

**TIDEWAY®**

3-lobe Roots Blower

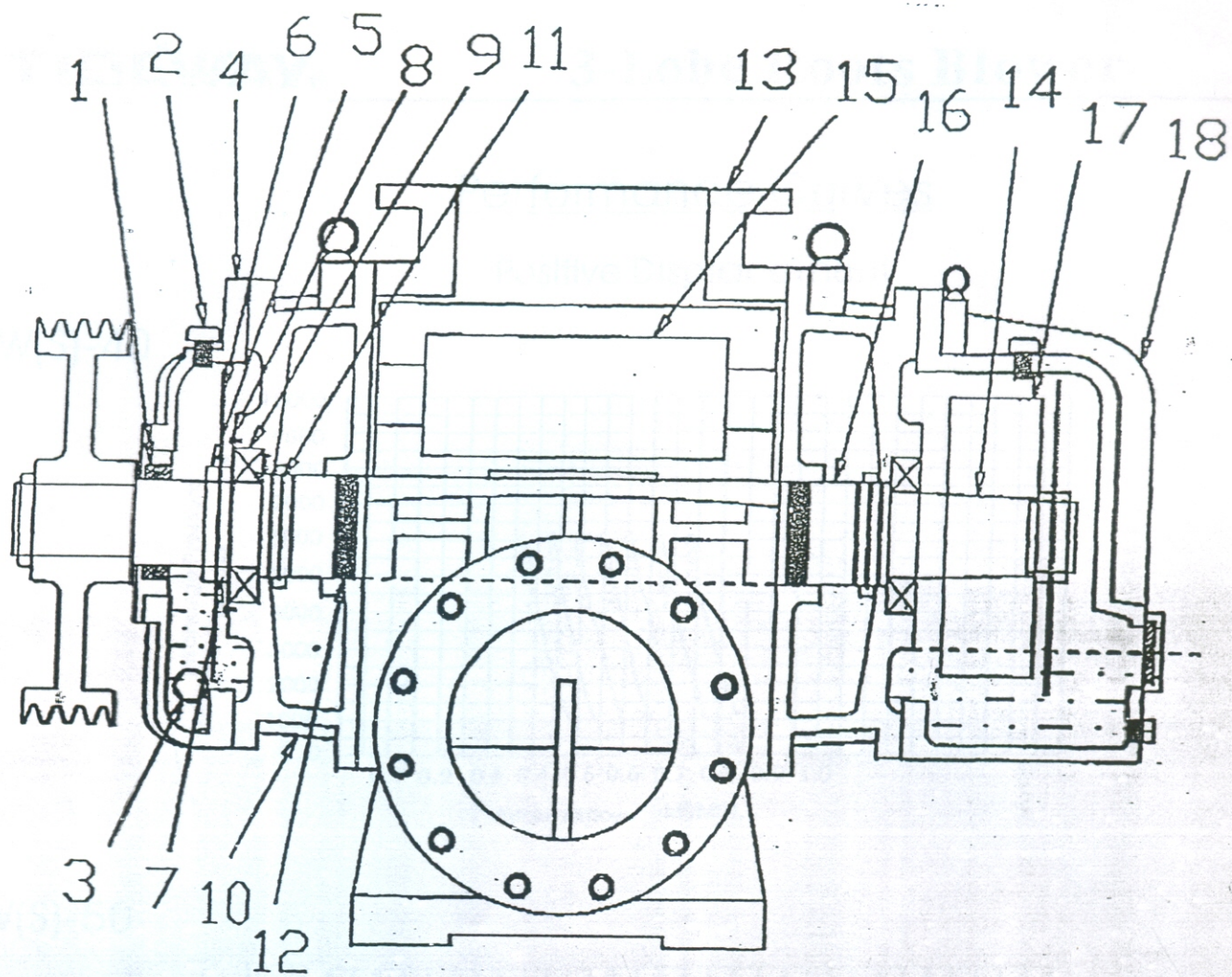
《 **OPERATION MANUAL** 》

**TWS Series**

**W**e would like to thank you at the outset for purchasing the Tideway Roots blower. We have though already done strict inspections on every detail of our blowers before shipment, there might be possible accidents occurred due to incorrect operation. Therefore, we strongly recommend the users to fully read this operation manual before proceeding with operations.

**Tideway Union Corporation**





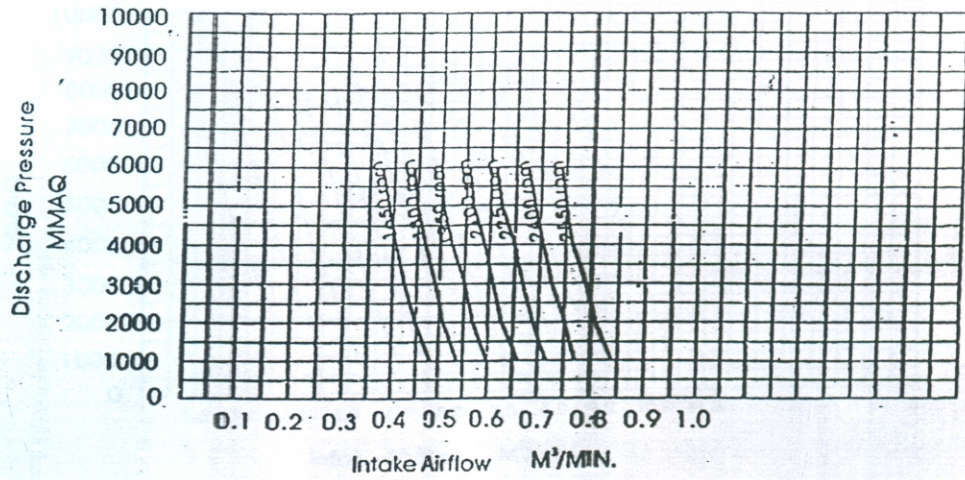
No.	Name	Material	QTY	No.	Name	Material	QTY
1	Oil Seal	Viton	1	10	Bearing Seat	FC25	2
2	Lubrication Plug	S45C	2	11	O-ring	Viton	4
3	Oil Gauge	Plastic	2	12	Piston Ring	FC25	8
4	Oil Case	FC25	1	13	Blower Body	FC25	1
5	Retain Nut	S45C	4	14	Drive Shaft	SCM440	1
6	Oil Splasher	SS41	2	15	Lobe	FCD500	2
7	Lock Washer	SS41	2	16	Shaft Bush	SCM440	2
8	Bearing Cap	SS41	4	17	Timing Gear	SNCM220	2
9	Bearings	SUJ2	4	18	Gear Case	FC25	1



