9659	9781
1250	1694.75	5022	5269	5352	5393	6093	6587	6998	7410	8357	8439	9057	9757	9880
1275	1728.65	5072	5322	5405	5447	6153	6652	7068	7484	8440	8523	9147	9854	9978
1300	1762.54	5122	5374	5458	5500	6213	6717	7137	7557	8522	8606	9236	9950	10076
1325	1796.44	5171	5425	5510	5552	6273	6781	7205	7629	8604	8689	9325	10045	10172
1350	1830.33	5219	5476	5562	5604	6332	6845	7273	7701	8685	8770	9412	10139	10268
1375	1864.23	5268	5527	5613	5656	6390	6908	7340	7772	8765	8851	9499	10233	10362
1400	1898.12	5315	5577	5664	5707	6448	6971	7406	7842	8844	8931	9585	10325	10456
1425	1932.02	5362	5626	5714	5758	6505	7033	7472	7912	8923	9011	9670	10417	10549
1450	1965.91	5409	5675	5764	5808	6562	7094	7538	7981	9001	9089	9754	10508	10641
1475	1999.81	5456	5724	5813	5858	6618	7155	7602	8049	9078	9167	9838	10598	10733
1500	2033.70	5502	5772	5863	5908	6674	7215	7666	8117	9155	9245	9921	10688	10823

K Factor and Stall Torque Ratio Based On 245 mm Pump Blade and Stator Combinations

In order by Torque Ratio, Low to High

Using Stator:	With Pump Blade:	Ratio	K Factor
380	Positive	1.66	101
102	Positive	1.68	128
094	Positive	1.68	140
380	Neutral	1.72	134
102	Neutral	1.76	178
049/082	Positive	1.78	113
380	Negative	1.80	148
102	Negative	1.82	232
094	Neutral	1.95	158
094	Negative	2.08	188
049/082	Neutral	2.35	152
049/082	Negative	2.70	204

In order by K Factor, Low to High

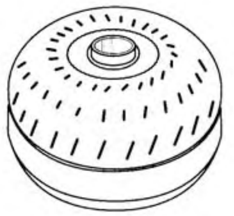
Using Stator:	With Pump Blade:	Ratio	K Factor
380	Positive	1.66	101
049/082	Positive	1.78	113
102	Positive	1.68	128
380	Neutral	1.72	134
094	Positive	1.68	140
380	Negative	1.80	148
049/082	Neutral	2.35	152
094	Neutral	1.95	158
102	Neutral	1.76	178
094	Negative	2.08	188
049/082	Negative	2.70	204
102	Negative	1.82	232

When building 245mm based performance converters from 125C, 180C, 3T40 & 440T4 cores, the 2nd digit on the label represents the stall speed code. Use the information found below and on the following pages to identify K factor of a variety of cores.

Fin Pitch Type A
Negative

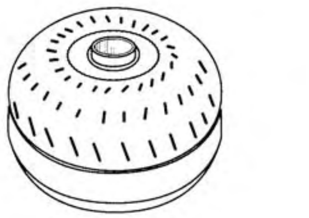
K Factor Code
A = 240K
B = 220K
C = 205K
K = 237K
Z = 203K

Fin Pitch Type B
Neutral



K Factor Code
D = 180K
E = 160K
F= 148K
G = 140K
J = 177K

Fin Pitch Type C
Positive



K Factor Code
H=130K
L=163K
M=131K
Y =122K

G. M. Torque Converter Code Identification

GM 245mm Torque Converter Identification Codes

for 125-C, 180-C, 3T40 & 440-T4

F J 2 B

1st Digit
Trans type
F=Front-wheel Drive
S=THM 180
H=Rear-wheel drive

2nd Digit
K-factor
A=240
B=220
C=205
D=180

E=160
F=148
G=140
H=130
J=177
K=237
L= 163
M=131
Y=122
Z=203

3rd Digit
Damper Style
0=No Clutch
1=120#
2=170
3= D=RWD 247.65mm

4=215# Heavy duty
5=215# RTC
6=170# H/D
7=215# RTC -H/D
8=Viscous Clutch
A=215#
B=215# Co-Axial RTC
9=240# 4-Lobe 10 Degree Travel

