



Mitsubishi uses TD04, TD05, TD06, ...to designate turbo housing.

Mitsubishi Heavy Industries' (MHI) turbocharger nomenclature, such as TD04-13G-6cm², requires some explanation. "TD04" and "TD05" refer to the turbocharger housing (either turbine housing or compressor housing or both), including the center housing (or CHRA or cartridge section). There are different styles of the basic housings and these have different suffixes appended to the basic designation, such as TD04L, TD04H, TD04HL, TD05, TD05H, and TD05HR.

TD04 housings have part numbers that start with 49177. TD04L housing part numbers start with 49377. Part numbers for TD04H and TD04HL housings start with 49189. The TD04HL compressor housing is easily distinguished from the others because of the integrated by-pass valve (see the pictures of the SL/MK TD04-18T hybrid below). The TD04LR-16Gk-6cm² turbo (used on the turbocharged 2.4-L I-4 engine in the new PT Cruiser GT and SRT-4 Neon) is unique: the turbine housing is cast into the exhaust manifold, the impeller spins counter-clockwise, and the bypass valve is cast into the compressor housing.

All TD05, TD05H, and TD05HR housings start with 49178. The TD05HR turbine housing (found on the Mitsubishi Lancer Evolution IV through VIII) is a twin scroll design. All the other TD04 and TD05 turbine housings have a single volute in the turbine housing. Like the TD04LR, the "R" in the designation refers to the fact that the turbine wheel spins in the reverse direction (counter-clockwise) compared to the standard TD05H turbine.

The MHI part numbering system, and the possible combinations, can be somewhat overwhelming and confusing. For example, the MHI Sport Turbo Upgrade for the Stealth/3000GT is usually referred to as the TD04L-13G-6cm². This turbo clearly has the standard TD04 (49177) housings (at least by external appearances). However, both the stock TD04-09B-6 and the upgrade TD04L-13G-6 use the 49377 cartridge (but note the different complete part numbers) from the TD04L turbos. TD04 turbos used in other cars (even some other TD04-09B turbos) use the 49177 cartridge.

The "13G" in the model name refers to the compressor wheel. The "13" is the size and the "G" is the style. The 13G wheel has an exducer (or base) diameter of 2.000" and an inducer diameter (air intake opening) of 1.580". All MHI wheels I have seen have 12 blades. Blades are always evenly spaced, but the pitch and height of the blades can change between models. "B"- and "C"-style compressor wheels have all blade tips at the same height. "G"-, "Gk"-, and "T"-style wheels have blade tips at two heights, alternating high and low.

Mitsubishi does not seem to use separate designations for different size turbine wheels, other than the TD04, TD04H, TD04L, TD05H, etc., designation. The "6cm²" in the model name is similar to the A/R ratio used by other manufacturers. The "A" in an A/R ratio is the cross-sectional area of the smallest intake passage in the turbine housing before the passage spreads around the circumferential volute that leads to the turbine wheel. The "R" in the ratio is the distance from the center of the "A" to the center of the turbine wheel. The MHI "6cm²" designation is just the "A" in the A/R ratio, that is, it is just the cross-sectional area. Like A/R, the smaller the size of the "cm²" number, the faster the exhaust gases will discharge onto the turbine wheel, and so the faster the spool up will be (less "lag"). The size of the "cm²" number or the A/R ratio also determines the amount of exhaust gas backpressure and, thus, reversion into the

combustion chamber. A larger "cm²" number (or larger A/R) means less backpressure at high exhaust flow. Extreme Turbo says that the TD05H-7cm² housing is equivalent to a 0.50 A/R. turbo guide presents the following conversion between Mitsubishi's "cm²" number and the standard A/R.

