Series H Right Angle Gearboxes  OPERATING INSTRUCTION MANUAL



 The People Republic of China

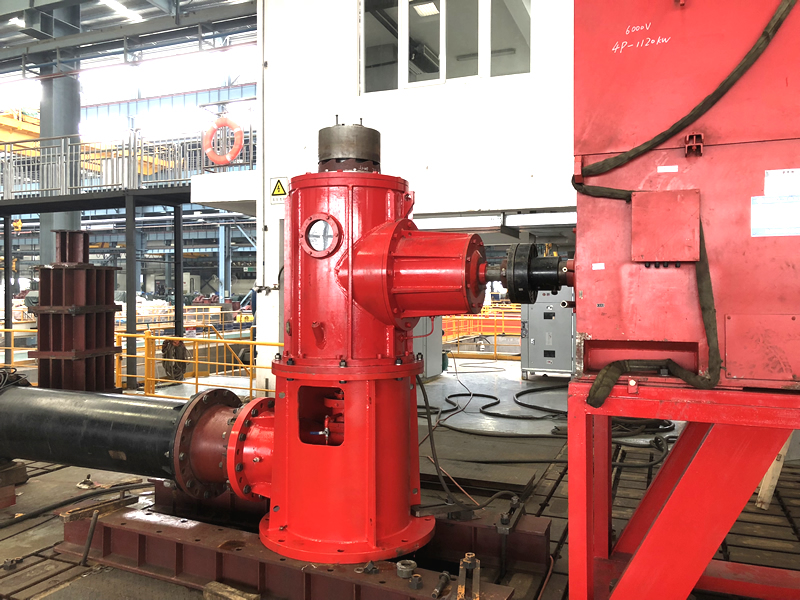
HUNAN PERFECT INDUSTRY CO.,LTD

Series H Right Angle Gearboxes

Operating Instruction Manual

The horizontal shaft of series H right angle gearbox is direxct connected with  a diesel, a horizontal type motor, a turbine, etc. Prime mover and after  acceleration(or deceleration) the power is exported by the Vertical shaft. The series  H right angle gearboxes are used for deep well pumps, axial pumps, inclined flow  pumps, major axis pumps, sub-fluid pumps and other a variety of vertical shaft  working machines to be driven and speed to be changed. They are used in a variety  of fields such as: hydraulic engineering, municipal water supply and sewage  disposal, smelter, mining area, petroleum and chemistry industry, fire protection  and oceaneering, etc.. A variety of type and transmission ratios are available to  meet specific requirements of high and low speed prime movers and working  machines. Large capacity thrust bearings make the structure of working machine to  be simplified. The series gearboxes have featuies of wide application range,  economy, highly efficient, space-saving, and the ability to function well under  varying climatic conditios.

In order to use well the series H gearboxes before operting please you have to  read conscientiously the following all clauses, thanks!



1．Performance Parameters

1.1 The gears of the series H right angle gearbox are conical gear with curved

teeth of Gleason tooth. the gears have large load carrying capacity and working  smoothly, and is not sensitive to installation tolerance and deformation, but its  axial thrust is larger and its rotation direction relate to direction of torque.

1.2 The gears are made with a steel 20CrMnTi. As the surface of cog-tooth is  carburizing and quenching, the surface of tooth has higher hardness, whereas the  core has better toughness.

2．Main structure

2.1 As the vertical shaft of gearbox is hollow, the strength and rigidity of the

shaft are raised, and the drive shaft of the working machine can be infixed in the  hollow shaft to be mounted. The type 7000/DT duplex angular contact ball  bearings are installed on the upper end of the vertical shaft, and they can bear  larger downthrust only. The deep groove ball bearing is installed on the down end  of the shaft，and it is a free end to bear a radial force only. The non-reverse  coupling is also installed on the upper end of the shaft.

2.2 The spherical roller bearing is installed on the left end of the horizontal  shaft, and it can bear a larger radial force and has certain self-aligning function.  The left end bearing is a free end not to bear any axial force. The deep groove ball  bearing is installed on the right end of the shaft, and it can bear an axial force  which results from the gearing towards left or right besides a radial force.

2.3 The upper bearings of the vertical shaft are installed in an upper cover.

The horizontal shaft and bearings are installed in a bearing block. Moving the  upper cover and the bearing block you straight can adjust backlash and contact  pattern of gear pair. There are paper pads between the upper cover or bearing block  and a box body, and they act as sealing and adjusting.

2.4 The gear pair, bearings of horizontal shaft and upper bearings of vertical  shaft adopt spraying oil for lubrication. The pressure oil are given by a pump puller  of vertical shaft down end, and are carried to all oil site throught multipath pipeline.  Besides the gears are lubricated by spraying oil of one pipeline, outflow lubricating  oil from a distribution oil slot of the upper cover lubricate the upper bearings at  one time lubricate the gears.

