



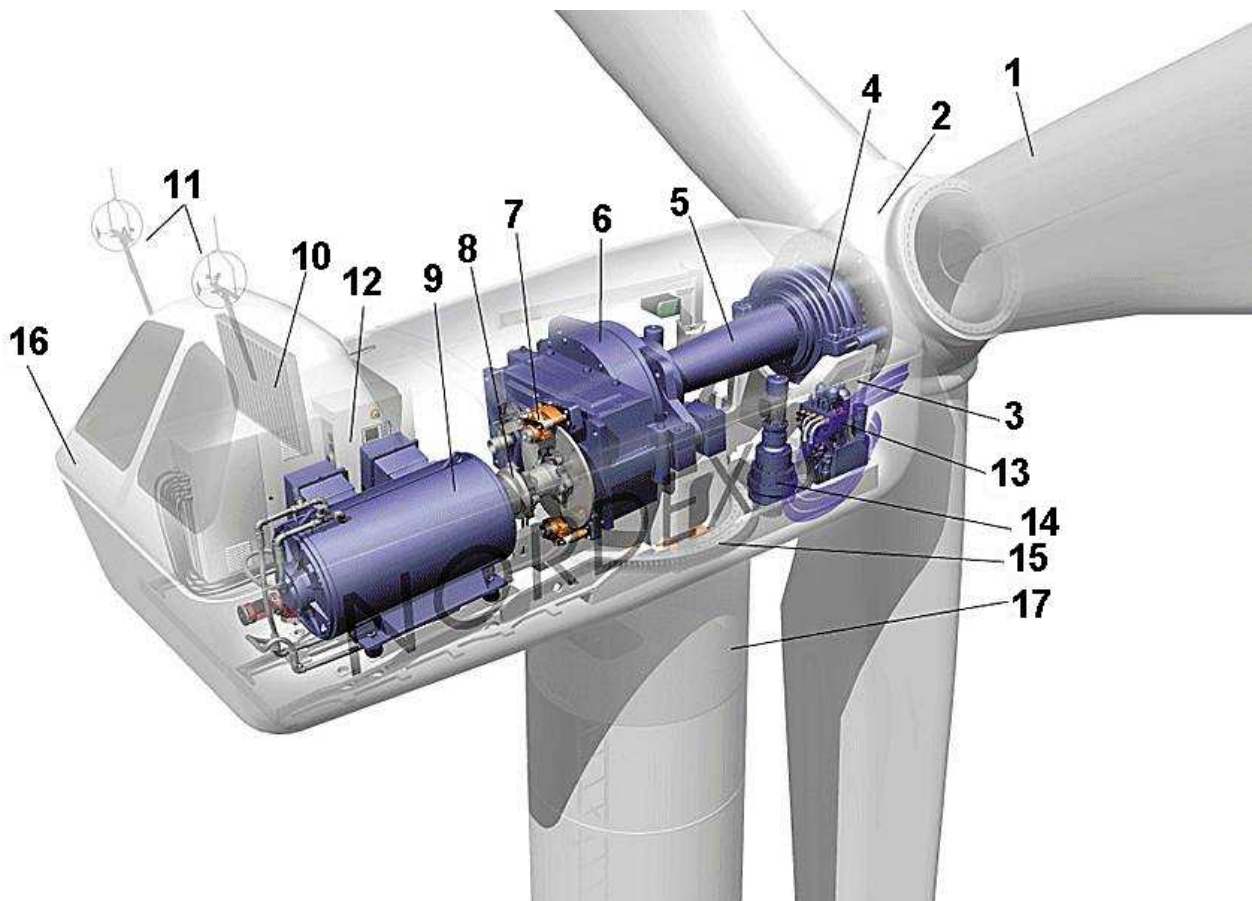
Brugarolas, S. A.