$$6 \text{ cm}^2 = 0.41 \text{ A/R}$$

$$7 \text{ cm}^2 = 0.49 \text{ A/R}$$

$$8 \text{ cm}^2 = 0.57 \text{ A/R}$$

$$9 \text{ cm}^2 = 0.65 \text{ A/R}$$

$$10 \text{ cm}^2 = 0.73 \text{ A/R}$$

$$11 \text{ cm}^2 = 0.81 \text{ A/R}$$

$$12 \text{ cm}^2 = 0.89 \text{ A/R}$$

Mitsubishi Heavy Industries use Journal Turbos

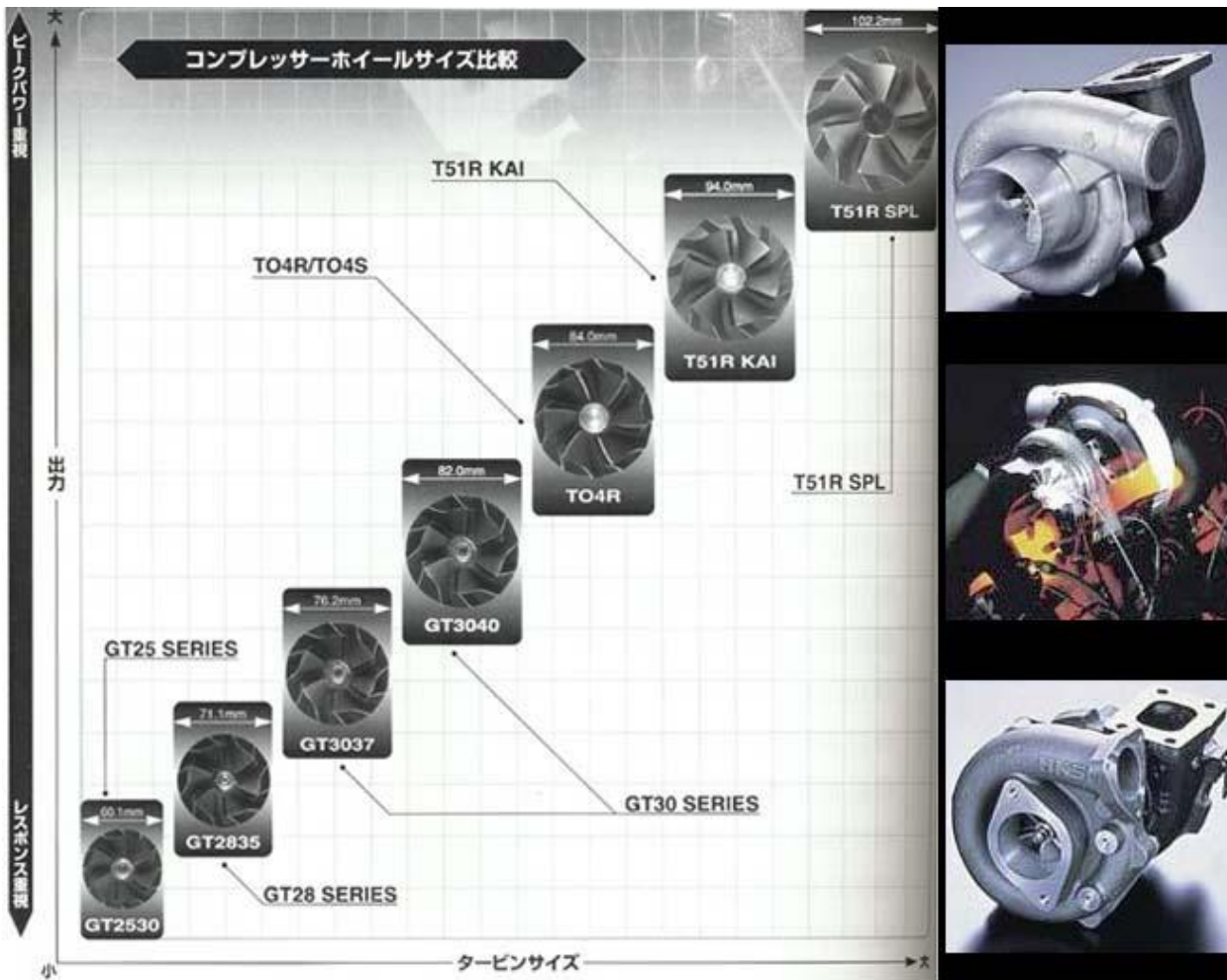
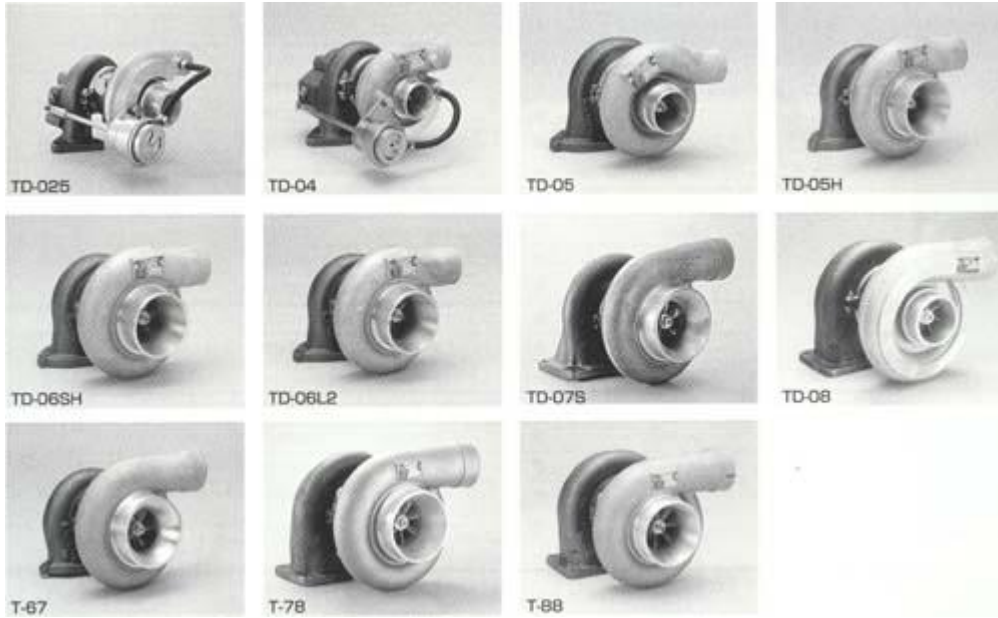
Conventional turbos, including all MHI TD04 and TD05 turbos, use sleeved journal bearings in the CHRA to support and protect the rotating shaft and to provide resistance to thrust loading. The bearings must carefully position the turbine and compressor wheels very close to the contours in their respective housings at speeds over 100,000 RPM. Oil from the engine is used as a lubricant to reduce friction on the bearing surfaces and to cool the CHRA. Various seal systems are used to prevent the oil from entering the turbine and compressor housings and to reduce the flow of exhaust gas and compressed air into the CHRA. Very often (and in all MHI TD04 and TD05 turbos), engine coolant circulates in a jacket through the CHRA to provide additional cooling. The maximum recommended operating temperature (maximum exhaust gas temperature) of nearly all turbos is 950°C (1742°F).

