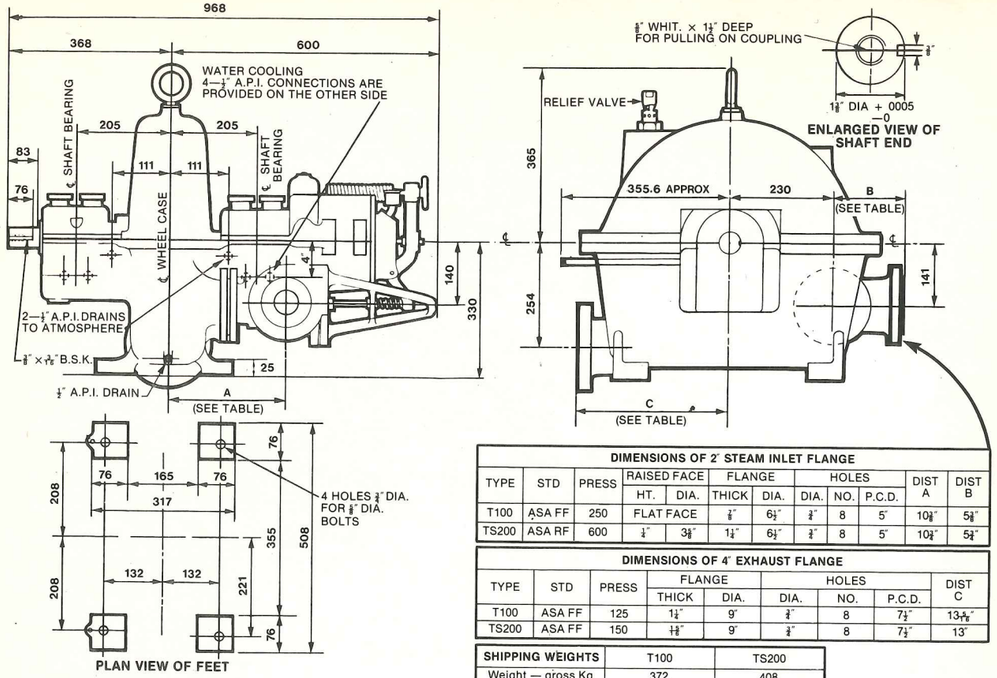


PLAN VIEW OF FEET

T-100 & TS-200

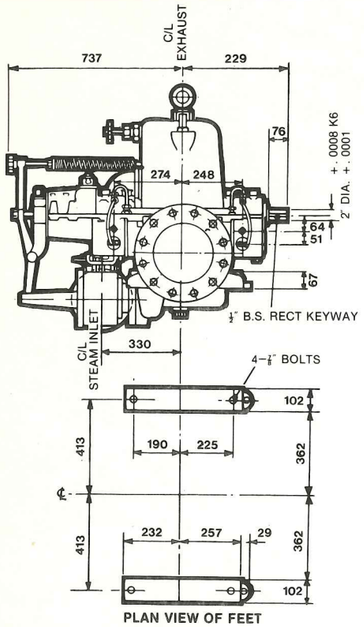
Principal dimensions in mm

DIMENSIONS OF 2" STEAM INLET FLANGE											
TYPE	STD	PRESS	RAISED FACE		FLANGE		HOLES			DIST A	DIST B
			HT.	DIA.	THICK	DIA.	DIA.	NO.	P.C.D.		
T100	ASA FF	250	FLAT FACE		¾"	6½"	¾"	8	5"	10⅛"	5⅛"
TS200	ASA RF	600	¼"	3⅛"	1¼"	6½"	¾"	8	5"	10⅜"	5⅜"

DIMENSIONS OF 4" EXHAUST FLANGE							
TYPE	STD	PRESS	FLANGE		HOLES			DIST C
			THICK	DIA.	DIA.	NO.	P.C.D.	
T100	ASA FF	125	1½"	9"	¾"	8	7½"	13 5/16"
TS200	ASA FF	150	1⅝"	9"	¾"	8	7½"	13"