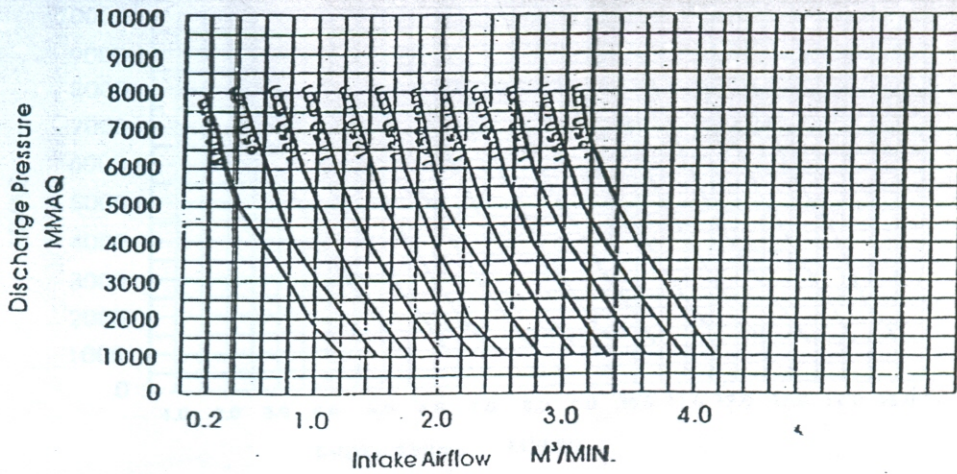
Performance Curves

Positive Displacement

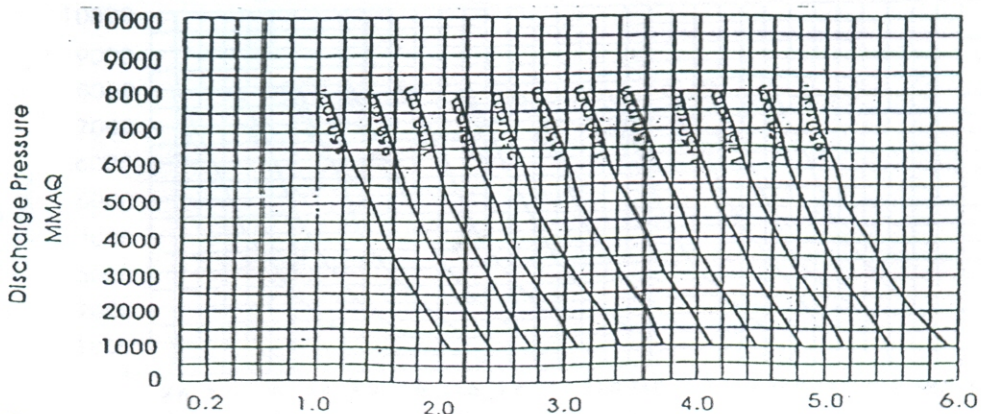
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TW(S)-50



TW(S)-65

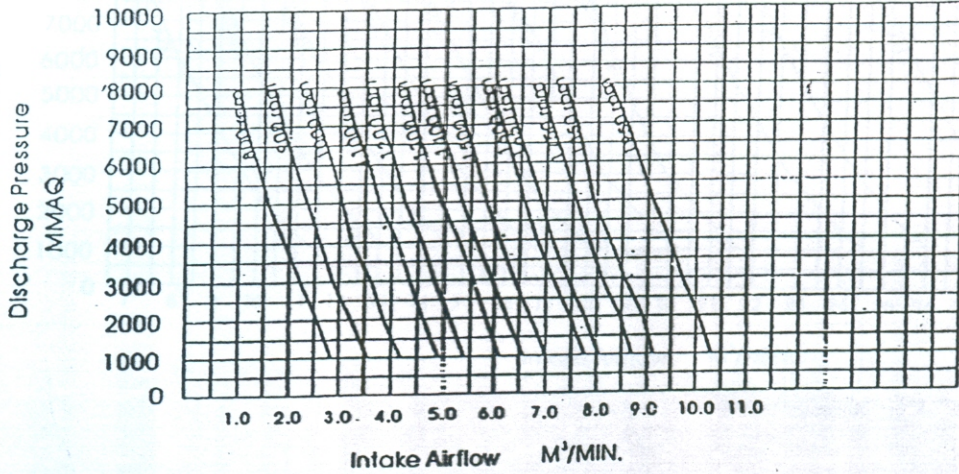




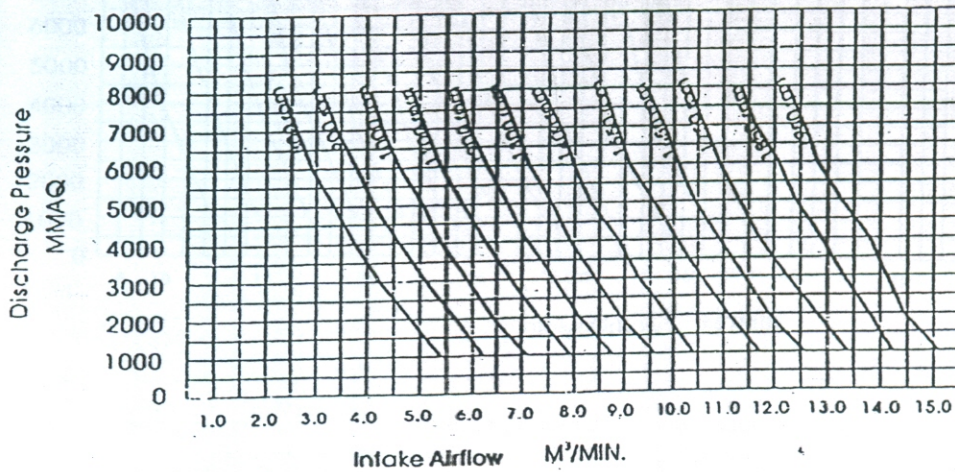
Performance Curves

Positive Displacement

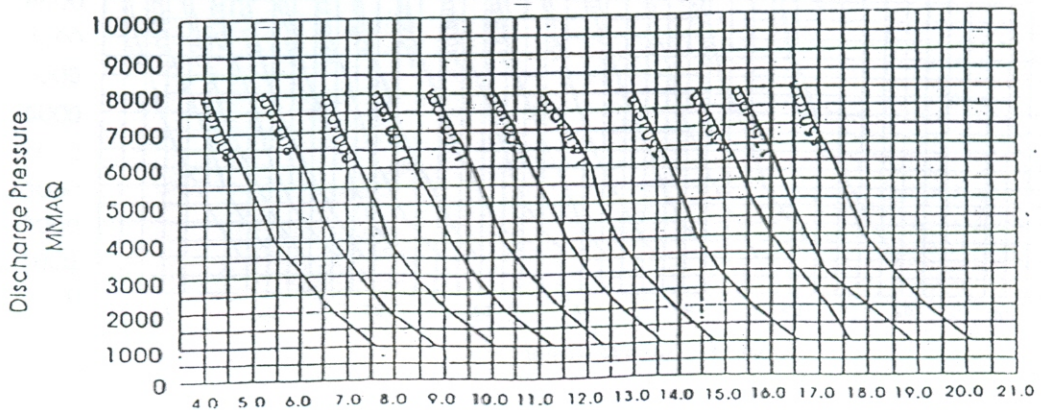
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TW(S)-125A