SPECIAL LUBRICANTS **FOR WIND TURBINES**



Scheme and description of the wind turbines parts

- | | | | |
|----|---|-----|-----------------------|
| 1. | Rotor blades | 9. | Generator |
| 2. | Hub, with connection to blade (bearing and yaw) | 10. | Radiator |
| 3. | Turbine frame | 11. | Wind measuring system |
| 4. | Main bearing | 12. | Control system |
| 5. | Rotor shaft | 13. | Hydraulic system |
| 6. | Gear box unit | 14. | Yaw drive |
| 7. | Hydraulic disc brake | 15. | Yaw bearing |
| 8. | Generator coupling (can be with CV joints too) | 16. | Nacelle cover |



BRUGAROLAS PRODUCTS

for wind turbines

OILS:

Nber.	Application	Product range	Product
6	Gear box unit	Mineral gear oils oil provided with special properties to avoid scuffing, micropitting etc. FLENDER manufacturer approved.	Beslux Gear XP
		100% PAO synthetic oil for gears. High viscosity index, excellent antiwear properties evidenced at FZG test, Micropitting, Fe8, etc. FLENDER manufacturer approved.	Beslux Gearsint XP
		Polyglycol base synthetic gear oils. Superior viscosity index, excellent antiwear properties evidenced at FZG test, Micropitting, Fe8, etc. FLENDER manufacturer approved.	Beslux Sincart W
13	Hydraulic unit	Hydraulic oil per DIN 51524, HLP class. Available in different viscosities	Fluid Drive
7	Hydraulic disc brake	High viscosity index hydraulic oil per DIN 51524, HVLP class. Available in different viscosities	Beslux Hidro
2	Pitch regulation	High viscosity index hydraulic oil per DIN 51524, HVLP class. Available in different viscosities	Beslux Hidro
		Special hydraulic oils provided with very high Viscosity Index to reduce temperature effects. Beslux ELA 164 meets ISO VG 32 at 40 °C	Arpolube 5606, Beslux ELA 164
14	Yaw gear motor	Polyglycol base synthetic gear oils. Superior viscosity index, excellent antiwear propertie evidenced at FZG test, Micropitting, Fe8, etc. FLENDER manufacturer approved.	Beslux Sincart W

GREASES:

Nber.	Application	Product range	Product	
2	Pitch bearing	Synthetic base grease with EP and antiwear additives. High resistance to mechanical work and aging, good behaviour at low temperatures and low "false brinelling" properties	G. Beslux Liplex M-1/2 S	
		Lithium soap thickened grease with white solid lubricants.	G. Beslux White Bearing Grease	
4	Main bearing	Synthetic base grease with EP and antiwear additives. High resistance to mechanical work and aging, good behaviour at low temperatures and low "false brinelling" properties. Base oil viscosity 460 cSt	G. Beslux Liplex H-1/2 S	
9	Generator bearings	Synthetic base grease with EP and antiwear additives. High resistance to mechanical work and aging, good behaviour at low temperatures and low "false brinelling" properties	G. Beslux Liplex H-1/2 S, G. Beslux Liplex M-1/2 S	
15	Yaw and pitch gear	Light colour grease, very adherent, provided with load resistance additives. Free of solid lubricants.	G. Beslux Komplex H-300	
		Sprays	Grease for high loads. Contains solid lubricants.	Beslux Engranajes Spray
		Light colour grease, very adherent, provided with load resistance additives. Free of solid lubricants	Beslux Grasa Spray AD	
15	Yaw bearing	Synthetic base grease with EP and antiwear additives. High resistance to mechanical work and aging, good behaviour at low temperatures and low "false brinelling" properties	G. Beslux Liplex M-1/2 S	
		Lithium soap thickened grease with white solid lubricants	G. Beslux White Bearing Grease	



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SPECIAL GREASES FOR DIFFERENT APPLICATIONS:

Application	Product range	Product
Constant Velocity Joints	Special grease for the coupling between the gear box unit and the generator	G. Beslux Plex M-2/BM
Elevator guides	Light colour grease, very adherent, provides with load resistance additives. Free of solid lubricants.	G. Beslux Komplex H-300
Corrosion protection slide bearings	Grease provided with high anticorrosive capacity for the mounting.	G. Aguila 5A3