2.5 The gearboxes of type H60 and up externally mounted a cooler. After  pressure oil cooled in the oil cooler, still flow into all spraying oil pipeline. Clean  pressure water is connected to the oil cooler, and after flows through heat exchange  pipes cooled for gear oil and the heat water issues from a return line.



3．Installation of Gearbox

3.1 Work before installation

3.1.1 After opened box gearbox is cleaned and checked whether it is complete  and damaged.

3.1.2 Stripping glass cover observe internal cleanness condition of the  gearbox, and should wipe or rinse with diesel oil when it is necessary.

3.1.3 Inspect and screw down all tie bolts and lifting screws.      
3.2 Connection of Gearbox and Working machine

3.2.1 Hoist on the gearbox to foundation in the meantime the drive shaft of  working machine is past through the hollow shaft of gearbox, and tie bolts of  gearbox and the foundation are set and screw up the nuts.

3.2.2 Set the gib head taper stock key. Screw up the nut of drive shaft end and  the lock bolt.

3.2.3 It is inspected that the gearbox drives the working machine rotating  whether to be normal, and screw down the tie nuts of gearbox and the foundation  next.

3.3 Connection of  Gearbox and Prime Mover

3.3.1 It is inspected whether the center-height of the prime mover are the

same with the horizontal shaft center-height of the gearbox. It is inspected whether  the aperture and keyseat of the input coupling are in agreement with the correlative  size of the gearbox horizontal.

3.3.2 The horizontal shaft of gearbox is direct connected to the output shaft of  the prime mover by means of the input coupling and a straight key. The axiality of  two shafts is inspected and adjusted, and the specific value is decided on to base  magnitude of the ability which the coupling compensate for defection of two  shafts.

3.3.3 Screw down the tie bolts of the prime mover and the base frame and one  of the input coupling. Inspect the set turning whether to be normal.

3.4 Installation of Accessories

3.4.1 Dust cover of the gearbox is installed.

3.4.2 For type H60 and up gearbox must joins a feed pipe and a return pipe to

the oil cooler, and the joint adapter is a taper-pipe-thread Rc1/2. The feedwater  pressure is from 0.15 to 0.3 MPa, and the temperature is about 20℃.

3.4.3 A safety cover of the input coupling is installed(consumer autonomous).     
3.5 Adding Clean Gear Oil of Qualification

   This gearbox uses type L－CKC 68 of medium load industry gear

oil(GB5903-1995)，and its kinematic viscosity is from 60 to 75mm2/s(centistokes)

at the temperature to be 40℃. If the ambient temperature is generally greater than  30℃ you must choose a gear oil whose kinematic viscosity is greater. When the  temperature rises per 10℃ the viscosity rises correspondingly for 10%. If it is less  than 10℃ you may choose one whose viscosity is less. When it sinks per 3℃ the  viscosity may correspondingly sink for 10%. Every tim oiling, the oil level must be  flush with the thread bottom of the filler.

4．Use of Gearbox

     4.1 The rotation direction of the prime mover must correspong with the  stipulation, otherwise the gears will be not turned and the machine can be caused  owing to the stopping effect of the non-reverse coupling. If the prime mover is a  electromotor after shutdown the rotation direction must be inspected whether to be  changed before starting next time.

     4.2 The output power of the prime mover shall be less than or equal to the  corresponding power value. Diverse type of the gearbox allow speed of vertical  shaft to be diverse.

     4.3 In running the downward tenside force that the working machine acts on  the vertical shaft of gearbox isn’t below the minimum axial thrust in the list 1,  otherwise an axial force of the gearbox and appending an axial force by the upper  bearing will make the inner race of bearing separating upward by the vertical shaft  carrying, so that affects normal motion of the bearings and the gear pair even  causes the gears, bearings and shafts, etc. parts to be destruction. The downward  tenside force neither can be greater than the maximum axial thrust in the list 1,   otherwise the working life of the upper bearings will be reduced.

     4.4 For the first time have given gearbox to have added oil or having  replaced oil, after working one number of runs should take apart the plug screw of  the filler, and inspect the oil level of the gearbox before starting at second number  of runs. When the oil level is below the thread bottom of the filler, should  supplement oiling. In the context of the gearbox does not leak afterwards the oil  level have been inspected once per week. To discover leaking you must find the  cause and remove the fault promply.

4.5 During gearbox running you must survey on time the case that the  lubricating oil are sprayed. If insrfficient quantity of spraying oil, ought to be a  shutdown inspection when make that spraying oil are restored to normal only can  go on use. During running yet note vibration, sound and temperature of the  gearbox whether to be normal.