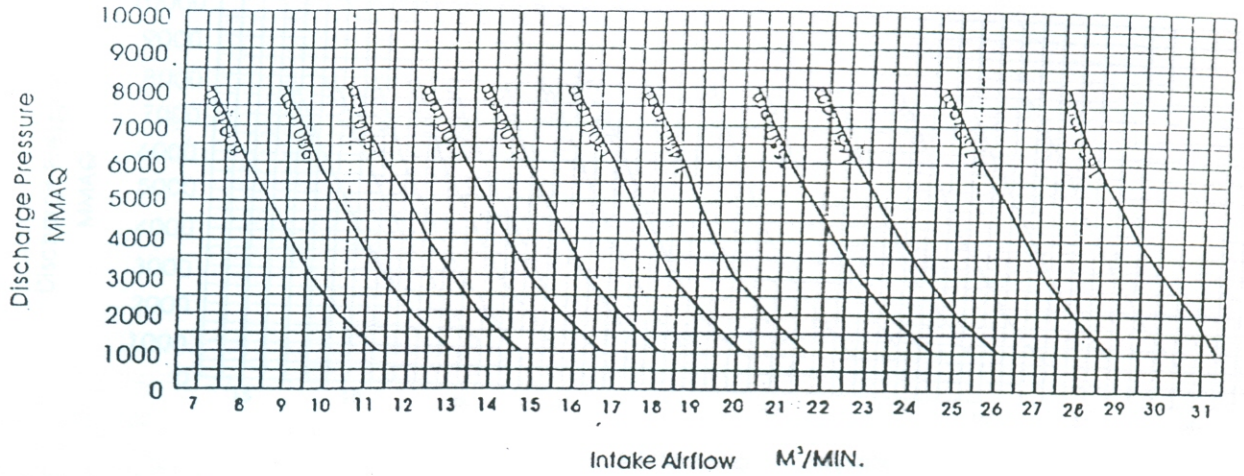




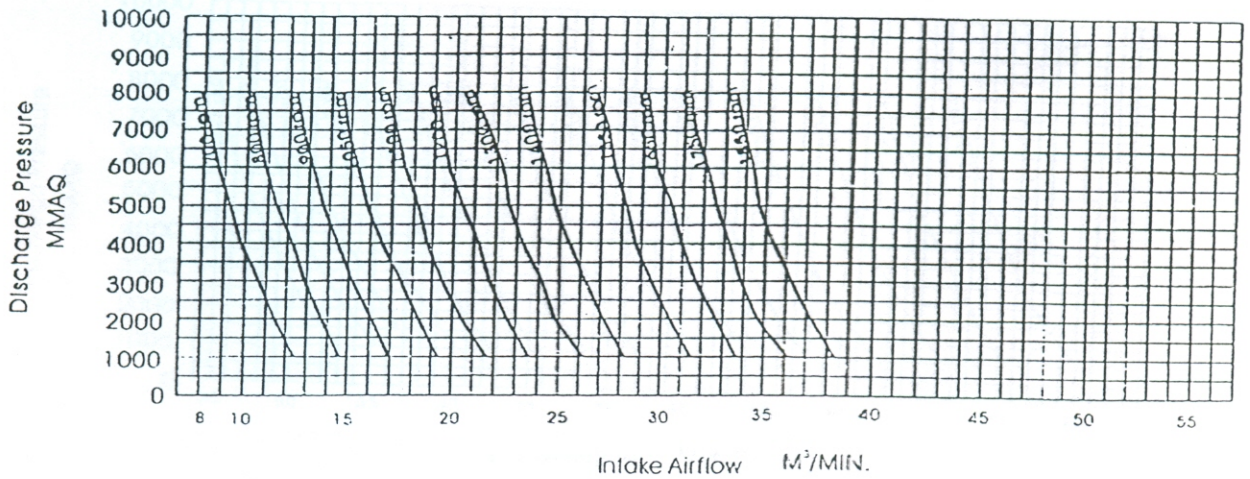
Performance Curves

Positive Displacement

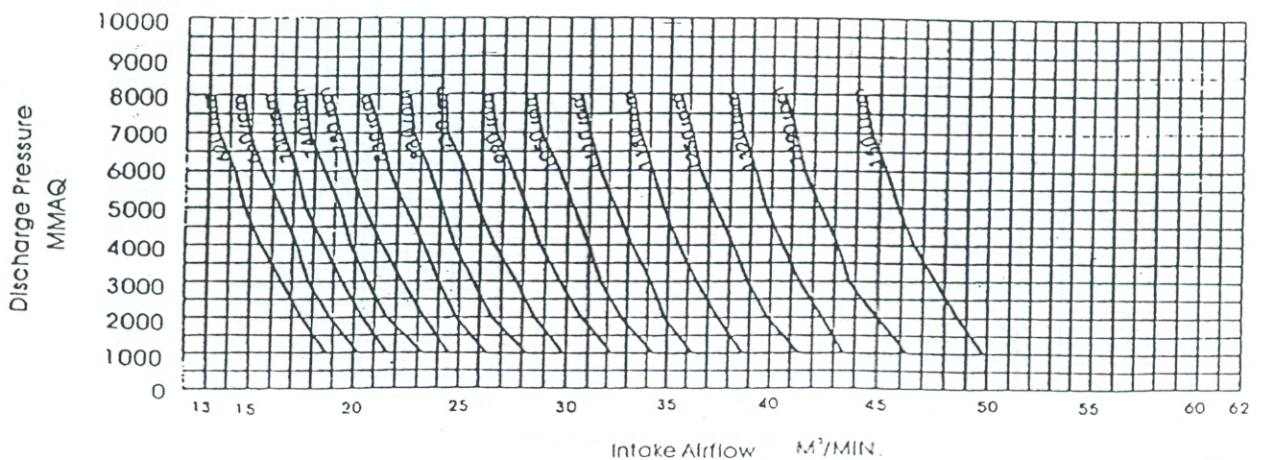
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TW(S)-150