SHIPPING WEIGHTS	T100	TS200
Weight — gross Kg	372.	408.
Weight — net Kg	317.	353
Case Size mm	1219 × 914 × 914	1219 × 914 × 914

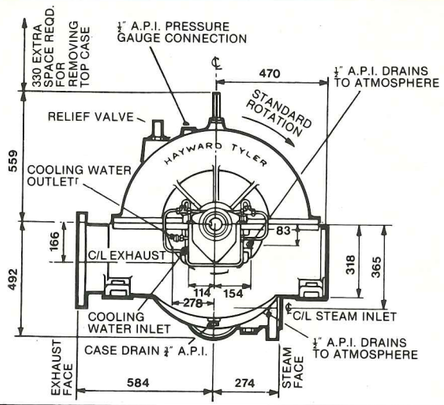
Steam and exhaust openings on these drawings are our standard for this frame. Purchaser must install pipes of sufficient size to ensure rate **steam and exhaust pressure at the turbine.**
Steam pipes should be lagged and a separator installed as close to the turbine as possible. Dry steam means better efficiency and longer life for the turbine.



PLAN VIEW OF FEET

T-400 & TS-600

Principal dimensions in mm



DIMENSIONS OF 4" STEAM INLET FLANGE									
TYPE	STD	THICK PRESS P.S.I.	RAISED FACE		FLANGE		HOLES		
			H.T.	DIA.	THICK	DIA.	DIA.	NO.	P.C.D.
T400	ASA FF	250	FLAT FACE	—	1¼"	10"	¾"	8	7⅞"
TS600	ASA	600	¼"	6 5/16"	1½"	10¾"	1"	8	8½"

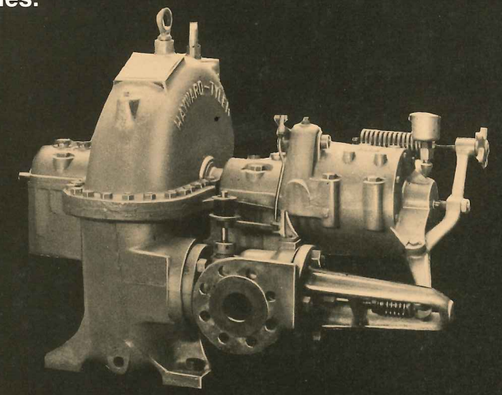
DIMENSIONS OF 10" EXHAUST FLANGE							
TYPE	STD	PRESS P.S.I.	FLANGE		HOLES		
			THICK	DIA.	DIA.	NO.	P.C.D.
T400	ASA FF	125	1 3/16"	16"	1"	12	14¼"
TS600	ASA FF	150	1 3/16"	16"	1"	12	14¼"

SHIPPING WEIGHTS	T400	TS600
Weight — gross Kg	748.	975.
Weight — net Kg	680.	907.
Case Size mm	1346 × 1295 × 1295	1346 × 1295 × 1295

Hayward Tyler

Hayward Tyler TS range of steam turbines

Single wheel, back pressure, general purpose steam turbines.



T and TS range

Range of back pressure turbines

These turbines are extensively used as prime movers for Fans, Blowers, Compressors, Pumps, Mixers, and Turbo-Alternators by the following industries: Chemical Manufacturers, Dyeworks, Laundries, Oil Refineries, Paper Mills and Sugar Refineries. Food, Process, Soap and Textile factories. Breweries, Distilleries, Dairies, and Power Plants for auxiliary drives, for land and marine applications.

Principle

The turbine is, basically, a single wheel, mounted on a shaft carried in sleeve bearings, and enclosed in a pressure-tight casing. Carbon packing rings, between wheel and bearings, prevent escape of steam along the shaft.

Steam, entering through a valve controlled by a centrifugal governor, passes, via an emergency governor valve, to the jets. Each jet directs the steam into the wheel buckets. The steam gives up part of its energy in rotating the wheel, and is collected in a reversing chamber which re-directs it into the buckets, the process being repeated until the steam, having given up most of its energy, is exhausted into the casing which is connected by an exhaust pipe either to a steam process plant, to atmosphere, or to a condenser.