4th Digit
Bolt Circle
A=FWD Opel
B=FWD 237mm
C=FWD Viscous

125-C & 3T40

1982 - 1986

TRANS	OEM ENGINE	CONVERTER CODE	FINAL-DRIVE	SPROCKETS
BA	V6 3.OL	FJ4B	2.84	33-37
BC	V6 3.OL	FJ4B	2.84	33-37
BD	V6 3.OL	FJ4B	2.84	35-35
BF	V6 3.OL	FE2	3.33	37-33
BL	V6 3.OL	FE2	2.84	37-33
BP	V6 3.OL	FJ4B	2.84	35-35
C3	L4 I.8L (PERF)	FAI	3.33	35-35
CA	L4 2.OL	FKIB	3.06	33-37
CB	L4 2.OL	FKIB	2.84	33-37
CC	L4 2.OL	FKIB	3.06	33-37
CD	V6 2.8L	FD2	2.84	37-33
CE	V6 2.8L	FD2	2.84	37-33
CF	L4 2.OL	FKI	3.33	33-37
CI	L4 1.8L	FBI	2.84	33-37
CJ	L4 1.8L	FBI	2.84	35-35
CK	V6 2.8L	FD2	3.06	35-35
CL	V6 2.8L	FD2	2.84	35-35
CM	L4 2.OL	FKIB	2.84	33-37
CT	V6 2.8L	FJ4B	2. 84	35 -35
CU	V6 2.8L	FJ4B	2.84	33-37
CX	V6 2.8L	FJ4B	2.84	33-37
EC	L4 2.OL Turbo	FJ2	3.33	35-35
EM	L4 2.OL	FC1	3.33	35-35
H6	L4 2.5L	FD2	2.84	38-32
HC	L4 2.0L	FKI	3.33	33-37
HD	V6 2.8L	FD2	2.84	37-33
HI	L4 I.8L	FAI	2.84	35-35
HN	V6 2.8L	FD2	3.06	35-35
HR	L4 I.8L	FAI	3.33	33-37
HS	V6 2.8L	FD2	2.84	35-35
HU	L4 1.8L	FAI	2.84	33-37
HW	L4 2.5L	FD2	2.84	38-32
HY	L4 2.OL	FKI	2.84	33-37
OP	V6 4.3L OLDS DIESEL	FM5	2.84	38-32
P3	L4 I.8L	FAI	3.33	35-35
PA	L4 2.OL (TURB0 PFI)	FA2B	3.33	35-35
PD	L4 2.5L (PERF)	FJ2B	2.84	35-36
PE	L4 I.8L (OHC/TBI)	FA3	3.06	33-37
PF	L4 2.5L (TBI)	FJ2	2.84	33-37
PG	L4 I.8L (OHC/TBI)	FA3	2.84	33-37
PH	L4 I.8L (OHC/TBI)	FAIB	3.06	33-37
PI	L4 2.5L	FD2	2.84	37-33
PJ	L4 I.8L RBO)	FA2B	3.33	35-35
PK	L4 I.8L (OHC/TBI)	FAIB	2.84	33-37
PL	L4 2.5L	FD2	2.84	38-32
PN	L4 2.5L (TBI)	FZ2B	2.84	35-35
PR	L4 I.8L (OHC/TBI)	FAIB	3.06	33-37
PW	L4 2.5L	FJ2B	2.84	38-32