For example, TD05H-16G 7cm² is a turbo with,

- TD05 turbine housing with 'H' style turbine wheel. There are S, SH, H... style of turbine wheel/housing.
- 16G compressor wheel. 16 is the size of the wheel, 1.83 inducer, 2.37 exducer. There is no direct correlation between MHI designation and actual physical size of the compressor wheel. G is the style of wheel (uneven height of blades). C, B, T style wheel's blades have the same height. Blades are equally spaced, but the number and pitch of the blades vary between models.
- 8cm² is referring to exhaust discharge area in the turbine housing. More specifically, it is the smallest cross-sectional area of the scroll, turbine housing. Very similar to Garrett turbo's A/R. The smaller number means faster spool-up but more back pressure at higher rpm. Bigger number means longer spool up but less back pressure, thus more top end power.

Greddy modifies Mitsu turbos. Greddy TD05 and TD06 use 3 bolt turbine flange where as Mitsubishi's uses 4 bolt flanges.




GRddy Turbo Photo Line up



Turbochargers Available for the Mitsubishi 3000GT/Dodge Stealth

Name	Min CFM @2.0 PR	Rated CFM @2.0 PR	Practical Max CFM	Choke Flow CFM	Compr. Flow Map	Source	Comments
<i>Stock manifolds retained</i>							
TD04-09B-6cm ²	80	275	250	280	✓	MHI	- stock on USA VR-4 and TT - right-side number: 49177-02310 or 49177-02300 - left-side number: 49177-02410 or 49177-02400 - cartridge number: 49377-08020 - turbine and shaft: 49177-30130 - repair kit number: 49177-80400 - rotor is 1.57"/1.86" (TD04)
TD04-13G-6cm ²	90	360	324	375	✓	MHI	- stock on European and maybe Japanese VR-4 - aka: Mitsubishi Sport Turbo - right-side number: 49177-00320 - left-side number: 49177-00420 - cartridge number: 49377-08040 - repair kit number: 49177-80400 - 1989-1994 Eclipse 4G63 2.0L Automatics had TD04-13G-5cm ² (turbo 49177-01901 with cartidge 49177-09010) - rotor blade length is 5 mm - rotor is 1.62"/1.86" (TD04L)
GT347	93	370	330		✓	GTP	- GTP does not release compressor information - Basically a "13G-class" turbo - Mitsu TE04H 13C compressor wheel - TD04 turbine housing and center section - Just a guess at CFM
GT357 Magnum	120	400	350	405	✓	GTP	- GTP does not release compressor information - Basically a "15G-class" turbo - Garrett T3 "50" Trim compressor wheel - TD04 housings and center section - GTP claims 480 CFM rated flow, but the compressor wheel size suggests a flow rating of about 400 CFM - Garrett flow map numbers shown for T3 "50" Trim - TE04 turbine wheel
TD04-13T-6cm ²	~106	~428	~405	~445	✓	VAR	- Flow is similar to the 15G and 15C - This is a hybrid turbo with flow characteristics varying depending on the manufacturer

							<ul style="list-style-type: none"> - Subaru WRX 13T compressor housing - Bored TD04-9B turbine housing with 13T TD04L wheel - Turbine inducer blade length is 6 mm - Requires modifications: <ul style="list-style-type: none"> - to turbocharge housings - wastegate relocation brackets with extension bosses - adapt IC pipe to rear turbo - notch out of upper intake support bracket near rear turbo - Rob Beck manufactures these hybrids; for more info see http://www.3si.org/forum/showthread.php?t=228909
TD04-15G-6cm ²	106	428	405	445		TEC VAR	<ul style="list-style-type: none"> - This is a hybrid turbo with flow characteristics varying depending on the manufacturer - TD04H flow map numbers shown - Actual flow rating may be closer to 400 cfm for some examples - on-car performance depends on rotor used
TD04HL-16T-6cm ²	120	435	400	450			<ul style="list-style-type: none"> - TD04HL compressor housing with integrated by-pass valve - TD04 turbine housing and center section - Requires modifications to : <ul style="list-style-type: none"> - front engine mount (must be ground a few mm) - oil supply lines to both turbos - coolant supply and return lines to both turbos - right plenum stay must be trimmed - rear IC pipe (cut then mount with clamps & 2" ID hose) - intake hoses (remove coupler, stretch to fit over compressor inlets)
TD04-17G-6cm ²	118	450	425	?480?		TEC VAR	<ul style="list-style-type: none"> - Just a guess at CFM; actual flow may be less - This is a hybrid turbo - Flow characteristics vary depending on the manufacturer
TD04HL-18T-6cm ²	130	488	450	500		SLT	<ul style="list-style-type: none"> - TD04HL compressor housing with integrated by-pass valve - TD04 turbine housing and center section - Requires modifications to : <ul style="list-style-type: none"> - front engine mount (must be ground a few mm) - water and oil lines to rear turbo - rear IC pipe (cut then mount with clamps)

							<ul style="list-style-type: none"> - intake hoses (stretch to fit over compressor inlets) - AC line on the firewall (re-routed) - the passenger's-side radiator fan (replace with a thinner one)
GT368SX	150	490	460	500		GTP	<ul style="list-style-type: none"> - GTP claims over 600 CFM rated flow - The 16G-size comp. wheel size suggests a flow rating of about 500 CFM - Garrett flow map numbers shown for T3 "60" Trim - Construction information provided by Todd Shelton from results of disassembly by two different turbo shops <ul style="list-style-type: none"> - Garrett T3 "60" Trim compressor wheel - TE04H turbine wheel in bored TD04 housing - MHI center section - Requires an install kit - Requires modifications to : <ul style="list-style-type: none"> - right plenum stay must be trimmed - both water feed lines need to be relocated and re-shaped or replaced pipes with hoses - front motor mount must be trimmed or use GT PRO replacement - a radiator fan support may need to be trimmed - intercooler pipes at the turbo must be larger - compressor housings may have to be clocked (rotated with respect to exhaust housing)
TD04HL-19T-6cm ²	105	500	430	550			<ul style="list-style-type: none"> - TD04HL compressor housing with integrated by-pass valve - TD04 turbine housing and center section - Requires modifications to : <ul style="list-style-type: none"> - front engine mount (must be ground a few mm) - oil supply lines to both turbos - coolant supply and return lines to both turbos - right plenum stay must be trimmed - rear IC pipe (cut then mount with clamps & 2" ID hose) - intake hoses (remove coupler, stretch to fit over compressor inlets)
<i>Requires new manifolds</i>							
IHI RHF5	50	382	363	?415?		DNP	<ul style="list-style-type: none"> - ball bearing center section - kit has new manifolds and exhaust

