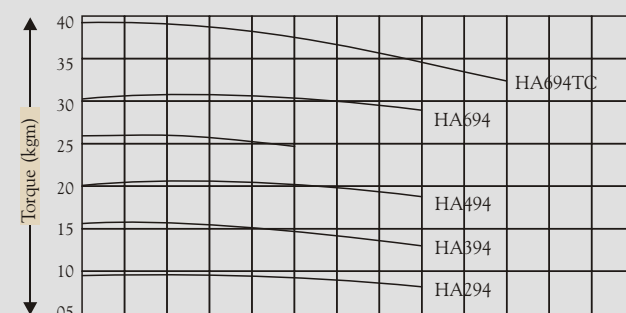


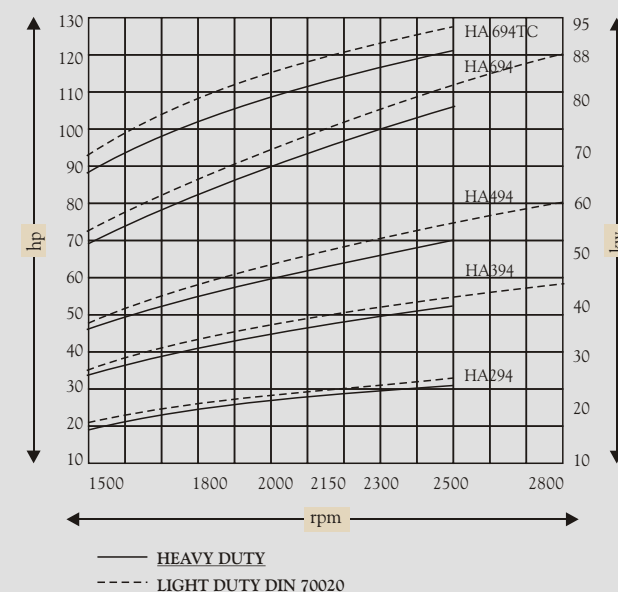
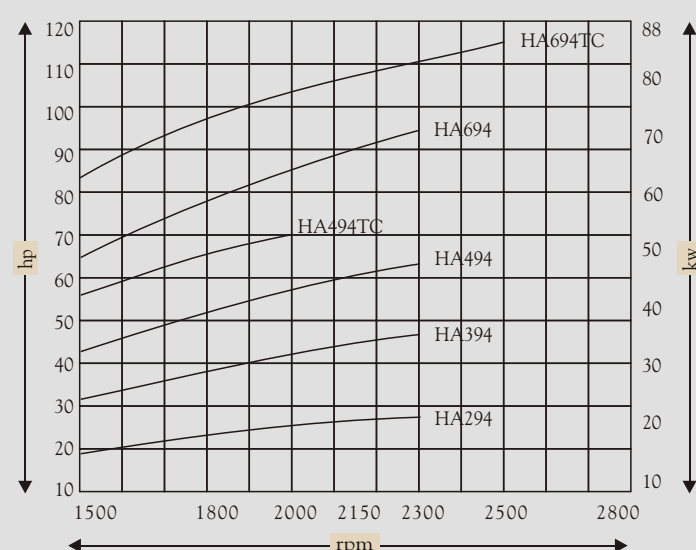
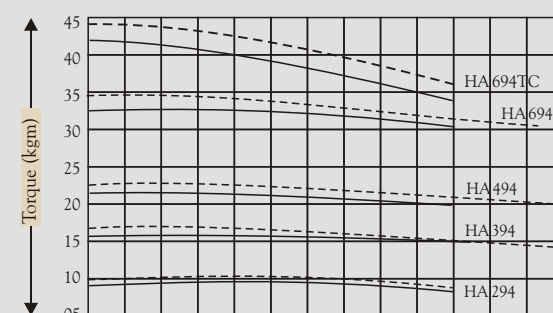


Enriching Lives

HORSE POWER RATINGS
AS PER IS: 10002/BS: 5514/DIN 6271/ISO: 3046
(ISO STD. POWER, CONTINUOUS RATING)



HORSE POWER RATINGS AS PER
IS:10002/BS: 5514/DIN 6271/ISO: 3046
ISO NET BRAKE FUEL STOP POWER (Max. Ratings)