125-C & 3T40

1987-1990

TRANS	OEM ENGINE	CONVERTER CODE	FINAL-DRIVE	SPROCKETS
AYC	L4 2.2L TBI	FK1B	2.84	35-35
BDC	V6 3.OL MPFI	FJ4B	2.84	35-35
BHC	V6 3.OLMPFI	FJ4B	2.84	37-33
BJC	V6 3.OL MPFI	FJ4B	2.84	37-33
BPC	V6 3.OL MPFI	FJ4B	2.84	35-35
BUC	V6 3.3L MPFI	FG9B	2.84	38-32
BYC	V6 3.3L MPFI	FY9B	3.06	37-33
BZC	V6 3.3L PFI	FY9B	3.06	37-33
CAC	L4 2.0L TBI	FKIB	3.06	33-37
CBC	L4 2.0L	FKIB	2.84	33-37
CCC	L4 2.0L	FKIB	3.06	33-37
CHC	V6 3.IL MPFI	FJAB	2.84	35-35
CJC	V6 2.8L MPFI	FJ4B	2.84	33-37
CMC	L4 2.OL TBI	FKIB	2.84	33-37
CPC	V6 2.8L MPFI	FD4K	3.33	35-35
CRC	L4 2.0L TB	FKIB	2.84	33-37
CSC	L4 2.OL TBI	FKIB	3.06	33-37
CTC	V6 2.8L MPFI	FJ4B	2.84	35-35
CUC & CXC	V6 2.8L MPFI	FJ4B	2.84	33-37
HJC	V6 2.8L MPFI	FDAB	3.06	33-37
HRC	V6 2.8L	FD4B	3.06	33-37
JDC	L4 1.8L	FCIB	3.06	33-37
JMC	L4 2.OL	FCIB	3.33	35-35
JNC	L4 2.OL	FZIB	3.33	33-37
JWC	L4 2.OL TURBO	FZIB	3.06	33-37
JXC	L4 2.OL PFI	FAIB	3.33	35-35
KCC	L4 2.3L QUAD FOUR	FKBB	3.06	35-35
KDC	L4 2.3L QUAD FOUR	FZBB	2.84	35-35
KKC	L4 2.3L QUAD FOUR	FKBB	2.84	33-37
KRC	L4 2.3L QUAD FOUR	FKBB	2.84	35-35
KXC	L4 2.3L QUAD FOUR	FZBB	2.84	33-37
LAC & LJC	V6 3. IL MPFI	FJAB	2.84	37-33
LKC & LLC	V6 3. IL MPFI	FJAB	2.84	35-35
LSC	V6 2.8L MPFI	FJAB	2.84	35-35
LUC	V6 3. IL MPFI	FJAB	2.84	33-37
LYC	L4 2.2L TBI	FKIB	2.84	33-37
PBS	V6 3. IL MPFI	FJBB	2.84	33-37
PDC	L4 2.5L TBI	FJ2B	2.84	35-35
PFC & PHC	L4 2.OL OHC/TBI	FA2B	3.06	33-37
PJC	L4 2.5 TBI	FZ2B	2.84	33-37
PKC	L4 2.OL OHC/TBI	FA2B	2.84	33-37
PMC	L4 2.5L TURB0	FB4B	2.84	33-37
PNC	L4 2.5L TBI	FZ2B	2.84	35-35
PPC	L4 2.OL TURB0	FBAB	2.84	33-37
PRC	L4 2.0L OHC/TBI	FAIB	2.84	33-37
PSC	L4 2.5L TBI	FJ2B	2.84	35-35
PTC	L4 1.6L TBI	FAIB	3.06	33-37
PWC	L4 2.5L TBI	FJ2B	2.84	38-32
PZC	L4 2.5L TBI	FJ28	2.84	35-35
RTC	V6 2.8L MPFI	FJAB	2.84	35-35
RUC	L4 2.5L TBI	FJ28	2.84	35-35
TNC	V6 2.8L MPFI	FJAB	2.84	35-35
TRC	L4 2.OL 0HC/TBI	FAIB	2.84	33-37

125-C & 3T40

1991

TRANS	OEM ENGINE	CONVERTER CODE	FINAL-DRIVE	SPROCKETS
AYC	L4 2.1 TBI	FKIB	2.84	35-35
BUC	V6 3.3L PFI	FGAB	2.84	38-32
BYC	V6 3.3 PFI	FYAB	3.06	37-33
BZC	V6 3.3 PFI	FYAB	3.06	37-33
CHC	V6 3.1L MPFI	FJAB	2.84	35-35
KDC	L4 2.3L DOHC	FZBB	2.84	35-35
KKC	L4 2.3L DOHC	FKBB	2.84	33-37
KMC	L4 2.3L DOHC	FKBB	3.33	35-35
KXC	L4 7 3L DOHC	FZ2B	2.84	33-37
KYC	L4 2.3L HO	FKBB	3.33	35-35
LAC	V6 3. IL MPFI	FJAB	2.84	37-33
LFC	V6 3. IL MPFI	FJAB	3.33	37-33
LJC	V6 3. IL MPFI	FJAB	2.84	37-33
LKC & LLC	V6 3. IL MPFI	FJAB	2.84	3S-35
LUC	V6 3. IL TBI	FZ2B	2.84	33-37
LYC	L4 2.2L TBI	FKIB	2.84	33-37
PBS	V6 3.1L MPFI	FJBB	2.84	33-37
PDC	L4 2.5L TBI	FJBB	2.84	35-35
PJC	L4 2.5L TBI	FZ2B	2.84	33-37
PMC	L4 2.0L TURBO	FAAB	2.84	33-37
PPC	L4 2.0L TURBO	FAAB	2.84	33-37
PRC	L4 2.0L OHC/TBI	FAIB	2.84	33-37
PTC	L4 1.6L TBI	FAIB	3.06	33-37
PWC	L4 2.5L TBI	FZ2B	2.84	35-35
RUC	L4 2.5L TBI	FZ2B	2.84	35-35
SWC & SXC	L4 2.2L PFI	FZ2B	3.06	35-35
TRC	L4 2.0L OHC/TBI	FAIB	2.84	33-37