5．Maintenance of Gearbox

5.1 It is the first time that New gearbox has bee used, after running for 300

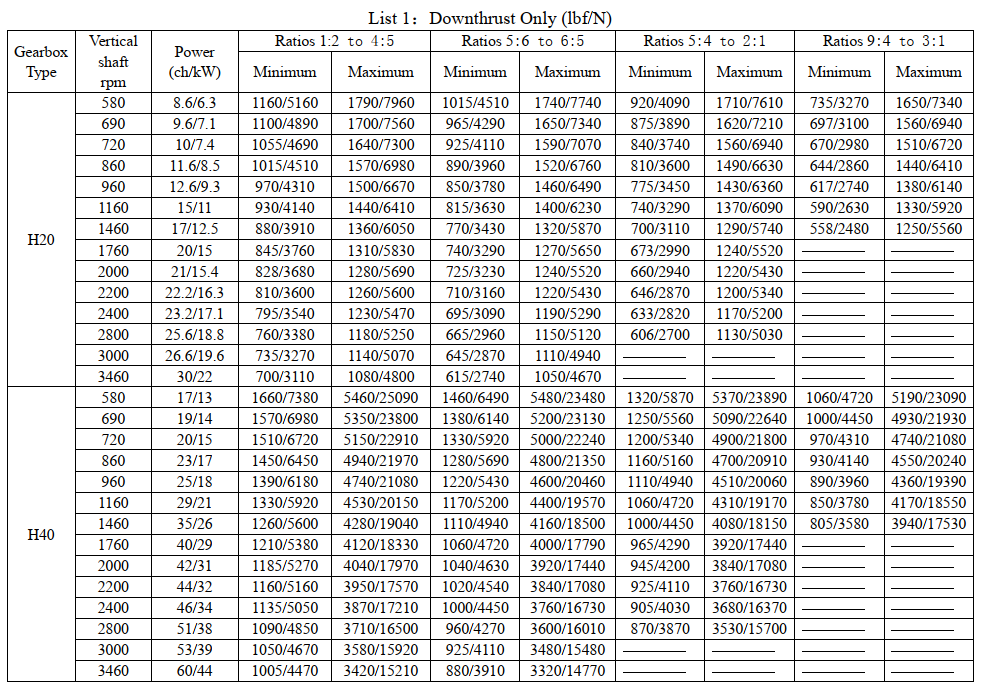
hours you must renew the gear oil. After shutdown the oil which is hot is  discharged at once. After during running each 2,000 hrs. of running or amounted to  6 months of natural time taking first achievement of them the gear oil should be  renewed usually.

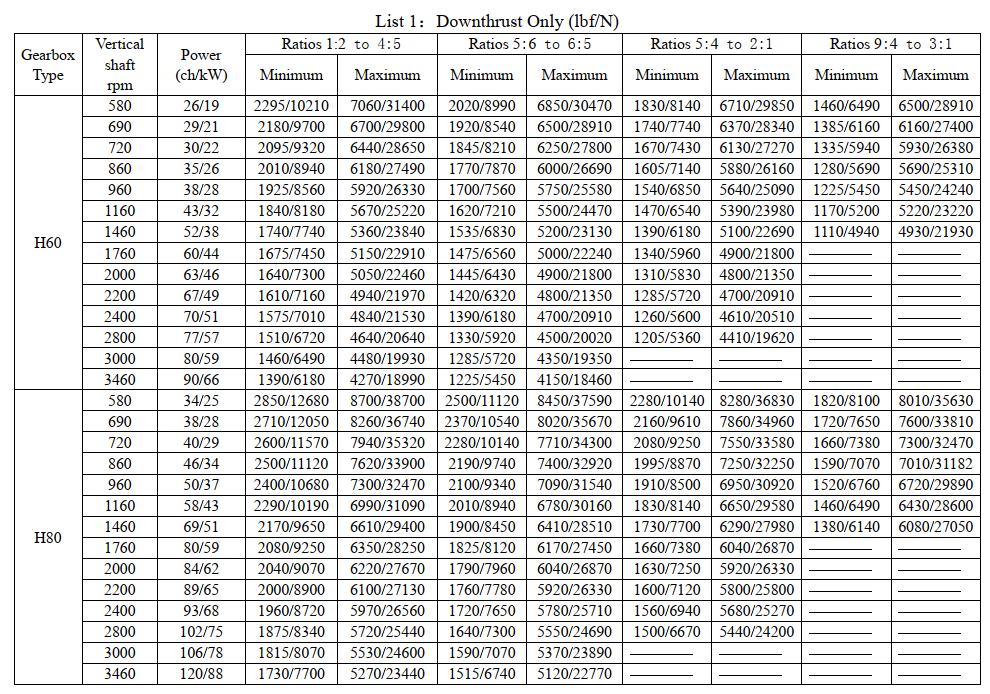
5.2 All bolts are inspected and screwed down regularly.