The number of jets used depends on the power required from the turbine.

Where a turbine may be required to give a lower power output than the maximum for which it is supplied, hand valves are fitted to enable one or more jets to be shut off, thus maintaining maximum steam economy at partial load.

Steam rates

Steam rates for Hayward Tyler Turbines vary depending on steam conditions. By selecting the size and number of jets to suit the conditions, economic steam rates can be arranged over a wide range of power requirements.
Factors affecting steam rate are as follows:

Speed

Increase of turbine speed results in improved steam rate. The use of a reduction gear box often enables a greatly improved performance to be obtained.

Total temperature

An increase in total temperature (degree of superheat) improves the steam rate.

Steam inlet pressure

An increase in steam inlet pressure improves the steam rate.

Exhaust back pressure

An increase in exhaust back pressure increases the steam rate, but the Hayward Tyler machine is primarily a back pressure turbine and does not always fully utilise very high vacuum conditions.

Direction of rotation

Standard rotation is clockwise looking on the turbine shaft extension. Counter-clockwise rotation can be provided if this is specified when ordering. This involves no extra in price unless the rotation has to be reversed after or during manufacture.

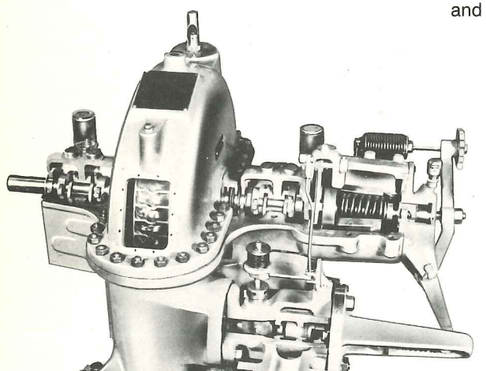
Construction features

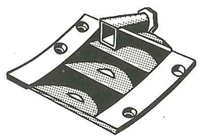
1. **Wheel**
   Manufactured from a single forging with semi-circular buckets milled from the solid metal. Blades have large clearance and are protected by projecting rims at the sides of the wheel. Radial flow ensures no end-thrust.
2. **Casing**
   Subjected to exhaust pressure and temperature only.
   Casing, bearings and governor housing are all split horizontally, allowing turbine to be dismantled without disturbing alignment or inlet and exhaust pipework.
3. **Shaft:**
   Critical speed is well above operating speed.
4. **Governor valve:**
   Balanced double seat with integral strainer and can be inspected and cleaned without disturbing pipework.
5. **Jets:**
   New nozzles can be fitted without altering reversing chambers.
6. **Control valves:**
   Supplied for economical operation at partial load conditions.
7. **Constant speed governor:**
   Built integral with shaft. Weights pivot on hardened steel knife edges.
8. **Emergency governor and valve:**
   Independent of constant speed governor.
9. **Carbon ring glands:**
   Enclosed in separate housing. Horizontally split for accessibility.
10. **Bearing cooling:**
    Water-cooling coils fitted for all operating conditions.
    Additional cooling features for high operating temperatures eliminate forced-feed lubrication systems.

Quotations

When quotations are requested the following information is required:

1. Power required.
2. Speed required.
3. Steam pressure at inlet.
4. Steam temperature.
5. Exhaust pressure.

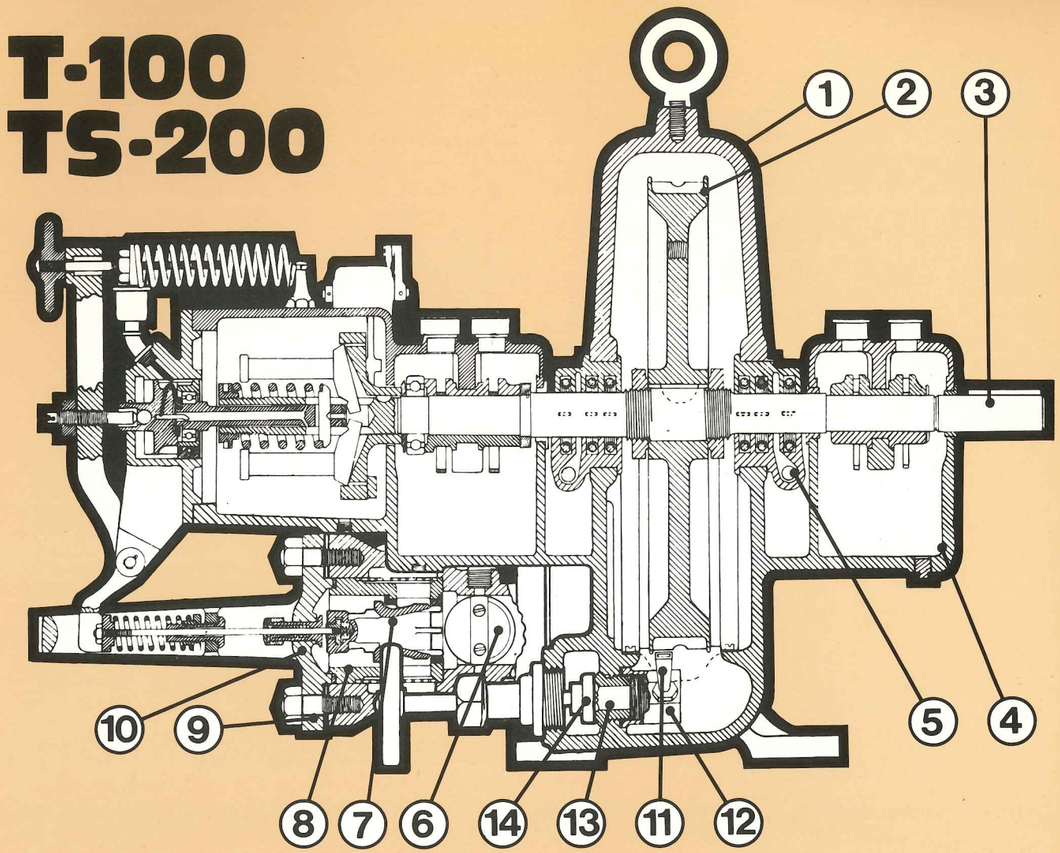




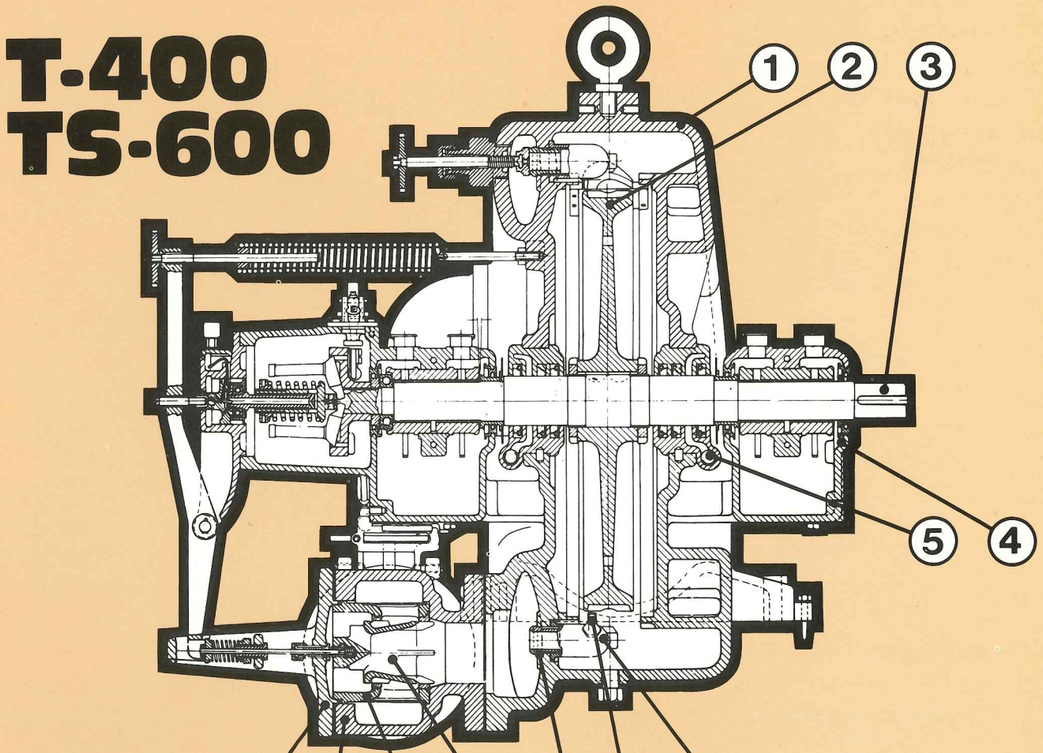
Steam jet and reversing chamber.