— HEAVY DUTY
- - - LIGHT DUTY DIN 70020



Enriching Lives

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NOTE : As continuous developments are contemplated, the information and illustrations are subject to change and are not binding.
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HA SERIES

WELL THOUGHT - OUT ENGINES



Product Support :

Kirloskar has one of the most extensive service networks in India. Almost 90% of Kirloskar medium engines are within a 100 kilometre periphery of a Kirloskar Service Dealer. 198 Service Dealership locations provide relentless service to the customers. The location of the dealerships and their infrastructure is continually assessed based on the Kirloskar engine population build-up in each territory, and the emerging service needs of the customers. Out of these, 68 Service Dealership locations provide 24-hour service. The number of Service Dealerships that provide 24-hour service are growing day by day. Additionally, Kirloskar Territory Managers, Service Engineers and Technicians are stationed at 21 Kirloskar Area Offices. A well spread out service network manned by about 1,545 Kirloskar trained engineers and technicians ensures prompt service and easy availability of genuine spare parts, thus enabling highest up time for Kirloskar engines.

All pervasive IT in operations:

Having foreseen the power of IT to transform businesses, way back in 1998 KOEL installed the world's leading Enterprise-wide Solution (ERP) Oracle. This installation is noted to be one of the most comprehensive installations of Oracle in the manufacturing industry. The installation of ERP in 1998 was followed up with net enabled business processes in 2000. With this initiative, Kirloskar Service Dealers, OEMs, Area Sales Offices, Suppliers and the Logistic Providers form a digital community that is ever ready to respond to each customer need efficiently. The Service Dealerships are able to respond to customer needs quickly



Kirloskar engines: Prime movers to your business.

Kirloskar Oil Engines Limited, founded in 1946 and popularly known as KOEL is India's leading manufacturer of the finest and widest range of diesel engines - from 3 hp to 800 hp, and from 2400 hp to 11,000 hp. The engines are branded as 'Kirloskar'. With annual manufacturing volumes exceeding 200,000 engines, Kirloskar engines are available in both air-cooled and liquid-cooled versions. The main engine manufacturing plant is at Pune, and other manufacturing locations are Nashik, Ahmednagar, Rajkot, Indore and Kolhapur. Kirloskar engines are used as prime movers in Industrial, Agriculture, Power Generation as well as Marine Application. The engine manufacturing facilities are continually upgraded and improved to ensure the requisite quality at competitive cost. Critical components like crankcases, crankshafts, camshafts, gear casing, cylinder heads and connecting rods are manufactured in-house. KOEL also manufactures for its exclusive use, special purpose machines to achieve critical degrees of precision that international specifications demand. The prestigious ISO 9001 certification for Quality Management Systems in 1992 and ISO 14001 certification for Environmental Management Systems in 1999 are proof of Kirloskar's commitment to quality and environment. KOEL is the first engine manufacturing company in India to be awarded the ISO 14001 certification. At Kirloskar, we believe that the industry and the environment can, and must, coexist in a mutually beneficial way. Bringing this thought into practice, is what has driven us to manufacture engines that are not only eco-friendly, but are also manufactured in an environment-friendly way.

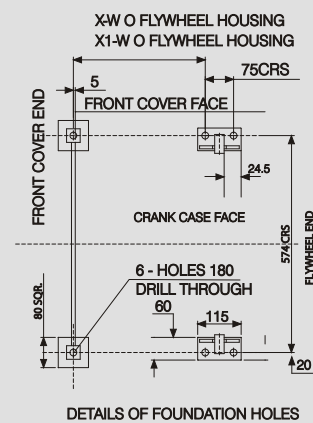
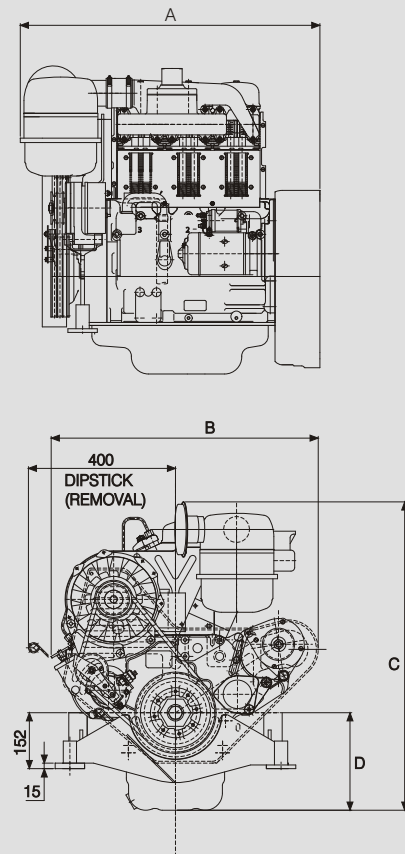
Brief specifications

