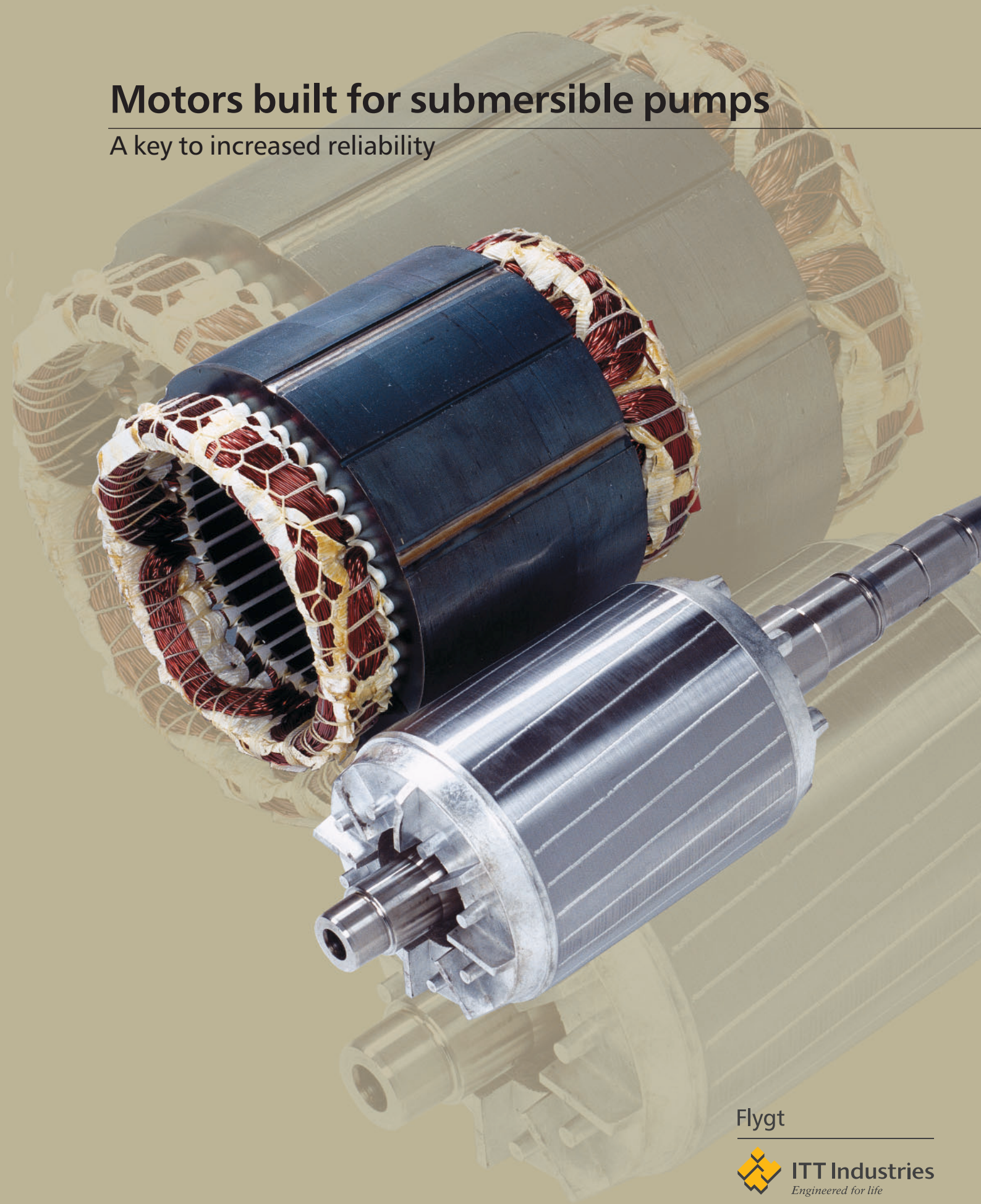
Motors built for submersible pumps

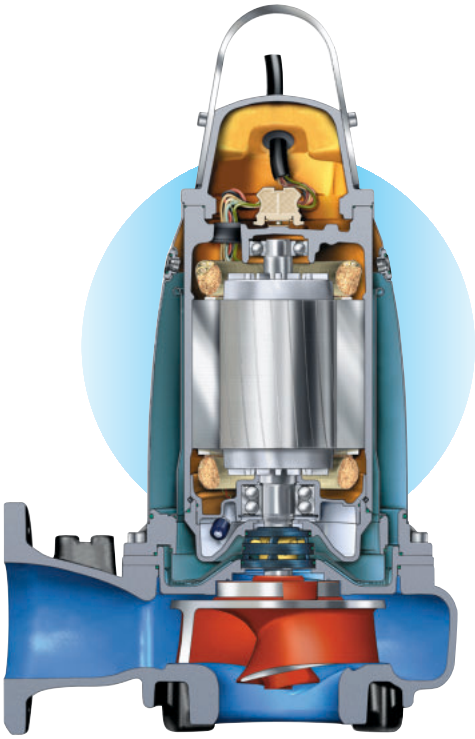
A key to increased reliability



Flygt

ITT Industries
Engineered for life

Flygt submersibles keep their cool



Why do motors fail? Usually, it's due to overheating somewhere in the motor.