TW(S)-200A

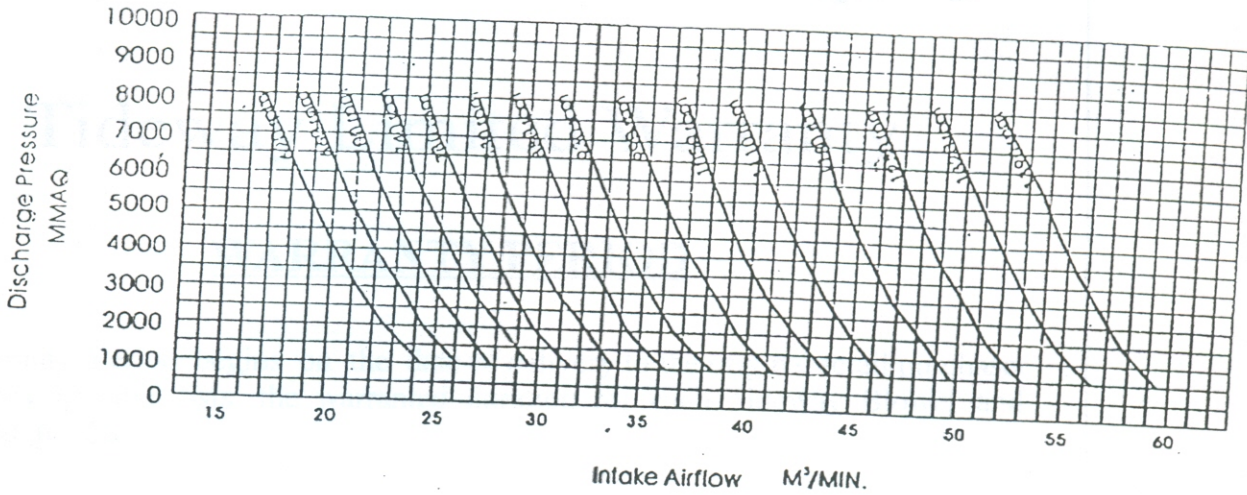




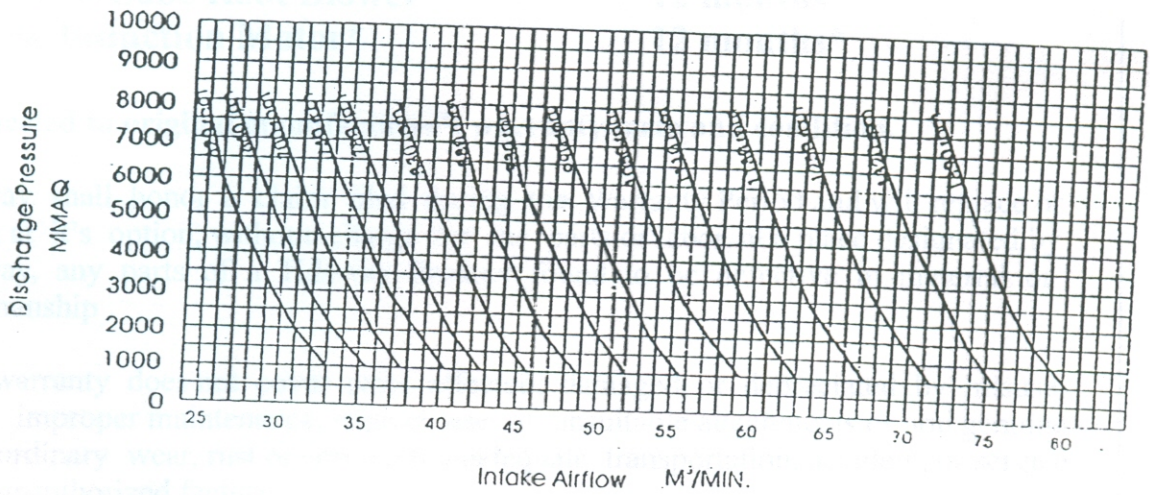
Performance Curves

Positive Displacement

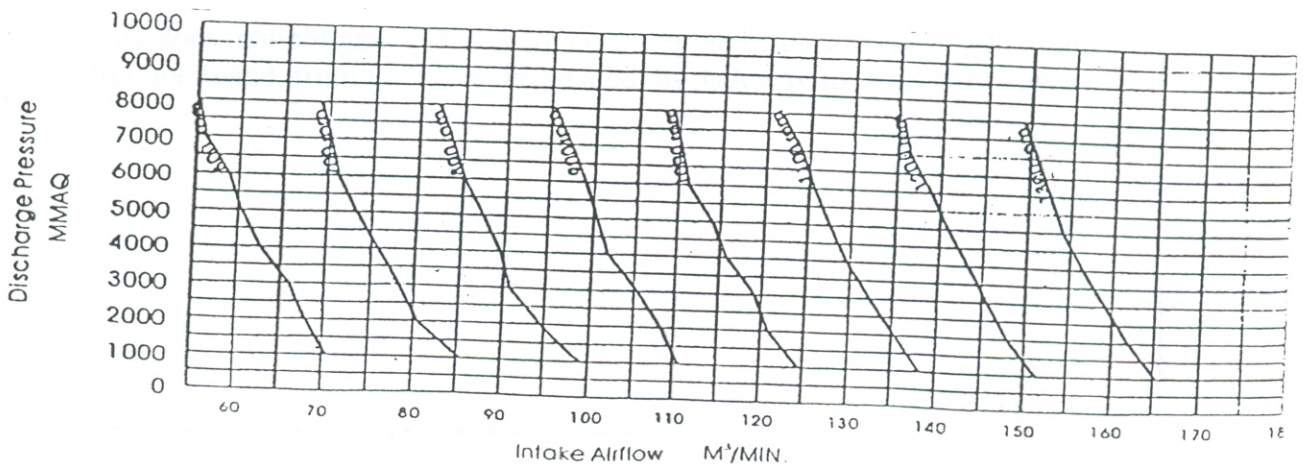
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TW(S)-300







**TIDEWAY®**

QUALITY & SERVICE

WELCOME TO VISIT TIDEWAY UNION CORPORATION



# Tideway Limited Warranty

## WARRANTY PERIOD

The Warranty Period begins on the date of delivery to the original retail purchaser. The following table lists the warranted duration for each Tideway Blower and associated product.

<u>Item</u>	<u>Warranty Period</u>
<b>Tideway 3-Lobe Root Blower</b>	<b>12 months</b>
<b>3 Phase Induction Motor*</b>	<b>12 months*</b>

\* subjected to original manufacturer's warranty term and condition.

Tideway shall honor a claim filed during the Warranty Period and will replace or repair, at it's option, without charge for the parts or labor, at a place designated by Tideway, any parts of a Tideway Product found to be defective in material or workmanship .

This warranty does not cover parts affected, damaged, or depreciated by misuse, abuse, improper maintenance, neglect, use of unsuitable attachments or non genuine parts, ordinary wear, rust or corrosion, inadequate transportation, accident, or service by an unauthorized facility.

Consumable parts, such as filters, belts, gasket, packing, lubricant, are not covered under this warranty. All expenses incurred in maintaining and replacing them shall fall on the purchaser.

This Warranty does not obligate Tideway to bear any fees for transportation of any Tideway Product to and from the place designated by Tideway for Warranty Service.