Models	HA294	HA394	HA494	HA694	HA494TC	HA694TC
Engine Description	Vertical air-cooled, compression Ignition four stroke cycle Naturally aspirated Diesel Engines				Vertical air-cooled, compression Ignition, four stroke cycle Turbo charged Diesel Engines	
Aspiration	Natural				Turbo	
Bore x Stroke (mm)	100 x 120					
Displacement (cc)	1884	2826	3786	5652	3768	5652
Compression Ratio	17:1				15:1	
Direction of Rotation	Counter-clockwise (looking at flywheel end)					
Speed						
Max Operating (rpm)	2300 (for continuous duty) 2800 (for automotive and intermittent duty as mentioned in the table for Horse Power Ratings)				2000	2500
Min. operating (rpm)	1500					
Low idling (rpm)	650					
Dry weight without flywheel (kg)	243	300	338	430	338	448
Weight of standard flywheel for industrial application (kg)	41	41	39	39	39	39

Approximate shipping specifications with standard equipment

Model	Net Weight (kg)	Gross Weight (kg)	Packing case size (mm)
HA294	284	354	1070 x 920 x 1100
HA394	341	411	1150 x 920 x 1100
HA494	377	477	1280 x 920 x 1100
HA494TC	385	485	1400 x 940x 1100
HA694	469	569	1550 x 1080 x 1120
HA694TC	495	595	1670 x 1090 x 1120

*As continuous development are contemplated the engine specifications are subject to change without prior notice.



Notes

1) Continuous Rating:

For NA engines IS: 10002/BS: 5514/DIN271 / ISO3046

For TC engines BS: 5514/din 6271 / ISO3046

(NA - Naturally aspirated, TC - Turbocharged)

The power available for heavy continuous load. An over load of 10% is permissible for 1 hour for every 12 hours of consecutive running.

2) Maximum Power Rating:

- Heavy Duty: Maximum power available for variable load/variable speed applications where the average load factor is as high as 70%

- Light Duty: Maximum power available for variable load/variable speed applications where max. load is required for short duration's and average load factor does not exceed 30% (Approval from KOEL Engineering Dept. is essential for applying maximum power rating to a particular application.)

3) Site deration for HA494TC/HA694TC engine is to be calculated as per BS 5514/DIN 6271/ISO3046

4) For applications demanding HA494TC engine operation beyond 2000 rpm, please consult KOEL.

Overall dimensions and installation drawings (HA294/HA394/HA494/HA694 engines)

Engine Model	A	B	C*	D*	X	X1
HA294	678	704	872	301	342	455
HA394	808	704	868	297	272	585
HA494	938	704	868	297	602	715
HA694	1277	704	922	300	869	982
HA494TC	938	704	868	297	602	715
HA694TC	1145	760	878	300	869	982

All dimensions are in mm * These dimensions may vary from alternations depending on applications.

and efficiently by accessing round-the-clock latest service information and parts' availability over the internet, 24 hours a day, 365 days a year, including a leap year. In the year 2005, KOEL is expanding the IT applications in the area of Customer Relationships Management [CRM]. The CRM Module will enable KOEL to actively address the needs of its existing as well as prospective customer base.

Air-cooled diesels, engineered to economise.

Maximum economy and reliability combined with air cooling are the features of these diesel engines. The power units are produced to meet the high precision and quality standards symbolised by the name Kirloskar. A strictly modular design ensures component standardisation which solves many spare parts supply problems. Air-cooling makes for simpler maintenance. Being air-cooled, HA series engines work efficiently under different climatic conditions and reduce about 40% failures which could be experienced on liquid-cooled engines.