To reduce the risk of heat build-up, we've incorporated a number of interesting features. Improvements that you won't find in standard, off-the-shelf motors. Innovations that together add up to a motor that will perform reliably for years and years.

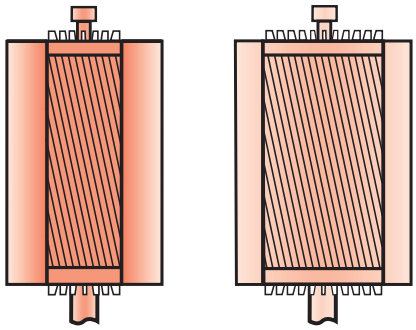
Moving the heat out

When manufacturers use standard, off-the-shelf motors in submersible pumps, heat that builds up in the middle of the unit isn't transferred outwards in an efficient way (see illustration).

The problem is how to bring this heat – which is a natural loss in any electrical device – closer to the surrounding, cooling water.

Our engineers, faced with a fixed motor volume, came up with an ingenious solution: they made the rotor bigger, and the stator smaller. In this way they shifted the losses from the rotor, out to the stator.

Their reasoning went like this: because the stator is in direct metal-to-metal contact with the stator housing, the heat would migrate quickly from the stator to the cooler housing. And because the housing is surrounded by water, the heat is efficiently dissipated.



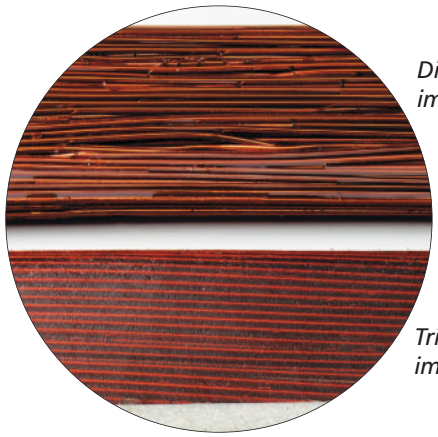
Standard motor design *Flygt's new design*

Compact, reliable insulation

The standard way to insulate windings in the stator is to dip them in a bath of varnish. This technique, however, can leave pockets of air trapped in the windings. And air doesn't transfer heat very well.

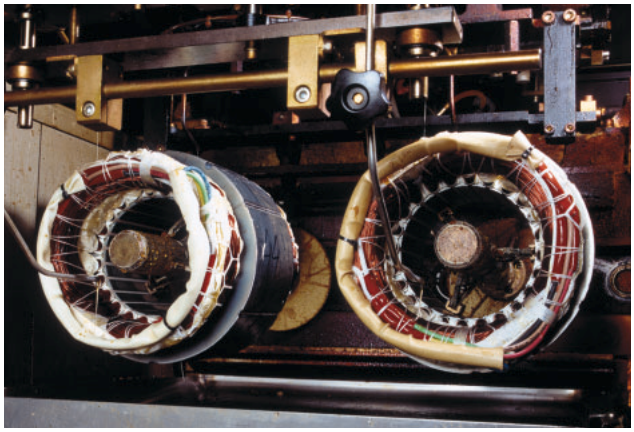
At ITT Flygt, we use a technique known as trickle impregnation. As the name suggests, we allow the resin to trickle down through the wire windings. The capillary force between the densely packed wires draws the resin from strand to strand, filling the gaps and eliminating the pockets of air.

The result, as you can see in the picture to the right, is a compact mass, with all the spaces between the wires filled by the resin. Also, the resin contains no solvent and so has negligible environmental impact.