JABATAN PERKHIDMATAN PEMBETUNGAN  
 KEMENTERIAN TENAGA, AIR DAN KOMUNIKASI  
 TINGKAT 6, WISMA DAMANSARA  
 JALAN SEMANTAN  
 50668 KUALA LUMPUR

Tei : 03 - 2096 261  
 Fak : 603 - 2096 260  
 2095 374  
 e-mail :

Ruj. Tuan :  
 Ruj. Kami : KTAK/JPP(P&P)/7/189-1( 8 )  
 Tarikh : 11 OKTOBER 2005

**EIK SENG MACHINERY SDN. BHD.**  
 4619-4620, JALAN CHAIN FERRY  
 12100 BUTTERWORTH  
**PULAU PINANG**  
 ( U/P : IR OOI CHENG HUAT )

No. Tel : 04 - 332 6363  
 No. Fax : 04 - 332 1827

Tuan,

**KELULUSAN PENGGUNAAN SISTEM DAN PRODUK PEMBETUNGAN  
 - ROOTS BLOWER 'TIDEWAY'**

Dengan hormatnya saya merujuk kepada perkara tersebut di atas.

2. Sukacita dimaklumkan bahawa setelah mengkaji dengan teliti permohonan syarikat tuan, serta merujuk kepada Mesyuarat Jawatankuasa Kajian dan Penilaian Produk (JKPP) Bil. 08/2005 pada 28 September 2005, pihak Jabatan bersetuju **meluluskan** penggunaan produk tersebut di atas untuk digunakan di dalam industri pembetulan. Model dan spesifikasi produk yang diluluskan adalah seperti berikut :

PRODUK	JENAMA/ MODEL
Produk : ROOTS BLOWER  Manufacturer & Prinsipal : TIDEWAY UNION CORPORATION. NO. 163, Se. 3, JUNGSHAN ROAD, TANZ HSIANG, TAICHUNG HSIEN, <b>TAIWAN</b>	Jenama :- Tideway  Model:- TWS40, TWS50, TWS65, TWS80, TWS100, TWS125A TWS125, TWS150, TWS200A, TWS200, TWS250 & TWS300  <i>Rujuk perincian spesifikasi di Lampiran A</i>

2/..

RUDUKAN FAIL : KTAK/JPP(P&P)/7/ 189-1( 8 )  
 EIK SENG MACHINERY SDN. BHD.....PP3..- JT4/PP

No Siri Kelulusan :

00000204

( Sila catatkan rujukan kami apabila berhubung )



3. Kelulusan yang diberikan adalah tertakluk kepada syarat-syarat berikut :-

- 3.1 Kelulusan yang diberikan ini adalah untuk tempoh sah sehingga **10 Oktober 2008**. Kelulusan selanjutnya akan berdasarkan penilaian semula terhadap laporan teknikal mengenai prestasi dan penyelenggaraan peralatan tersebut. Untuk itu, tuan hendaklah mengemukakan permohonan pembaharuan kelulusan serta laporan teknikal tersebut, **enam (6) bulan sebelum** tempoh kelulusan yang diberikan tamat;
- 3.2 Pihak syarikat perlu mengemukakan *dua (2)* salinan jadual penyelenggaraan produk mengikut format Lampiran MS ke Jabatan ini dan satu salinan lagi dihantar terus ke **IWK (Pengurus Besar Jabatan Perancangan dan Kejuruteraan)** dalam tempoh *dua (2)* minggu dari tarikh surat kelulusan dikeluarkan.
- 3.3 Pihak Jabatan ini akan menjalankan audit teknikal pada bila-bila masa dalam tempoh kelulusan tersebut sebagai asas untuk proses pembaharuan kelulusan nanti. Segala kos ujian yang terlibat berhubung audit teknikal tersebut adalah ditanggung oleh pihak syarikat tuan;
- 3.4. Pihak syarikat perlu mengemukakan *Certificate of Origin* dan *Bill of Landing* setiap kali produk ini dibekalkan kepada mana-mana projek, dan pihak syarikat juga perlu memaklumkan kepada Jabatan ini sebarang pemasangan yang melibatkan peralatan tersebut. Ini bertujuan untuk mengawal prestasi serta mengenal pasti sebarang masalah yang mungkin timbul ketika peralatan tersebut beroperasi ;
- 3.5. Pihak syarikat juga perlu membekalkan buku jadual penyelenggaraan komponen peralatan dalam tempoh jaminan (*warranty period*)
- 3.6 Pihak syarikat hendaklah bertanggungjawab sepenuhnya sekiranya peralatan tersebut gagal berfungsi dengan baik untuk tempoh sekurang-kurangnya tiga (3) tahun. Manakala bagi peralatan *Mechanical & Electrical* pula, tempoh jaminan adalah sekurang-kurangnya satu (1) tahun. Ini termasuklah menggantikan peralatan tersebut dengan peralatan yang lebih sesuai dengan menggunakan perbelanjaan daripada syarikat tuan ;
- 3.7 Semua model *Roots Blower* yang dibekalkan mestilah mempunyai label atau cetakan yang jelas dengan maklumat-maklumat seperti *brand, model, dates of installation* dan sebagainya ;
- 3.8 Semua peralatan *blower* yang dibekalkan hendaklah dengan *air pressure relief valve, silencer, filter system* dan *damper*.
- 3.9 Semua peralatan *blower* yang mempunyai tahap kebisingan kurang daripada 90 dB perlulah mempunyai '*enclosure*' dan bagi peralatan yang tahap kebisingan bunyi melebihi 90 dB ke atas hendaklah menyediakan *individual acoustic enclosure*.
- 3.10 Pihak syarikat juga dikehendaki mengemukakan rekod maklumat penjualan/pemasaran setiap tahun bagi sistem yang diluluskan, mengikut format *Borang 'JPP-K'* yang disertakan bersama-sama ini. Sila kembalikan borang tersebut setiap tahun untuk tujuan penilaian dan rekod.

3/...



4. Sayugia dimaklumkan bahawa *kebenaran yang diberikan ini adalah tertakluk kepada syarat-syarat yang dinyatakan. Pihak Jabatan ini berhak untuk menarik balik kelulusan yang diberikan sekiranya pihak syarikat gagal memenuhi dan mematuhi syarat-syarat tersebut atau pun mendapati peralatan yang diluluskan gagal menunjukkan prestasi yang memuaskan.*

5. **Bersama-sama** ini juga dilampirkan dua (2) salinan Surat Akuan Penerimaan syarat-syarat kelulusan penggunaan peralatan sistem pembedungan dan loji pakej (JPP-PS) yang perlu dipatuhi oleh tuan. Surat akuan yang lengkap hendaklah dikembalikan ke Jabatan ini dan **satu (1) salinan** lagi dihantar terus kepada IWK, dalam tempoh dua (2) minggu dari tarikh surat ini dikeluarkan. Sekiranya tiada jawapan yang diterima dalam tempoh tersebut, kelulusan untuk produk ini adalah **TERBATAL** dengan sendirinya.

Sekian, terima kasih.

**"BERKHIDMAT UNTUK NEGARA"**

Saya yang menurut perintah,

  
( **DATU' IR. TAN HOO** )

Ketua Pengarah,  
Jabatan Perkhidmatan Pembedungan,  
Kementerian Tenaga, Air dan Komunikasi.

s.k.