							<ul style="list-style-type: none"> housings - exhaust housings eliminate pre-cats, keep O2 mounts - manifolds fit TD04L (3-bolt), TD05H (3-bolt), and RHF turbos (not stock 9B housings though) - IC pipes need to be modified
TD05H-14B-6cm ²	125	430	385	500	✓	MHI	<ul style="list-style-type: none"> - stock on 1st gen DSM cars - number: 49178-01030 - cartridge number: 49178-09010 - repair kit number: 49178-81100
TD05H-14G-6cm ²	150	470	420	480	✓	MHI	<ul style="list-style-type: none"> - number: 49178-01750 - cartridge number: 49178-08620 - repair kit number: 49178-81200
IHI RHF55	85	477	410	?500?	✓	DNP	<ul style="list-style-type: none"> - Flow is from IHI rating at 2.0 PR and 65% eff. - ball bearing center section - kit has new manifolds and exhaust housings - exhaust housings eliminate pre-cats, keep O2 mounts - manifolds fit TD04L (3-bolt), TD05H (3-bolt), and RHF turbos (not stock 9B housings though) - IC pipes need to be modified
GT28RS 62-Trim	150	495	450	550	✓	GT	<ul style="list-style-type: none"> - the Garrett "Disco Potato"
TD05H-16G-7cm ²	145	520	470	520	✓	MHI	<ul style="list-style-type: none"> - small 1.830"/2.365" compressor wheel - number: 49178-05200 - cartridge number: 49178-09090 - repair kit number: 49178-81200
TD05H-16G-7cm ²	150	520	445	560	✓	VAR	<ul style="list-style-type: none"> - large 1.892"/2.680" compressor wheel
ETA12	220	525	475	525	✓	DSM	<ul style="list-style-type: none"> - Garrett/ETA compressor housing - Garrett TO4B S-Trim compressor wheel - TD05H-7cm² turbine housing - Garrett center cartidge
TD06H-16G-7cm ²	138	550	495	560	✓	VAR	<ul style="list-style-type: none"> - large 1.892"/2.680" compressor wheel
AAM GT30R	200	570	525	600	✓		<ul style="list-style-type: none"> - custom Garrett GT35 48-trim compressor wheel - Garrett T04B compressor housing - TD05H-7cm² turbine housing - Garrett ball-bearing center cartidge
TD05H-16G6-7cm ²	150	580	530	625	✓	MHI	<ul style="list-style-type: none"> - With the TD05H-7cm² exhaust housing it is used on the Lancer Evolution 3. With the TD05HR twin-scroll housing it is available on Evo 4 to 8 - Compressor wheel is aluminum with thinner blades than standard 16G

							- Turbine wheel is Inconel (steel alloy)
TD05H-18G-7cm ²	~150	~590	~525	~640	✓	MHI	- flow map is speculation
HKS GT2835	210	600	555	636		GT	- custom Garrett GT35 56-trim compressor wheel - Garrett T04E compressor housing - custom Garrett GT30R 90-trim turbine wheel - Garrett turbine housing with T25 flange - Garrett ball-bearing center cartridge
TD05H-20G-7cm ²	163	650	550	680	✓	VAR	- TD05H 17C compressor housing
DNP - DN Performance DSM - DSM Performance/Extreme Turbo GTP - GT-PRO Performance Tuning IHI - Ishikawajima-Harima Heavy Industries (Warner-Ishi)				MHI - Mitsubishi Heavy Industries SLT - SL Turbo and Mikael Kenson TEC - Turbo Engineering Corporation VAR - various aftermarket sources GT - Garrett Turbochargers			