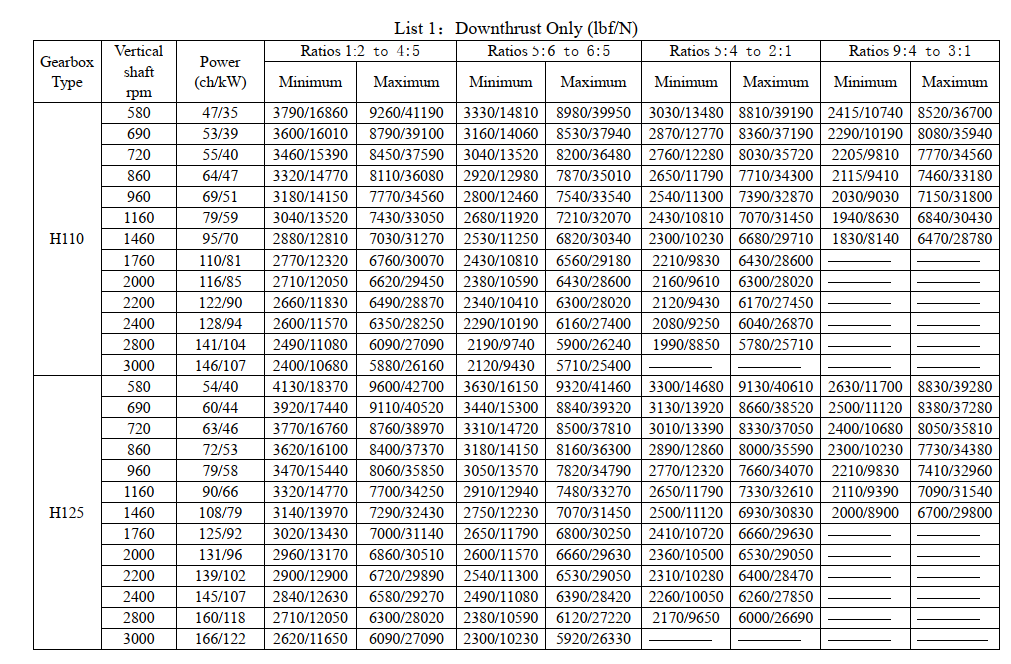
5.3 Usually when gearbox has run to 6,000 hrs. after the gear oil is

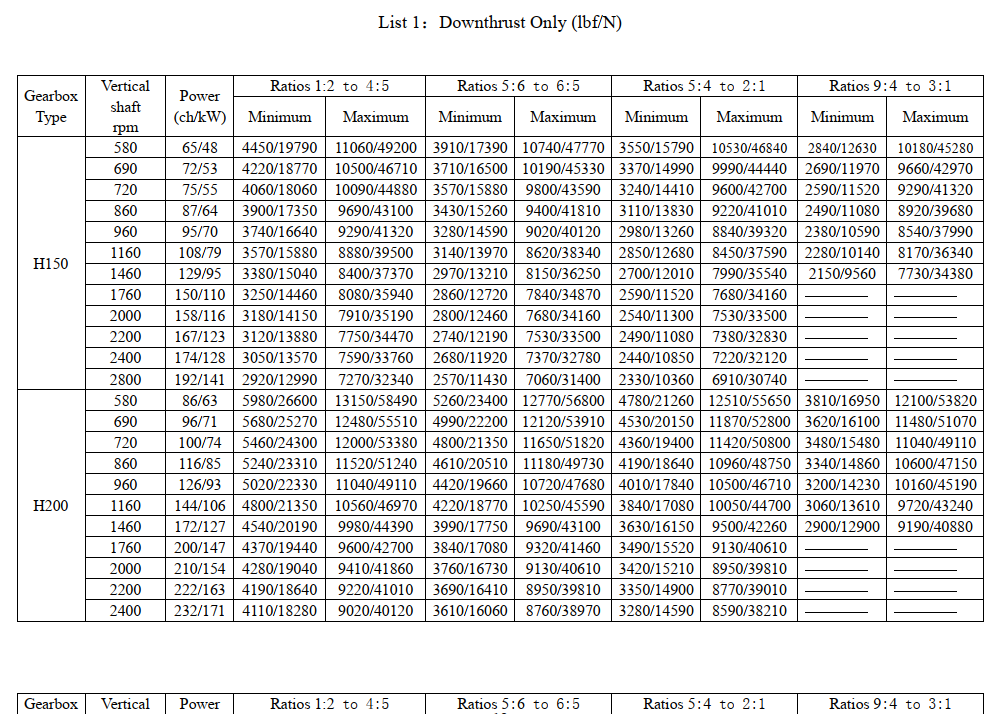
discharged, diesel oil is added to the oil level of the stipulation, and the prime  mover is used driving gearbox free running for one minute. After the diesel oil  hasing been discharged backlash and contact pattern of the gear pair are inspected,  and are adjusted if necessary. The adjusting method see clause 2.3 and the specific  data see “Technical Requirments” in assembly drawing of gearbox supplied with  machine. Afler to have finiched adjusting new gear oil are added.