Pengarah Unit Implementasi Projek JPP  
Pengarah Bhg. Pelesenan, Penguatkuasa & Kadar JPP  
Pengarah Cawangan Tengah JPP  
Pengarah Cawangan Utara JPP  
Pengarah Cawangan Selatan JPP  
Pengarah Cawangan Timur JPP  
Ketua Pegawai Eksekutif  
Indah Water Konsortium Sdn. Bhd.  
( up : *Pengurus Besar Jabatan Perancangan dan Kejuruteraan* )

**Bersama-sama** ini disertakan satu salinan katalog produk tersebut untuk rujukan tuan.



## Installation:

1. Foundation masonry is not necessary to be over concerned for the blowers. 3-lobe design provides slight vibration within 0.01~0.02 mm. It only needs a flat surface.
2. Free space for men should be kept around the blower surroundings for the convenience of future maintenance.
3. Ensure that the suction pipe is properly located, so that it can intake enough fresh air.
4. If the blower room is narrow, a ventilator is necessary. Because when the room temperature is above 50°C, blower motor life will be hugely reduced.

## Operation:

Please carefully check on the following items before operating the blower.

### 1.Piping:

- a. Clean inside of pipes, and remove any fragments and sundries that are resident inside the pipes.
- b. Make sure that all the joints are tightly fixed.
- c. Valves should be fully opened.

### 2.Electrical Wiring:

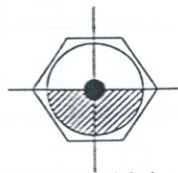
- a. Wire connections must be securely fastened, and the rating power should be correct.

### 3.Direction of Rotation:

- a. The rotation direction must be right in the direction of the arrow, wrong direction will cause intake of water. If water had been sucked into blower casing, correct the rotation direction to the arrow direction, and operate the blower for about 30~60 minutes, water will be thoroughly blown out.

### 4.Lubrication Oil:

- a. Confirm that the oil level line on the gear cover is in the middle of the oil level gauge. Fully change the oil every month.



- b. The bearing grease must be heat-resist grease which can resist high temperature up to 200°C. Supply assigned grease once every month.

## Safety Notices:

- ※Always keep hands off the rotation parts during operation of blower package.
- ※When processing maintenances, the blower must be stopped, and make sure the power source is disconnected.
- ※Keep any flammable sources away from the blower package site.



## Inspection and Troubleshooting:

Elements that may influence on the service time of the blowers are many, though. Regular maintenance and inspection on the blowers will ensure performance and lengthen service time of the blowers. Following are criteria table on inspection and troubleshooting table:

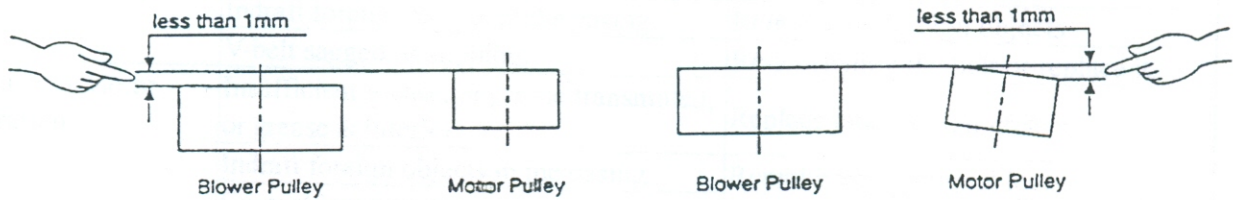
### 1. Inspection:

Inspection Cycle Inspection Items	Before Test Running	Daily	Every 3months	Remarks
Clean sundries from pipes	<input type="radio"/>			No residents should be inside the pipelines.
Make sure joints are firmly fixed	<input type="radio"/>		<input type="radio"/>	Where the joints that blower and pipe are connected.
Open all valves	<input type="radio"/>	<input type="radio"/>		Fully opened
Make sure Check Valve is in good condition	<input type="radio"/>			Make sure that the valve body can be smoothly moved.
Check the wiring connections	<input type="radio"/>		<input type="radio"/>	Wires must be tightly connected.
Check Gear Oil Level	<input type="radio"/>	<input type="radio"/>		On the middle of level gauge.
Check Safety Valve operation	<input type="radio"/>		<input type="radio"/>	Confirm with discharge side valve operation.
Check Power Voltage and Current	<input type="radio"/>	<input type="radio"/>		Voltage: within $\pm 10\%$ of rated voltage. Current: below rated current.
Sound of motor and blower	<input type="radio"/>	<input type="radio"/>		There should be no strange noises.
Check V-belt tension	<input type="radio"/>		<input type="radio"/>	Re-tension if sagging.
Supply Bearing Grease			<input type="radio"/>	With specified Grease.
Replace Gear Oil			<input type="radio"/>	Replace all.
Check V-belt	<input type="radio"/>		<input type="radio"/>	Will extend initially, re-tensioning will be necessary. Replace all every year.
Clean insides of Suction Silencer	<input type="radio"/>			Clean it every year.



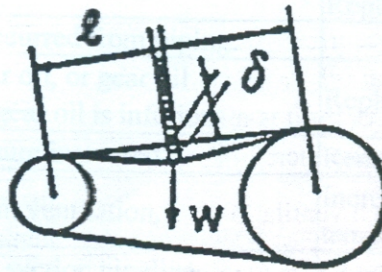
## 2. Belt Tension Adjustment:

### I. Pulley Alignment:



1. Loosen the motor side pulley fixing bolts, and use a metal scale or another similar tool, attach it to both walls of motor pulley and the blower pulley, adjust to make both pulleys more parallel and make them to the correct alignment.

### II. Belt Tensioning:



1. Find out the center of “ $l$ ”, depress vertically with under listed tension forces “ $W$ ” (measured by a tension meter), you will find the flexibility “ $\delta$ ” (belt shifting in mm). If the measured values are according to following relationship, the belt tension will be good for operation.

$$\delta = 0.016 \times l$$

Tension Force “ $W$ ” (kg)

Belt Type	A	3V	5V
Min. Value	1.0	1.5	3.5
Max. Value	3.0	3.0	5.0

2. Recheck the belt tension after 7 ~ 10 days of first operation. Owing to initial extension, the belts should be re-tensioned after some period of operation time.