Wheel	Inducer Diameter (in.)	Exducer Diameter (in.)	Trim	Housing	Wheel	Exducer Diameter (in.)	Inducer Diameter (in.)	Housing	
TD04-09B	9B	1.365	1.930	50	TD04-09B	TD04	1.57	1.86	TD04-6cm ²
TD04-13G	13G	1.580	2.000	62	TD04-13G	TD04L	1.62	1.86	TD04L-6cm ²
GT347	TE04H 13C	1.580	2.087	57	TD04-09B bored	TD04	1.57	1.86	TD04-6cm ²
TD04-13T	13T	1.597	2.203	53	TD04HL-13T	TD04HL	1.80	2.05	TD04-6cm ²
TD04-15G	15G	1.625	2.187	55	TD04-13G bored	TD04L	1.62	1.86	TD04L-6cm ²
TD04H-15G	15G	1.625	2.187	55	TD04H-15G	TD04H	1.735	2.042	TD04H-6cm ²
NA	Hitachi HT12	1.638	2.244	53	TD04-09B bored	NA	NA	NA	NA
TD04H-15C	15C	1.654	2.187	57	TD04H-15C	TD04H	1.735	2.042	TD04H-6cm ²
GT357 Magnum	T3 "50" Trim	1.674	2.367	50	TD04-13G bored	TE04H	1.88	2.01	TD04-6cm ²
TD05H-14B	14B	1.695	2.285	55	TD05H-14B	TD05H	1.93	2.20	TD05H-6cm ²
TD04-16T	16T	1.713	2.205	60	TD04HL-16T	TD04L	1.62	1.86	TD04L-6cm ²
TD04-18T	18T	?	?	?	TD04HL-18T	TD04L	1.62	1.86	TD04L-6cm ²
TD04-17G	17G	1.744	2.382	54	TD04-13G bored	TD04L	1.62	1.86	TD04L-6cm ²
TD04-19T	19T	1.809	2.283	63	TD04HL-19T	TD04L	1.62	1.86	TD04L-

									6cm ²
TD05H-14G	14G	~1.80	2.285	~62	TD05H-14G	TD05H	1.93	2.20	TD05H-6cm ²
RHF5	F5	1.812	2.375	58	RHF5	F5	1.875	2.065	RHF5-6cm ²
RHF55	F55	1.812	2.375	58	RHF55	F55	1.875	2.065	RHF55-6cm ²
TD05H-16G "small"	16G small	1.830	2.365	60	TD05H-16G	TD05H	1.93	2.20	TD05H-7cm ²
GT368SX	T3 "60" Trim	1.830	2.367	60	Garrett T3	TE04H	1.88	2.01	TD04-6cm ²
Disco Potato	GT28RS	1.860	2.362	62	Garrett GT	NA	NA	NA	NA
TD05H-16G "large"	16G large	1.892	2.680	50	TD05H-16G	TD05H	1.93	2.20	TD05H-7cm ²
TD05H-18A	17C	1.900	2.680	50	TD05H-16G bored	TD05H	1.93	2.20	TD05H-8cm ²
TD05H-16G6 (Evo 3)	16G6	1.902	2.680	50	TD05H	TD05H	1.93	2.20	TD05H-7cm ²
ETA12	TO4B S-Trim	1.904	2.750	48	Garrett	T3	?	?	TD05H-7cm ²
GT35 48-trim 71-mm	custom GT35	1.936	2.795	48	Garrett T04B	TD05H	1.93	2.20	TD05H-7cm ²
TD05H-18G	18G	1.992	2.680	55	TD05H-18G	TD05H	1.93	2.20	TD05H-7cm ²
TD05H-20G	20G	2.070	2.680	60	TD05H-17C	TD05H	1.93	2.20	TD05H-7cm ²
HKS GT2835	custom GT35	2.092	2.795	56	Garrett T04E	GT30R? trimmed	2.016	2.224	Garrett
GT35 52-trim 76-mm	GT35	2.158	2.992	52	Garrett GT	NA	NA	NA	NA
GT42 56-Trim	GT42	2.769	3.700	56	Garrett GT	NA	NA	NA	NA
GT42 53-Trim	GT42	2.924	4.016	53	Garrett GT	NA	NA	NA	NA

MHI Turbine Wheels				
Wheel	Exducer (in.)	Inducer (in.)	Trim	Notes
TD04	1.57	1.86	71	wheel height is less than the others
TD04L	1.62	1.86	76	
TD04H	1.74	2.04	73	
TD04HL	1.80	2.05	77	
TE04H	1.88	2.01	87	
TD05H	1.93	2.20	77	