Path of steam from jet to wheel

T-100 TS-200



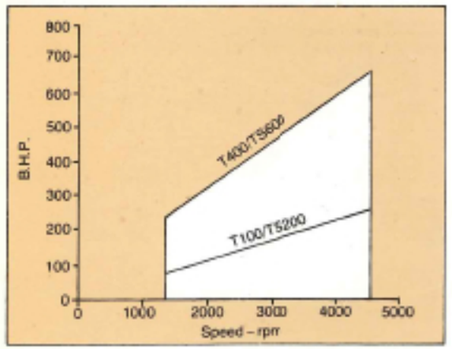
T-400 TS-600



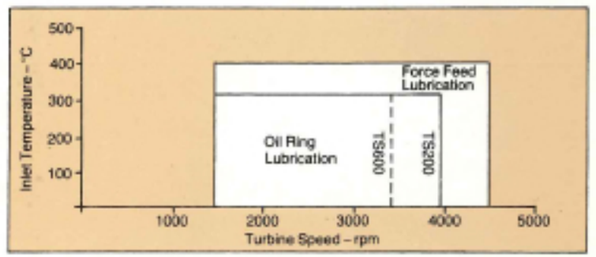
Item No.	Part Name	Models: T100 & T400	Models: TS200 & TS600
1	Case	Cast Iron	Cast Steel
2	Bucket Wheel	EN.12 Forged	EN.12 Forged
3	Wheel Shaft	EN.19 Steel Cr. Plated	EN.19 Steel Cr. Plated
4	Bearing Housing	Cast Iron	Cast Steel
5	Carbon Ring Box	Cast Iron	Cast Iron
6	Emergency Valve	St. Steel	St. Steel
7	Governor Valve	Monel	Monel
8	Governor Valve Cage	S.G. Cast Iron	Cast Steel
9	Governor Valve Body	Cast Iron	Cast Steel
10	Governor Valve Bonnet	Cast Iron	Cast Steel
11	Steam Jet	Monel	Monel
12	Steam Jet Body	S.G. Cast Iron	Mild Steel
13	Steam Jet Body Holder	St. Steel	St. Steel
14	Hand Valve	Steel & Monel	Steel & Mcnel