125-C & 3T40

1992-UP

TRANS	OEM ENGINE	CONVERTER CODE	FINAL-DRIVE	SPROCKETS
2, 3AJC	2.2L	FZCB	2.84	35-35
4AJC	2.2L	FG9B	3.33	37-33
2, 3AKC	2.2L	FZCB	2.84	33-37
4AKC	2.2L	FZCB	2.84	33-37
3ARC	3.3L	FG9B	2.84	38-32
2BUC	3.3L	FG9B	2.84	38-32
1, 2, 3BYC	3.3L	FY9B	3.06	37-33
1, 2, 3CHC	3.1L	FJAB	2.84	35-35
3CWC	2.3L	FZBB	2.84	37-33
4CWC	2.3L	FD9B	3.06	33-37
3CYC	2.2L	FZCB	2.84	33-37
3, 4HBC	1.5L	FKIB	3.06	33-37
2HCC	3.1L	FJAB	2.84	33-37
2, 3, 4HLC	1.8L	FAIB	3.06	33-37
2HMC	2.8L	FJAB	2.84	33-37
2, 3, 4HNC	2.0L	FAIB	3.33	35-35
2, 3, 4HSC	1.5L	FAIB	3.06	33-37
2, 3, 4HUC	3.1L	FJAB	2.84	33-37
2, 3HXC	3.1L	FJ9B	2.84	33-37
2, 3, 4JAC	1.5L	FKIB	3.06	33-37
3, 4JMC	2.8L	FJAB	2.84	37-33
2KDC	2.3L	FZBB	2.84	35-35
3KLC	2.3L	FZBB	2.84	33-37
2, 3KNC	2.3L	FKBB	2.84	33-37
2KSD	2.3L	FZBB	2.84	35-35
3, 4LCC	3.1L	FJAB	2.84	37-33
2, 3LFC	3.1L	FG9B	2.84	37-33
2, 3, 4LJC	3.1L	FJAB	2.84	37-33
2, 3, 4LKC	3.1L	FJAB	2.84	35-35
0, 1, 2, 3LLC	3.1L	FJAB	2.84	35-35
2LUC	3.1L	FJAB	2.84	33-37
3LUC	3.1L	FJ9B	2.84	33-37
0, 1, 2PDC	2.5L	FZ2B	2.84	35-35
0, 1, 2PJC	2.5L	FAIB	2.84	33-37
8, 9, 0, 1, 2PRC	2.0L	FAIB	3.06	33-37
7, 8, 9, 0, 1, 2, 3PTC	1.6L	FAIB	3.06	33-37
2, 3, 4PXC	2.0L	FACB	2.84	33-37
3, 4SWC	2.2L	FZCB	3.06	35-35

External Pump Number ID

To identify the impeller number before cutting the unit open look for number stamped next to hub. This number is stamped on about half the converters you will look at. Inside the unit, the number is also stamped on the tabs.

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Pump Number	Equals	Blade Tip Angle
2	=	-41
1	=	-35
8	=	-25
7	=	-8
6	=	+18
0	=	+30
4	=	+38
3	=	+55

245 Impeller ID

These blade tip angles vary from **very** high to **very** low stalls. The greater the negative tip angle the higher the stall. The greater the positive tip angle the lower the stall. The selective use of tip angle and stator allows for us to tailor the stall speed and torque multiplication to almost any combination.

External Vane Thickness ID

To identify impeller vane thickness before cutting unit open, use a vernier caliper to measure outside dimples on impeller. A dimple for a thick vane will measure approximately.175" - .185". A dimple for a thin vane will measure approximately .140" - .150". The thick vane will hold more horsepower and will not bend over under the pressure inside the converter.