Dip impregnated

Trickle impregnated



Trickle impregnation produces a solid and reliable insulation

The right motor for the job

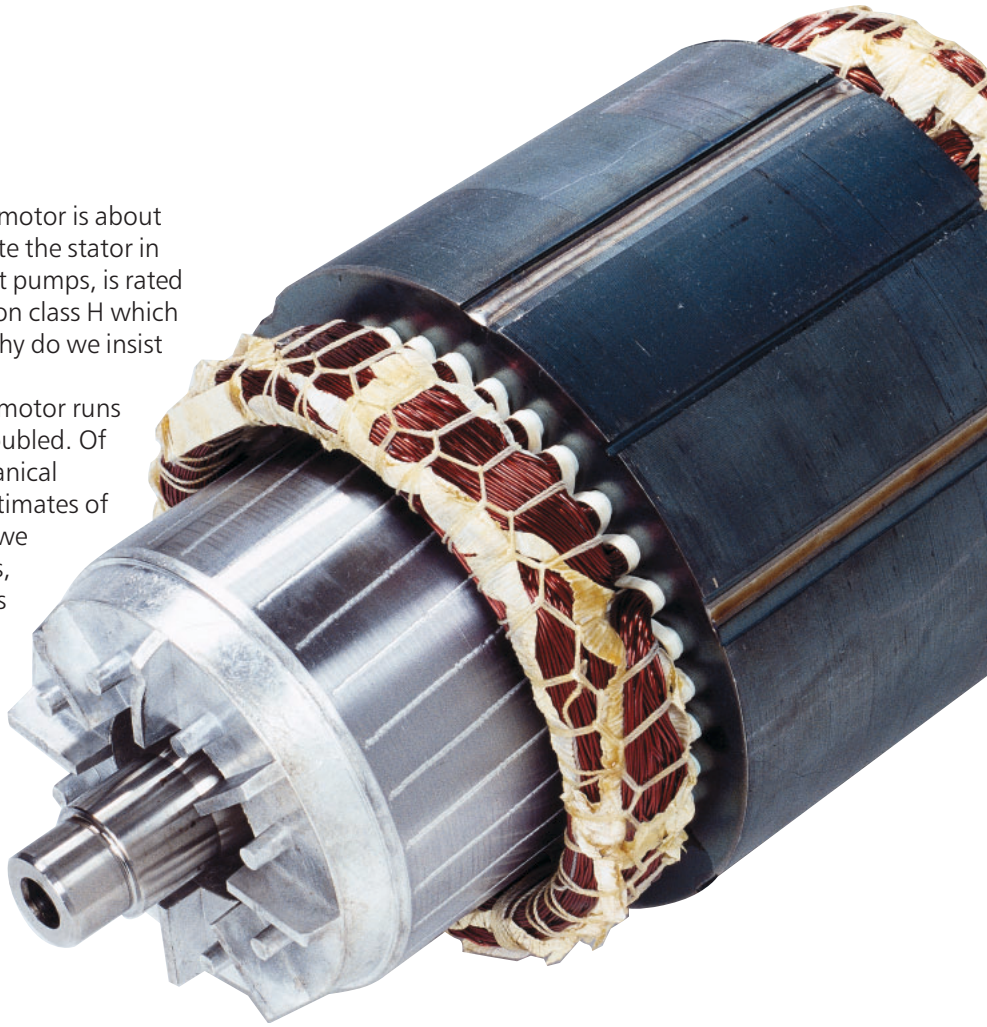
At ITT Flygt, we offer a complete range of motors. In this way, you always get a motor that's correctly dimensioned for your specific applications.

Type of motor:	squirrel cage
Motor range:	0.4-600kW
No. of poles:	2-16
Voltage range:	110V–4160V

Extending motor lifetime

The average operating temperature in a motor is about 120°C. However, the resin used to insulate the stator in all Flygt products, apart from our smallest pumps, is rated to run at 180°C. This is known as insulation class H which is the highest class for normal use. So, why do we insist on a margin of 60°C?

The reason is simple: for every 10°C a motor runs under its insulation class, motor life is doubled. Of course, over a long period of time mechanical stresses and strains can also influence estimates of how long a motor will last. But because we have selected the highest insulation class, the theoretical lifetime of a Flygt motor is well above 20 years.



Efficient heat transfer

A layer of air between the stator and stator housing acts like insulation, trapping the heat. At ITT Flygt, we fix the stator into place with a technique that ensures a good tight fit and thereby eliminates this layer of air.

Because it's such a snug fit, you get good metal-to-metal contact between the stator and the housing. And this means that heat is transferred efficiently to the outer shell, which is surrounded by water.

Bettering the best

If you're still not convinced, look at it this way. Manufacturers of off-the-shelf motors don't have submersible pumps in mind when they design their motors and work out how to cool them.

We, on the other hand, design and manufacture motors for one specific application. Consequently, we make sure that the cooling method, insulation material and dozens of other design details are all selected for one single purpose: to run in a submersible pump for years without electrical or mechanical problems.

But the best can be bettered. We see improvement as a continuous process: our engineers are equipped with the latest design tools to produce the best submersible motors, for the best submersible pumps.

For example, we've just upgraded motors in the 0.4-75kW range. Here we've managed to boost output by up to 20 per cent, while actually lowering the temperature in the rotor. And this, of course, extends lifetime still further.

Advanced manufacturing processes ensure high quality and short lead times

ITT Flygt is the world's leading manufacturer and supplier of submersible pumps and mixers. Our products are used in wastewater, sewage treatment, agriculture, aqua-culture, irrigation and water attractions, among other areas. ITT Flygt has 40 sales companies and we are represented in over 130 countries around the world.

FLYGT

www.flygt.com

894325 Motors built for submersible pumps 02.02.Eng.1M.11.03 © ITT FYGT AB KT 231209