



# Useful Information



2204.00

## QUESTION

**When is a cooling system required and which cooling equipment can be used?**

## ANSWER

Horizontal series helical gear H series and bevel-helical gear B series gearboxes are high quality heavy duty gearboxes produced with advanced technology. Since this product group is designed by keeping the principle of giving the highest power in the smallest possible volume in the foreground, when their volume decreases, their thermal loads increase inversely. Therefore, thermal powers gain great importance. The thermal powers of the gearboxes are given with different cooler options in the performance tables in our catalogues for ambient temperatures of 20 °C, 30 °C and 40 °C.

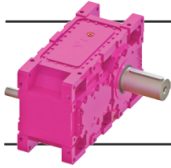
Values in the tables; indicates the maximum motor power that can be connected at given ambient temperature and at the motor input speed used, at sea level, at 1.25 m/s air velocity and at given ambient conditions, calculated as the temperature of the oil in the gearbox is not to exceed 70 °C. Therefore, the maximum effective motor power that can be used have to be below these power values. Otherwise, a solution can be obtained by using additional cooling equipment..

For example;  
HT1122 sized, i (ratio):6,33 gearbox with 250 kW 1450 rpm motor has been chosen, At 20 °C ambient temperature, we can check whether cooling equipment is required for this product as follows:

First, the thermal capacity of the gearbox without any cooling equipment is divided by the motor power to be used. Thus, the thermal service factor of the gearbox is determined. The condition sought here is that the thermal service factor is greater than one. ( $f_{s,thermal} > 1,0$ ). If this situation is provided, the selected product can be recommended without cooling.

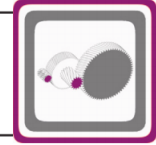
$$f_{s,thermal} = \frac{139 \text{ kW}}{250 \text{ kW}} = 0,56 < 1,0$$

As can be seen above, since the thermal service factor is below the desired value, the product should be recommended with additional cooling equipment that can meet the desired condition.



## H Serisi Güç Devir Sayfaları H Series Performance Tables H Serie Leistung und Drehzahlübersicht

**n<sub>1</sub>=1400**

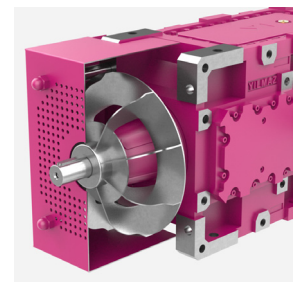


| Anma Momenti<br>Nominal Torques | Çevrim Oranı<br>Ratio | Çıkış Devri<br>Output Speeds | Giriş Devri<br>Input Speeds | Nominal Güç<br>Nominal Power | Tipi<br>Type | Çevre Sıcaklığı 20°C için<br>For Ambient Temperature 20°C<br>Für Umgebungstemperatur 20°C |                 |                 |                 |                 |                 | Güv. Rad. Yük Çıkış<br>Per.O. Loads (Output) | Güv. Rad. Yük Giriş<br>Per.O. Loads (Input) |
|---------------------------------|-----------------------|------------------------------|-----------------------------|------------------------------|--------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|--|---|
|                                 |                       |                              |                             |                              |              | Termik Güç Pt [kW]<br>Thermal Power Pt [kW]<br>Wärmegrenzleistung Pt [kW]                 |                 |                 |                 |                 |                 |  |   |
| Ma [Nm]                         | i                     | n <sub>2</sub> [r.p.m]       | n <sub>1</sub> [r.p.m]      | Pn [kW]                      | Typ          | Pt <sub>1</sub>   | Pt <sub>2</sub> | Pt <sub>3</sub> | Pt <sub>4</sub> | Pt <sub>5</sub> | Pt <sub>6</sub> |  |   |
| 38650                           | 6,33                  | 221                          | 1400                        | 913                          | HT1122       | 139   | 514             | 713             | 1030            | 1112            | E6 1002 R3      | 63   | 3,7   |
| 40600                           | 7,31                  | 191                          |                             | 829                          |              | 163   | 560             | 750             | 1085            | 877             | E5 1074 R3      | 66   | 4,6   |
| 42700                           | 8,50                  | 165                          |                             | 750                          |              | 174   | 570             | 741             | 1072            | 883             | E5 1077 R3      | 69   | 4,9   |

In Yılmaz Redüktör H/B series industrial gearboxes the following cooling equipment can be supplied:

### Cooling with Fan (Pt<sub>2</sub>)

It consists of a fan mounted on the gearbox input shaft with cover and It is a cooling equipment that blows the ambient air on the gearbox body with the movement it receives from the input shaft. Since it rotates with the gearbox input shaft, the input shaft speed should not be low. Ideal rotation speed is 1400 rpm. If the gearbox is moved by making a reduction with any transmission device (such as belt/pulley) on the input side, it is not recommended in such operating conditions as the rotation speed of the fan will decrease. Not recommended for use in very dusty working environments. In addition, it should be noted that sufficient free space is left for fresh air inlet at the suction point of the fan and whether the fan cover prevents the installation depending on the mounting location.





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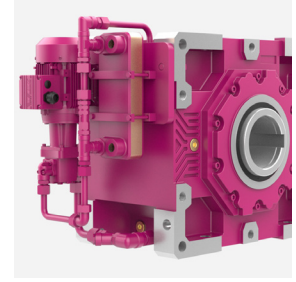
### Cooling with Coil (Pt<sub>3</sub>)

The serpentine is produced from copper material with a high heat transfer coefficient. It is mounted on the base part of the gearbox so that it comes into contact with the oil. Inlet and outlet connections are left to the user for water connection. In plants with cooling water, the oil in the gearbox is cooled by passing the cooling water through the serpentine. When using cooling coil, care should be taken that the water is not limy. Minimum water inlet temperature and flow rates are given in our catalogues.



### Cooling with Oil/Water Heat Exchanger (Pt<sub>4</sub>)

Heat exchangers are cooling equipment used with oil pump, pump motor, oil filter and distributor elements mounted on the gearbox. It is preferred instead of cooling coil for ease of maintenance. The gearbox oil is passed through the heat exchanger by means of a pump. At the same time, the cooling water passing through the heat exchanger cools the oil and the cold oil returns to the gearbox. As in cooling coil, cooling water is needed in plant.



### Cooling with Oil/Air Heat Exchanger (Pt<sub>5</sub>)

In radiator cooling, the fan on the radiator blows the ambient air to the radiator and cools the gearbox oil passing through it. No cooling water is needed. It is not recommended to be used in dusty environments as the dusty environment will reduce the cooling capacity of the radiator. Radiator air intake area should be left empty for fresh air intake.