Stator Clutch Options

Options	***Load Comparisons***
Roller Clutch - O.E.M.	Designed for OEM "stock" engine torque loads
Roller Clutch - Sonnax	Designed for increased torque capacity
Mechanical Diode	Greatly increased torque capacity
Clutch Eliminator	Highest torque capacity

Available Clutches for Race Kit applications using GM 245mm Cores

Application	Sonnax Roller Clutch	Sonnax Clutch Eliminator	Sonnax Race Kit #
General Motors			
350/400 10"	GM-CS-2	GM-R-5	GM-RK-1
Powerglide 10"	GM-CS-2	GM-R-5	GM-RK-7
2004R 10"	GM-CS-2	GM-R-5	GM-RK-9
700R4 10" -non lockup	GM-CS-2	GM-R-5	GM-RK-10
7004R 10" - lockup	GM-CS-2	GM-R-5	GM-RK-11
Ford			
ADO	FD-CS-1	FD-R-1*	FD-RK-1
C-4 10 & 12"	FD-CS-1	FD-R-1*	FD-RK-3
C-6 10"	FD-CS-1	FD-R-1*	FD-RK-4
C-4 11"	FD-CS-1	FD-R-1*	FD-RK-9
		* coming soon	
Chrysler			
904 10"	GM-CS-2	GM-R-5	CH-RK-2-CP

Available Clutches for Race Kit applications using the 8" Opel Stator

Application	Sonnax Roller Clutch	Sonnax Mechanical Diodes	Sonnax Clutch Eliminator	Sonnax Race Kit #
General Motors				
350/400 &				
Powerglide 30 spline	GM-CS-3	GM-MD-3	GM-R-8	GM-RK-2
Powerglide 17 spline	GM-CS-3	GM-MD-3	GM-R-8	GM-RK-8
Ford				
C-4 10 & 12"	FD-CS-2	GMFD-MD-1	FD-R-10	FD-RK-3
C-6 10"	FD-CS-2	GMFD-MD-1	FD-R-10	FD-RK-4
C-4 11"	FD-CS-2	GMFD-MD-1	FD-R-10	FD-RK-9

Available Clutches for Race Kit applications using the 10" Ford Stator

Application	Sonnax Roller Clutch	Sonnax Mechanical Diodes	Sonnax Clutch Eliminator	Sonnax Race Kit #
Chrysler				
904 10”	GM-CS-3	FDGM-MD-1	GM-R-8	CH-RK-2-CP

Assembly Clearances

When assembling a high performance torque converter the endplay clearances are very important to the longevity of the converter. When the clearance is too tight the bearing races become prematurely indented or worn. When the converter is built with too much endplay, the impact load on races and fiber washers increases and longevity suffers.

Clearances between turbine, stator and impeller will affect stall speed and converter efficiency. Reducing clearances will promote maximum converter efficiency but will also lower stall speed. Increasing clearances raises stall speed but reduces converter efficiency.

Run out is extremely critical in performance converter assembly. It is recommended that the assembly be spot-welded and run out re-checked before and after completing the weld. This helps to ensure a tight run out tolerance after final welding.

- 1 bearing, 2 thrust washer units require .030" - .035" clearance.
- 2 bearing, 1 thrust washer units require .020" - .025" clearance.
- 3 bearing, 0 thrust washer units require .010" - .015" clearance.

The turbine to impeller clearance should not be closer than .070" - .075" due to internal flexing and slight run-out of these parts. To increase the stall a small amount and still retain good torque multiplication you can add clearance between the turbine and impeller. Adding .150" of clearance will increase stall by 300-400 RPM.

The turbine hub should be supported by a bushing in most units depending on the application and transmission being used. If a bushing is used the clearance should be approximately .003"-.004".

Total indicated run-out should not exceed .006" after welding. There should be no more than .001" - .0015" pilot to crankshaft clearance.

The torque converter should be balanced to within 2 - 5 grams of perfect.

Assembly Tips

Impeller and turbine must be furnace brazed for maximum strength and efficiency. Turbine vane bracing is an absolute necessity if you want the durability necessary for transbrake and nitrous use. Impeller vane bracing is not necessary. Turbine stitch welding or blade bracing should be done prior to furnace brazing.

An oversized inner stator race should be used to help prevent brunnelling and to set proper clearance between inner race and stator. The inner race to stator housing clearance should be .0015" to .002".

The stator over-running clutch assembly rollers should have heavy duty (GM-S-3HP) springs used. The rollers used should be exactly the same as the OEM rollers that were originally used.

Stator caps and the area where the rollers seat in the stator should have no wear notches wom in them.

Vehicles producing 750+ ft. lbs. of torque should use a Sonnax stator clutch or mechanical diode. If the vehicle is used for 1/8 mile drag racing then a Sonnax clutch eliminator can be used.

Optional Bearing Kit Front Cover Milling Instructions

Mill four (4) .125" wide X .125" deep slots in thrust face before final assembly.