Salient features

- Various applications in industrial, power generation, tractor, mining, earth moving, construction, material and fluid handling, offshore, marine and automotive market segments.
- Piston continuously cooled by built-in oil jet spray for minimum liner piston wear.
- Auto-belt tensioning system, resulting in increased belt life.
- In-line gear driven MICO fuel pump with EP-RSV governor for ease of fuel setting and field servicing
- Lower fuel consumption as compared to other engines in

this class (up to 20%)

- Full flow block type lube oil cooler for maintaining optimum lube oil temperature
- Ability to take drive from both engine ends to meet specific application requirement.
- No external lube oil piping for engine lubrication.
- Provision for engine-mounted, belt or gear-driven compensatory, gear driven hydraulic pump to meet specific application requirements for compact installation.
- All maintenance points like fuel pump, fuel lift pump, lube oil filling, dipstick, fuel and lube oil filters on one side for easy maintenance.
- Turbocharged versions available for 4 and 6 cylinder engines.

User advantages

Benefits of the same engine family covering the output range 19 to 128 BHP and variety of equipment :

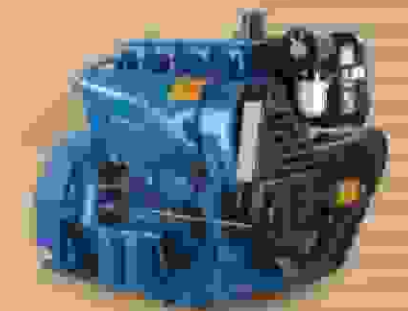
- Lowest possible parts stocking to meet any field service need. 85% components are common throughout the HA engine family.
- As the HA engine family also has a very wide operating speed range up to 2800 rpm, and is used on a variety of equipment, the need for training of maintenance personnel is minimized.
- Better logistics support is possible due to lower weight and volume of equipment and individual engine parts, lower frequency of workshop attendance, extended MTOBs, faster maintenance, extended diesel and lube oil top-up intervals.
- Agency Certification by institutions like R&D Dighi, Pune, ARAI Pune, DGS&D, for use in Defence, Mining and Govt. Sectors.



HA 294



HA 394



HA 494 / HA494TC



HA 694



Standard equipment

- Oil bath air cleaner with pre-cleaner and dust collector.
- Exhaust silencer.
- 12V electric starting with starter, without wiring, batteries and leads.
- 12V, 35 amps Alternator with built-in cut out.
- Engine control panel consisting of start push button, lube oil pressure gauge, ammeters and cutout.
- Pre and micro fuel filters.
- Lube oil cooler.
- Fuel lift pump.
- Lube oil filter.
- Engine stop lever. (hand operated)
- Belt guard (for Genset application engines only)
- Engine supports suitable for rigid mounting.
- Torsional vibration damper on crank pulley (for Ha694/HA694TC engine only) as applicable.
- Automatic belt tension unit.
- Mechanical engine shut down system in case of 'V' belt failure.

Optional equipment

- Absorption type exhaust silencer suitable for remote mounting.
- Spark arrestor type exhaust silencer.
- Expansion bellow.
- Exhaust manifold-cum-silencer for HA294/HA394/HA494/HA694

engine only (replaces separate manifold and exhaust silencer)

- Dry type air cleaner with evacuator valve and restriction indicator (pre-cleaner available on demand)
- Lock nut type speed adjusting unit on fuel pump.
- Engine supports suitable for anti-vibration mountings.
- Anti-vibration mountings.
- Hand starting arrangement at gear end on HA294,HA394 AND HA494 only. (This requires extra heavy flywheel



which can be accommodated only in SAE-1, Flywheel Housing)

- Holset type flexible coupling with following unfinished bore flanges

Engine Model	Unfinished bore/ Coupling type
HA294/HA394	25mm(0.12RB)
HA494/HA494TC	25mm(0.12RB)
HA694	25mm(0.12RB)
HA694TC	25mm(0.2RB)

- Provision for gear driven hydraulic pump.
- Belt / gear driven compressor.
- Right angle or straight tachometer drive unit.
- Automatic engine shut-down arrangement in case of low lube oil pressure, high cylinder head temperature, V belt-failure and

engine over speed.