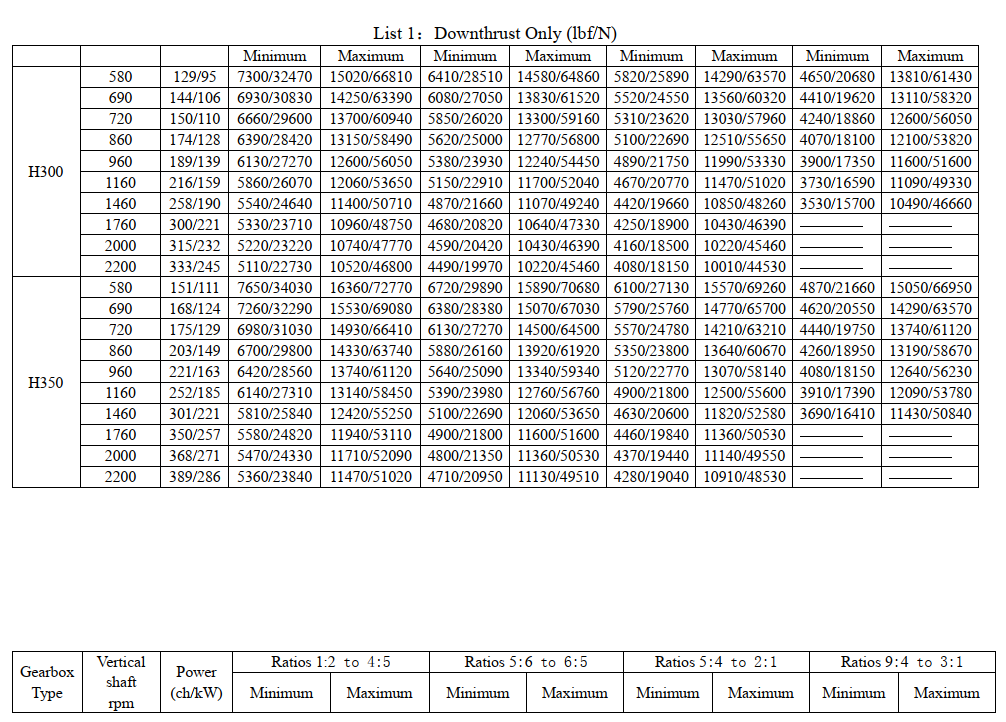
5.4 After the gearbox working 20,000 hrs. the clearance and wear conditions  should be inspected for two end bearings of the horizontal shaft and upper bearings  of the vertical shaft, and at exceeding limit should be renewed. Attention: new  bearing ought to be heated in lubricant first, before is set to shaft. The down  bearing of the vertical shaft isn’t liable to dismount owing to its down end there is  a pump pulley whose shrink range is much, so the working life of the bearing has  been designed to be very long. Under conditions that the gearbox uses and  lubricates normally its working life is generally from 70,000 to 100,000 hourst.