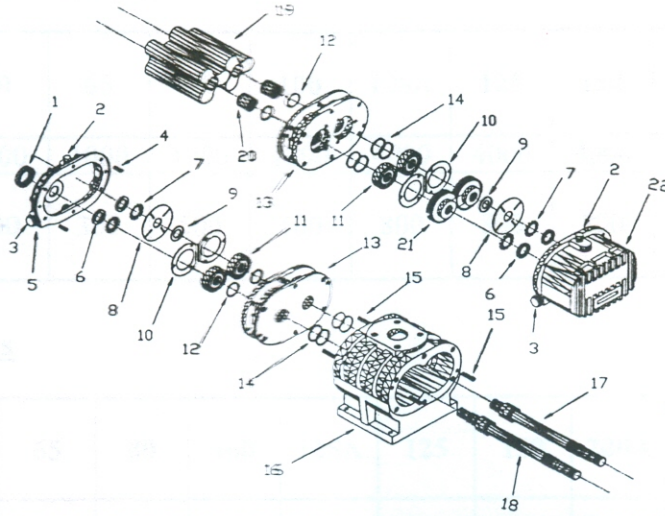


### 3. Troubleshooting:

Abnormality	Cause	Antidote
Blower can not rotate	Rotor sticking.	Rotate by hand, perform an inching operation.
	Indraft foreign objects in the casing.	Remove the foreign objects
	V-belt sagged or slipping.	Re-tensioning the belt or replace it.
Strange noise or vibration	Insufficient grease, or grease transmuted, or grease is inferior.	Replace (add) assign grease.
	Indraft foreign objects in the casing.	Remove the foreign objects
	Contact between rotors.	Re-align the rotor position.
	Abnormal pressure rising.	Remove the sources that cause it.
	Safety valve ejected.	Inspect on the safety valve.
	Bur or protrusion on pulley surface.	Remove them.
	Belt too tight.	Re-tensioning it.
	Contact between belt cover and belt.	Re-tensioning the belt, or adjust the belt cover.
	Bad blower foundation, cause to vibration.	Strengthen the foundation.
	Looseness in the fixing area.	Tighten the loose joints.
	Piping bent.	Replace the bent segment.
	Co-vibration occurred from piping.	
Abnormal heat emission	Insufficient gear oil, or gear oil transmuted, or gear oil is inferior.	Replace (add) assigned gear oil.
	Discharge pressure increased.	Remove sources that cause it.
	Insufficient room ventilation.	Increase ventilation to lower room temperature.
Oil leakage	Clogging of the suction pipeline.	Cleaning silencer and the piping.
	Too much Grease supplied.	Reduce the Grease volume.
	Too much Gear Oil added.	Adjust to the middle level of the level gauge.
	Looseness in the fixing area.	Tighten the loose area.
	Gasket damage.	Replace gasket.
Insufficient air or no air	Leaking from piping.	Make up the leakage.
	Safety valve ejected.	Inspect on the safety valve.
	Clogging of the suction pipeline.	Cleaning silencer and the piping.
	Discharge pressure increased.	Remove sources that cause it.
	V-belt sagged or slipping.	Re-tensioning the belt or replace it.
	Insufficient motor RPM	Increase the RPM.
Discharge pressure increased	Valve closed or not fully opened.	Fully open the valve.
	Water level of pond ascended.	
	Sludge density or sedimentation increased.	Remove the sludge sedimentation.
	RPM too high cause to high air volume supply.	Reduce RPM.
	Clogging of the diffusers.	Clean the diffusers.
	Check valve malfunctioned, or connected in wrong direction	Replace, or adjust the direction of the check valve.



## Spare Parts List:



MODEL PARTS	TWS 40	TWS 50	TWS 65	TWS 80	TWS 100	TWS 125	TWS 150	TWS 200	TWS 250	TWS 300
Bearings for SHAFTS	Pulley end: 6306Zx2 Gear end : 6207Zx2			6309Z x 4		6312Z x 4		Gear end: NU315x2 Pulley end: 6315 x 2		Gear end: NU315x2 Pulley end: 6320 x 2
V-Seal	VA40 x 4			VA 55 x 4		VA70 x 4		VA95 x 4		VA 120 x4
Seal at the Oil Cover End	ID28 x OD45 x 10t mm			ID40 x OD62 x 10t mm		ID55 x OD70 x 10t mm		ID89 x OD115 x 13t mm		152 x 128 x13
V-belts	B46 x 1	B52 x 2	B52 x 2	B60 x 3	B65 x 4	B80 x 4		5V 1020 x 4		SPB 4000 x 8
Timing Gear	M2 x 45 Teeth	M2 x 45 Teeth	M2 x 45 Teeth	M2.5 x 48 Teeth	M2.5 x 48 Teeth	M3 x 53 Teeth	M3 x 53 Teeth	M3 x 53 Teeth	M4 x 60 Teeth	M8 x 60 Teeth
Remarks:	1. V-belts are recommended to be replaced in every 1/2 year. 2. Commonly Bearings needs to be replaced after 2 years of operation. 3. For other parts, the replacement shall depend on the operation of the package.									

## Lubricant Cross Reference Table

Item	Viscosity	ISO DIN-3498	NIPPON GREASE	SHOWA	ESSO	SHELL	MOBIL	CALTEX
Gear Oil	#220	CC220	Gear SP220	GC-220SP	Spartan EP220	Omala 220	Moble Gear 630	---
Grease (for Water Cool type)	---	---	---	Sunlight MB*2	Beacon Q2	---	Mobiltemp 78	Molytex ZP2
Remarks:	1. Gear oil needs to be completely replaced at every 2 months. 2. Grease is required for the Water Cooling type.							



### Lubricant Reservoir Volume :

Unit in C.C.

Model	40	50	65	80	100	125A	125	150	200A	200	250
Item											
Gear Box	1000	1000	1000	1200	1200	4000	4000	4000	8000	8000	8000
Pulley Side Bearings	300	300	300	500	500	800	800	800	2000	2000	2000

### Rotor Specifications

Unit in mm

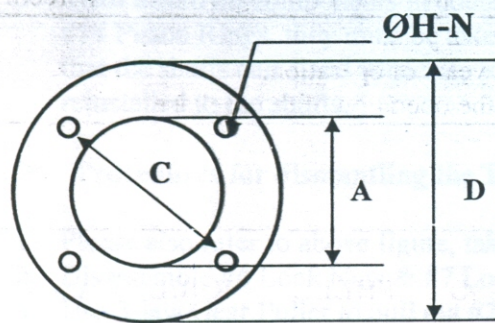
Model	40	50	65	80	100	125A	125	150	200A	200	250	300
Item												
Lobe Length	120	200	260	250	350	260	380	490	350	450	600	560
O.D.	130	130	130	175	175	240	240	240	360	360	360	540

### Timing Gears

Unit in mm

Model	40	50	65	80	100	125A	125	150	200A	200	250	300
Item												
Spec.	M2 x 45 T	M2 x 45 T	M2 x 45 T	M2.5 x 48 T	M2.5 x 48 T	M3 x 53 T	M3 x 53 T	M3 x 53 T	M3 x 53 T	M3 x 53 T	M4 x 60 T	M8 x 60

### JIS 10 K Flange Specifications



### Flange with type JIS 10 Kg/cm<sup>2</sup>

	A	D	C	H	N	THK	Screw
TWS-40 (I)	52.5	130	105	12 PT	4	14	12 PT
TWS-40 (O)	61.5	155	120	19	4	16	16
TWS-50	61.5	155	120	19	4	16	16
TWS-65	77.5	175	140	19	4	18	16
TWS-80	90	185	150	19	8	18	16
TWS-100	116	210	175	19	8	18	16
TWS-125	142	250	210	23	8	20	20
TWS-150	167	280	240	23	8	22	20
TWS-200	218	330	290	23	12	22	20
TWS-250	270	400	355	25	12	24	20
TWS-300	320	445	400	25	16	24	M20