- (details on request)
- Industrial power take-offs (Twin disc type)*
- Hot air outlet ducting and fresh air intake ducting. (details on request)
- Raised oil filling and raised dipstick arrangement.
- Special lube oil sumps to suit high inclinations. (details on request)
- Flywheel housing (SAE4,3,2 and 1)
- 24V electrical starting system.
- Cold starting aid for engine starting below minus 5 C down to minus 20 C (detail on request)
- Mud filter and water separator Instruments.
 - Low lube oil pressure switch (normally open type)
 - V belt failure switch.
 - High cylinder head temperature switch.
 - Engine over speed switch (12V/24V)
 - 12V/24V stop solenoid(in lieu of mechanical shut down)
 - Tacho-hour meter with 1m/2m/3m long cable.
 - Electrical hour meter and tachometer.
 - Lube oil temperature gauge.



Horse power ratings: as per IS:10002/BS:5514/DIN 6271/ISO 3046

ISO STD: Power (Continuous Rating)

Engine	rpm	kW	bhp	ISO Net Brake Fuel Stop Power (Max Ration)					
				Torque		Heavy Duty		Light Duty	
				KNm	Kgm	HP	Torque	HP	Torque
HA294	1500	14.0	19.0	0.089	9.1	20.0	9.55	21.0	10.00
	1800	16.9	23.0	0.090	9.2	24.5	9.75	25.5	10.15
	2000	18.4	25.0	0.087	9.0	26.5	9.50	28.0	10.00
	2150	19.5	26.5	0.086	8.9	28.0	9.35	29.5	9.85
	2300	20.2	27.5	0.084	8.6	29.0	9.00	30.5	9.50
	2500	*	*	*	*	30.5	8.70	32.0	9.20
HA394	1500	23.6	32.0	0.150	15.3	34.0	16.25	36.0	17.20
	1800	28.0	38.0	0.148	15.1	40.0	15.90	42.0	16.70
	2000	30.2	41.0	0.144	14.7	44.0	15.75	46.0	16.50
	2150	32.4	44.0	0.143	14.6	47.0	15.65	49.0	16.30
	2300	34.6	47.0	0.143	14.6	49.0	15.25	51.0	15.90
	2500	*	*	*	*	52.0	14.90	54.0	15.50
HA494	1500	31.6	43.0	0.201	20.5	46.0	22.00	48.0	22.90
	1800	38.2	52.0	0.203	20.7	54.0	21.50	58.0	23.00
	2000	41.2	56.0	0.196	20.0	60.0	21.50	63.0	22.50
	2150	44.2	60.0	0.196	20.0	63.0	21.00	67.0	22.30
	2300	46.4	63.0	0.192	19.6	66.0	20.56	70.0	21.80
	2500	*	*	*	*	70.0	21.10	74.0	21.20
HA494TC	1500	41.0	56.0	0.262	26.7	*	*	*	*
	1800	48.0	65.0	0.253	25.8	*	*	*	*
	2000	51.5	70.0	0.245	25.0	*	*	*	*
HA694	1500	47.8	65.0	0.304	31.0	69.0	32.90	73.0	34.80
	1800	57.4	78.0	0.304	31.0	82.0	32.60	87.0	34.60
	2000	62.6	85.0	0.298	30.4	90.0	32.20	95.0	34.00
	2150	66.2	90.0	0.294	30.0	95.0	31.60	100.0	33.30
	2300	69.9	95.0	0.290	29.6	100.0	31.15	106.0	33.00
	2500	*	*	*	*	106.0	30.40	112.0	32.10
HA694TC	1500	61.0	83.0	0.387	39.5	88.0	41.90	93.0	44.30
	1800	72.0	98.0	0.380	38.8	103.0	40.80	109.0	43.20
	2000	76.0	103.0	0.365	37.2	108.0	39.00	114.0	41.60
	2150	78.0	106.0	0.352	35.9	112.0	37.70	119.0	40.00
	2300	81.0	110.0	0.340	34.7	116.0	36.30	123.0	38.60
	2500	84.5	115.0	0.324	33.0	121.0	34.70	128.0	36.70

* Note: Selection depends on application, rpm and torque to be transmitted, Consult KOEL for proper selection