Turbine designations

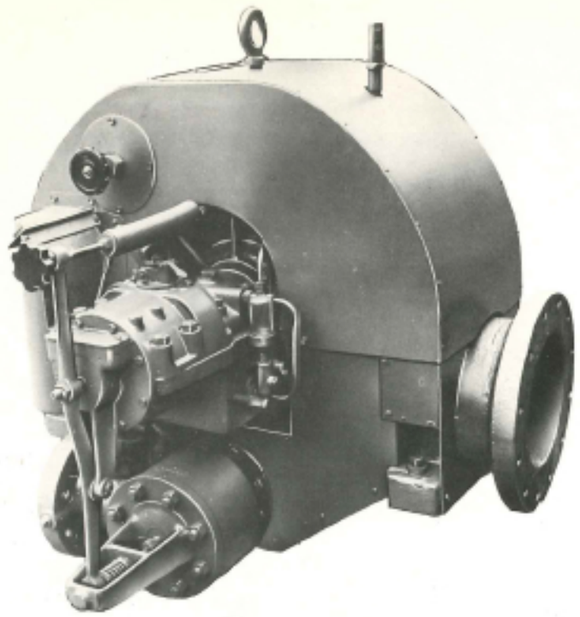
OPERATING CONDITIONS AND LIMITATIONS	MACHINE DESIGNATIONS AND LIMITATIONS			
TURBINE DESIGNATION	T100	TS200	T400	TS600
Maximum Power Output	150	250	450	750
Inlet Pressure Maximum psig	250	640	250	640
Exhaust Pressure Maximum psig	50	90	50	90
Inlet Temperature Maximum °C	274	400	274	400
Exhaust Temperature Maximum °C	260	315	260	315
Maximum Speed rpm	4500	4500	4500	4500
Minimum Speed rpm	1200	1200	1200	1200
Maximum Number of Steam Jets	4	4	10	10
Maximum Number of Hand Valves	3	3	6	6

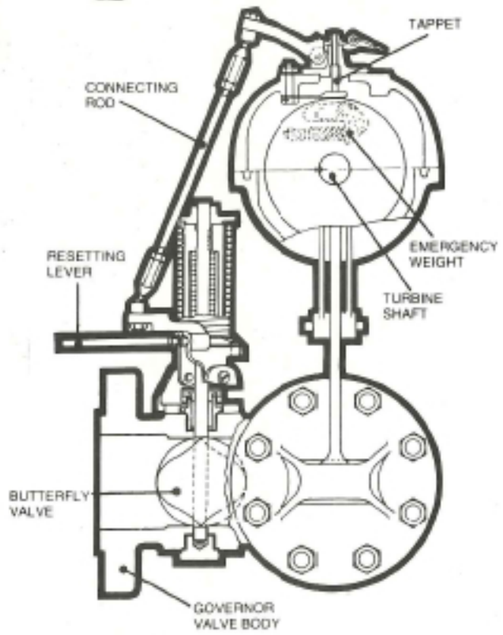


Power/speed limitations



Speed/temperature for oil rirg and force feed lubrication on TS200 & TS600 Turbines





Governors

Mechanical System

This is a constant speed, fly ball type of governor that is fitted as standard. Speed is normally variable within plus or minus 10 percent of the rated speed when the turbine is running by means of the hand speed-changer.

If the driven machine is a boiler feed pump or a machine with frequent but gradual load variations, it is recommended that a constant pressure regulator be fitted to the turbine.

Should the driven machine be an emergence generator, compressor, or any similar machine that mposes rapid and large variations in load, it is recommended that a Woodward hycraulic governor be fitted in place of the mechanical governor system.

Hydraulic System

A Woodward TG10, which is driven directly from the turbine shaft, will give speed control accuracy to NEMA A. The Woodward UG8, also driven directly from the turbine shaft, will give speed control to NEMA C, and is recommended for generator drives where close speed control is essential.

Emergency Governor Valve

The emergency governor valve is actuated by a mechanism separate from the main governor.

The valve can be re-set manually with steam on-line. Two versions are available, the butterfly valve and the globe valve.

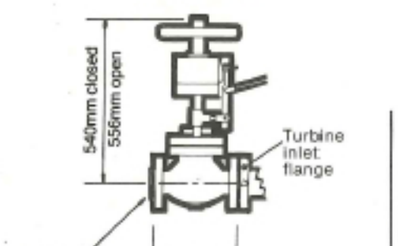
Butterfly valve

This is a spring-loaded unit used for duties up to 450 psig/260°C., and is an integral feature of the turbine.

Globe valve

A single seat quick closing valve suitable for use to 640 psig/400°C. The valve is mounted on the inlet flange and is operated by the standard trip mechanism.

TS-200



TS-600