Unit: mm

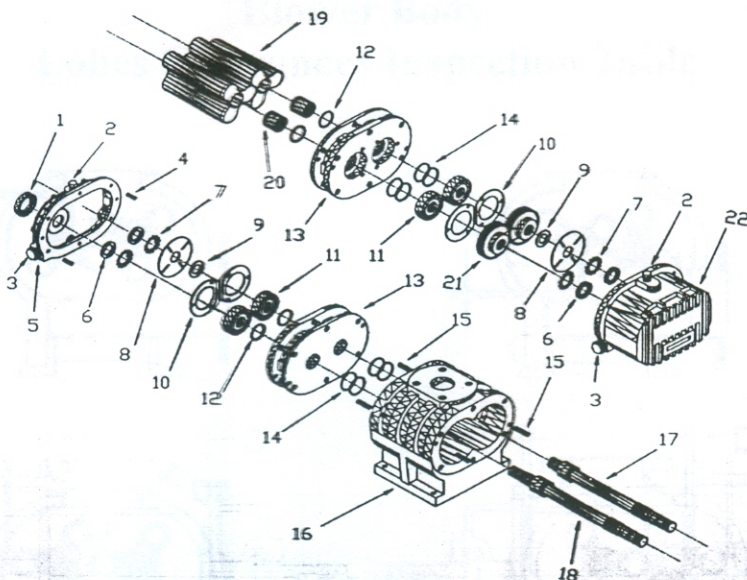
### Key Way Size

Unit: mm

Model	TWS 40	TWS 50	TWS 65	TWS 80	TWS 100	TWS 125	TWS 150	TWS 200	TWS 250	TWS 300
Item										
Key size (W x H)	8 x 7	8 x 7	8 x 7	10 x 8	10 x 8	14 x 10	14 x 10	18 x 12	18 x 12	25 x 14
Keyway Size (W x H x L)	8 x 3.5 x 55	8 x 3.5 x 55	8 x 3.5 x 55	10 x 4 x 75	10 x 4 x 75	14 x 5 x 90	14 x 5 x 90	18 x 6 x 110	18 x 6 x 110	25 x 7 x 120



## Dismantling Procedures of the Tideway Roots Blowers



### ➤ Procedures for dismantling our Roots Blowers

1. Please refer to above figure, take off the #5 Oil Case as the first step. Be sure not to damage the gasket behind it, and remember not to drop the #4 Positioning Pins.
2. Then take out the #6 Lock Nuts for Bearings, and #7 the Lock Washer, the #8 Oil Thrower and the #10 Bearing Washers.
3. Use two sets of Gear pullers (best using 3-jaw type), one for the drive shaft, and the other for the driven shaft. Take off the #13 Bearing Case by gradually fasten Gear Pullers simultaneously, the #13 bearing case will be taken apart along both shafts and be taken off. Please preserve #15 Positioning Pins (2 pcs of expansible pins) also.
4. After the bearing case being removed, you will see #12 O-ring and #14 Piston Rings on both shafts, please install another #12 O-ring on the shafts next to it. Both shafts need totally 2 extra O-rings.
5. Then install all components in counter sequences. Most important of all is, when reinstall the #14 Piston Rings, they must be taken out from the shafts, and turn the blower body upright so that the shafts can stand vertically to the ground surface, the Piston Rings will be easily to be reinstalled to the shafts.

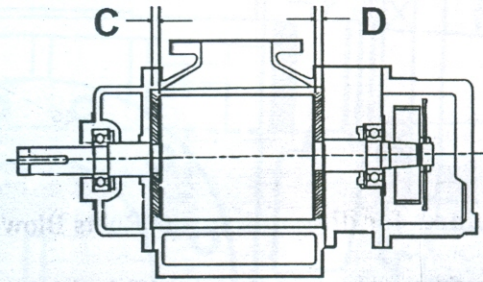
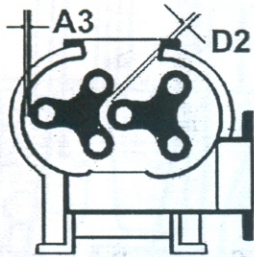
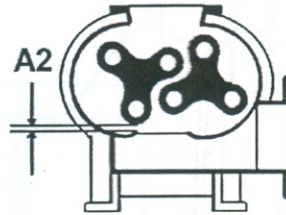
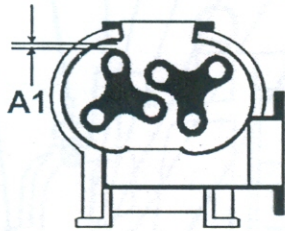
### ➤ Procedures for dismantling the Timing Gear.

1. Please also refer to above figure, take off #22 Gear Case first.
2. Disassemble #6 Lock Nuts & #7 Lock Washers, and then #8 Oil Thrower.
3. Use 3-jaw Gear Puller to pull out #21 Timing Gears.
4. To remove #13 Bearing Case, the method is the same done to the other side (item 3. of above).
5. Proceeding counter-procedures to re-install all the components.
6. Before installing timing gears back, knock and fix the Driven Shaft End Gear first, then install the Drive Shaft End Gear and make it slightly loose stalled; and then using a thickness gauge to check clearances between two lobes, the clearance table are enclosed for your check. Slightly knock on the Gear to adjust the clearance. After all clearances are procured and set, securely fix the drive shaft end Timing Gear.
7. Then fasten the washer · Oil Thrower · Lock Washer and Lock Nuts.
8. Then assemble the #22 Gear Case.

☀ Before reassembling, all components and parts shall be completely cleaned.



# Tideway "TWS" Type Blower Body Lobes Clearances Inspection Table



Position Model	A1 Suction End	A2 Discharge End	A3	D2	C Fix End	D Expansion End
TWS-50	0.13	0.08	0.12	0.10	0.12	0.18
TWS-65	0.13	0.08	0.12	0.10	0.12	0.18
TWS-80	0.18	0.12	0.15	0.15	0.12	0.25
TWS-100	0.18	0.12	0.15	0.15	0.12	0.28
TWS-125	0.26	0.18	0.25	0.27	0.14	0.32
TWS-150	0.26	0.18	0.25	0.27	0.14	0.42
TWS-200	0.37	0.25	0.30	0.34	0.18	0.51
TWS-250	0.37	0.25	0.40	0.38	0.18	0.60

## Rotor Specifications

Unit in mm

Model Item	40	50	65	80	100	125A	125	150	200A	200	250	300
Lobe Length	80	200	260	250	350	260	380	490	350	450	600	560
Rotor O.D.	129.79	129.79	129.79	174.7	174.7	239.56	239.56	239.56	359.38	359.38	359.38	539.04