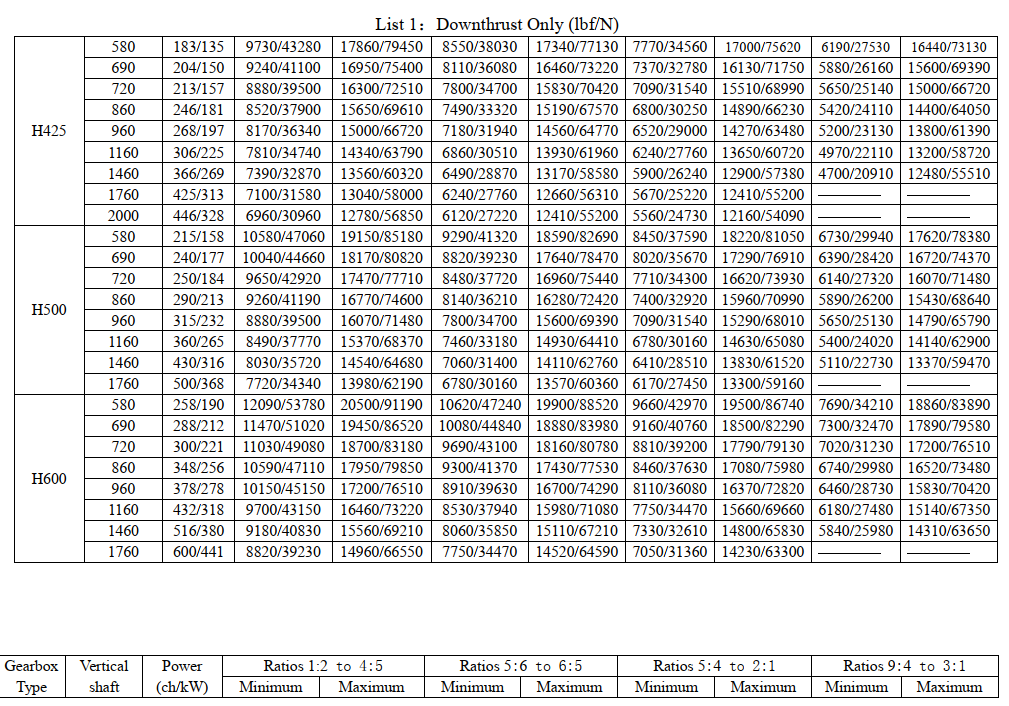


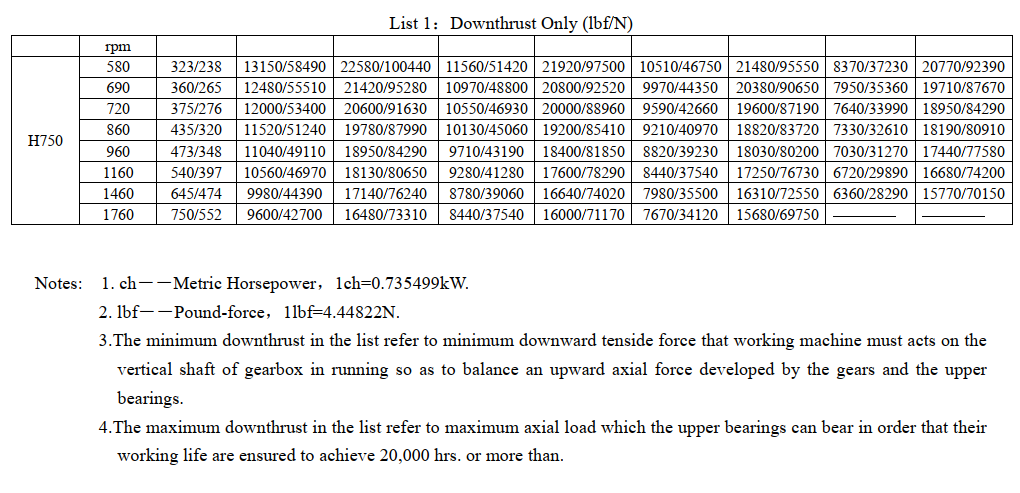




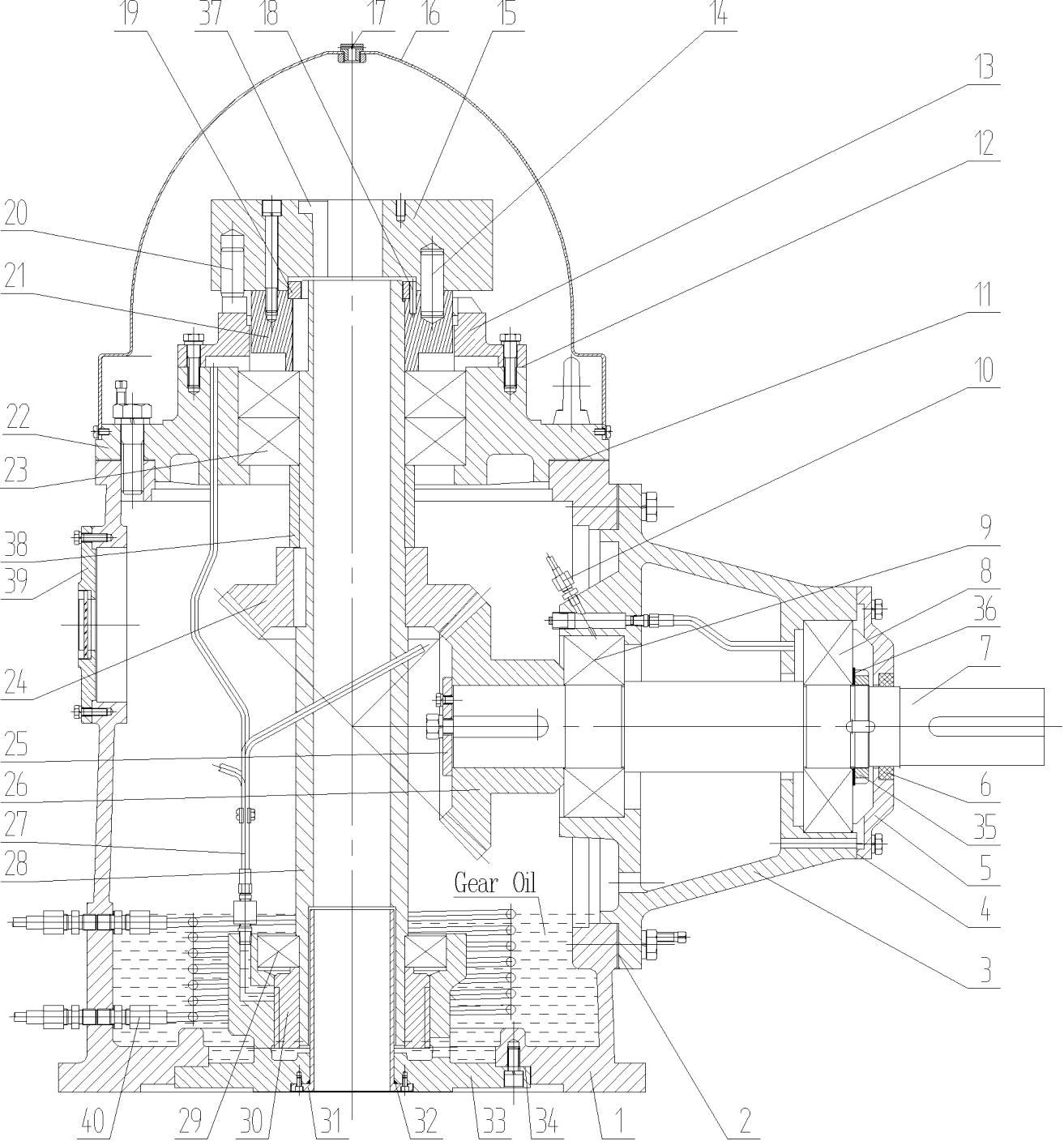








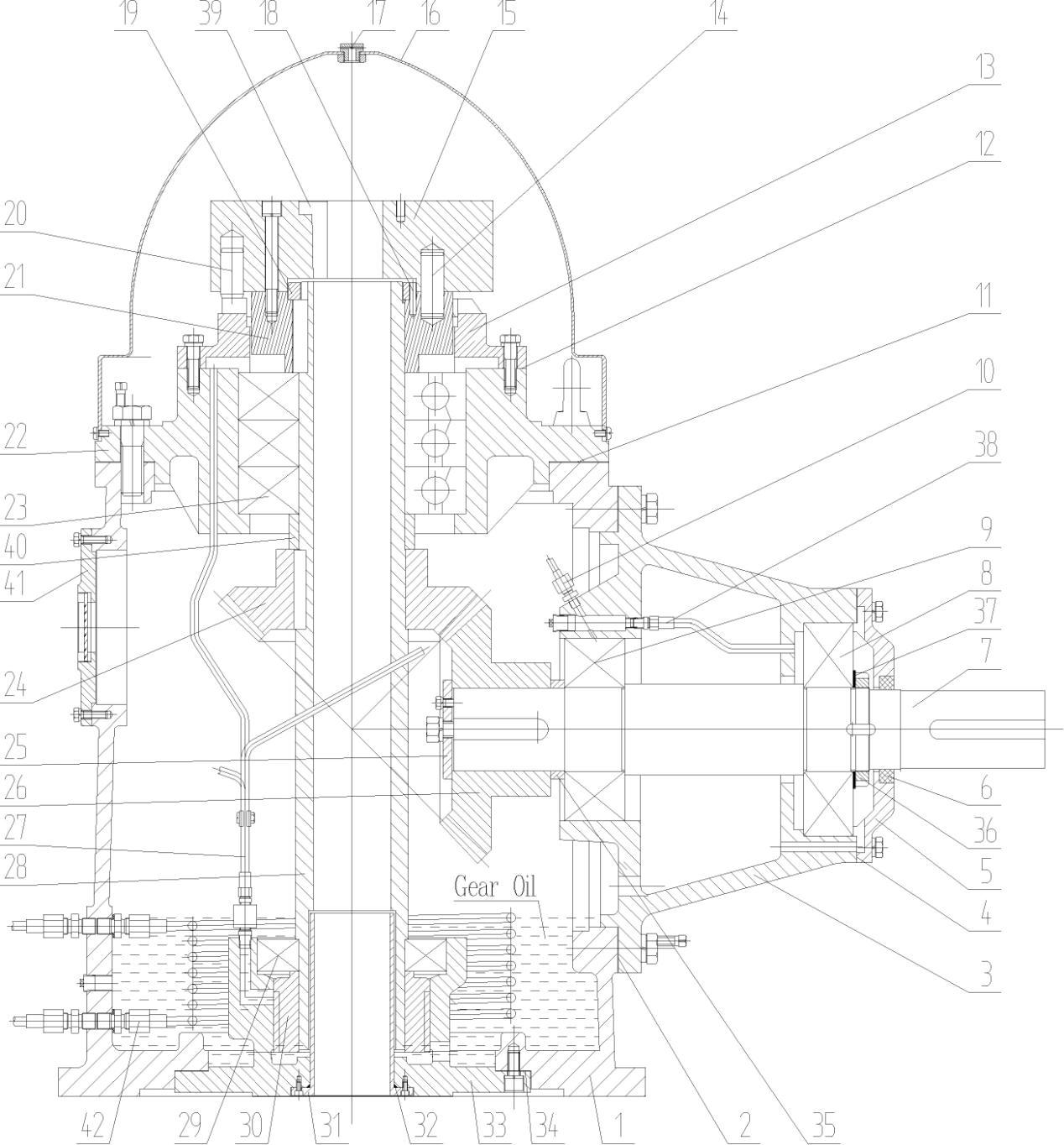
LIST 2  PARTS OF THE GEAR BOX



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. | NAME  Box Body | No.  13 | NAME  Ratchet Wheel | No.  25 | NAME  Armor Plate | No.  37 | NAME |
| 1 | Taper Key |
| 2 | Pads | 14 | Dowels | 26 | Drive Bevel Gear | 38 | Shaft Sleeve |
| 3 | Bearing Block | 15 | Non-reverse Coupling | 27 | Oil Pipe Pack No.2 | 39 | Glass Cover Pack |
| 4 | Paper Pad | 16 | Dust Cover | 28 | Vertical Shaft | 40 | Oil Cooler |
| 5 | End Cover | 17 | Abat-vent | 29 | Lower Bearing |  |  |
| 6 | Lip Type Seal | 18 | Dowels | 30 | Pump Pulley |  |  |
| 7 | Horizontal Shaft | 19 | Circinal Nut | 31 | Lining |  |  |
| 8 | Dexter Bearing | 20 | Dowels | 32 | Oil Ring Packing |  |  |
| 9 | Left Bearing | 21 | Flywheel | 33 | Base |  |  |
| 10 | Oil Pipe Pack No.1 | 22 | Upper Cover | 34 | Paper Pad |  |  |
| 11 | Pads | 23 | Upper Bearing | 35 | Circinal Nut |  |  |
| 12 | Paper Pad | 24 | Driven Bevel Gear | 36 | Gasket |  |  |

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 LIST 3  PARTS TWO OF THE GEAR BOX



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. | NAME   Box Body | No.   13 | NAME   Ratchet Wheel | No.   25 | NAME   Armor Plate | No.   37 | NAME |
| 1 | Gasket |
| 2 | Pads | 14 | Dowels | 26 | Drive Bevel Gear | 38 | Oil Pipe Pack No.3 |
| 3 | Bearing Block | 15 | Non-reverse Coupling | 27 | Oil Pipe Pack No.2 | 39 | Taper Key |
| 4 | Paper Pad | 16 | Dust Cover | 28 | Vertical Shaft | 40 | Shaft Sleeve |
| 5 | End Cover | 17 | Abat-vent | 29 | Lower Bearing | 41 | Glass Cover Pack |
| 6 | Lip Type Seal | 18 | Dowels | 30 | Pump Pulley | 42 | Oil Cooler |
| 7 | Horizontal Shaft | 19 | Circinal Nut | 31 | Lining |  |  |
| 8 | Dexter Bearing | 20 | Dowels | 32 | Oil Ring Packing |  |  |
| 9 | Left Bearing | 21 | Flywheel | 33 | Base |  |  |
| 10 | Oil Pipe Pack No.1 | 22 | Upper Cover | 34 | Paper Pad |  |  |
| 11 | Pads | 23 | Upper Bearing | 35 | Shaft Sleeve |  |  |
| 12 | Paper Pad | 24 | Driven Bevel Gear | 36 | Circinal Nut |  |  |

Field application



