

# IE3?

## Premium Efficiency

Energy efficiency is the key for today's pumping business. Therefore all manufacturers make promises about efficiency levels, especially for electric motors. The question is, if they are applicable for submerged wastewater pumps.



# Energy efficiency is key – but even a pump with a perfect motor will waste energy.

Pumps are responsible for 10% of the world's electricity consumption and the majority of the installations waste a lot of energy in their operation. As a consequence, minimizing the environmental impact and the energy costs has become a priority for pump manufacturers, customers and governments. As a result, Hidrostal and many other pump companies get more and more request for submersible pump motors meeting IE3 standards.



High efficiency submersible motor from Hidrostal

## Different ways to improve energy efficiency

Unfortunately the whole discussion about energy efficiency in pumps has focused only on the motor efficiency lately. Hidrostal, the inventor of the non-clogging screw centrifugal impeller, has always strived for the highest overall system efficiency. Within the pump industry it is known that the best results in efficiency is to optimize the following components.

- System losses: friction losses, appropriate system design
- System selection at the BEP (best efficiency point) of the pump: knowing where your pump runs
- Hydraulic efficiency
- Variable speed drives: being able to run near BEP with different operating points
- Motor efficiency
- Reliability: non-clogging, high operational availability

If one of these factors is out of the optimal range, even a perfect motor (100% efficiency) will waste a lot of energy. This is also recognized by the European Union, which is currently creating the Extended Product Approach definition which will reflect more of these aspects.

# So why this discussion about IE efficiency classes?

## Harmonized standards

In many areas there have been large energy improvements within the last decade: cars, light bulbs, etc. This also includes efforts to harmonize standards around the world. One of the success stories is related to electric motors. As a common driver for all type of machines, electric induction motors with their simple design principle was a good starting point for higher energy requirements. The IEC (International Electrotechnical Commission) has defined in the IEC 60034 standard (50 & 60Hz) the now well-known energy classes

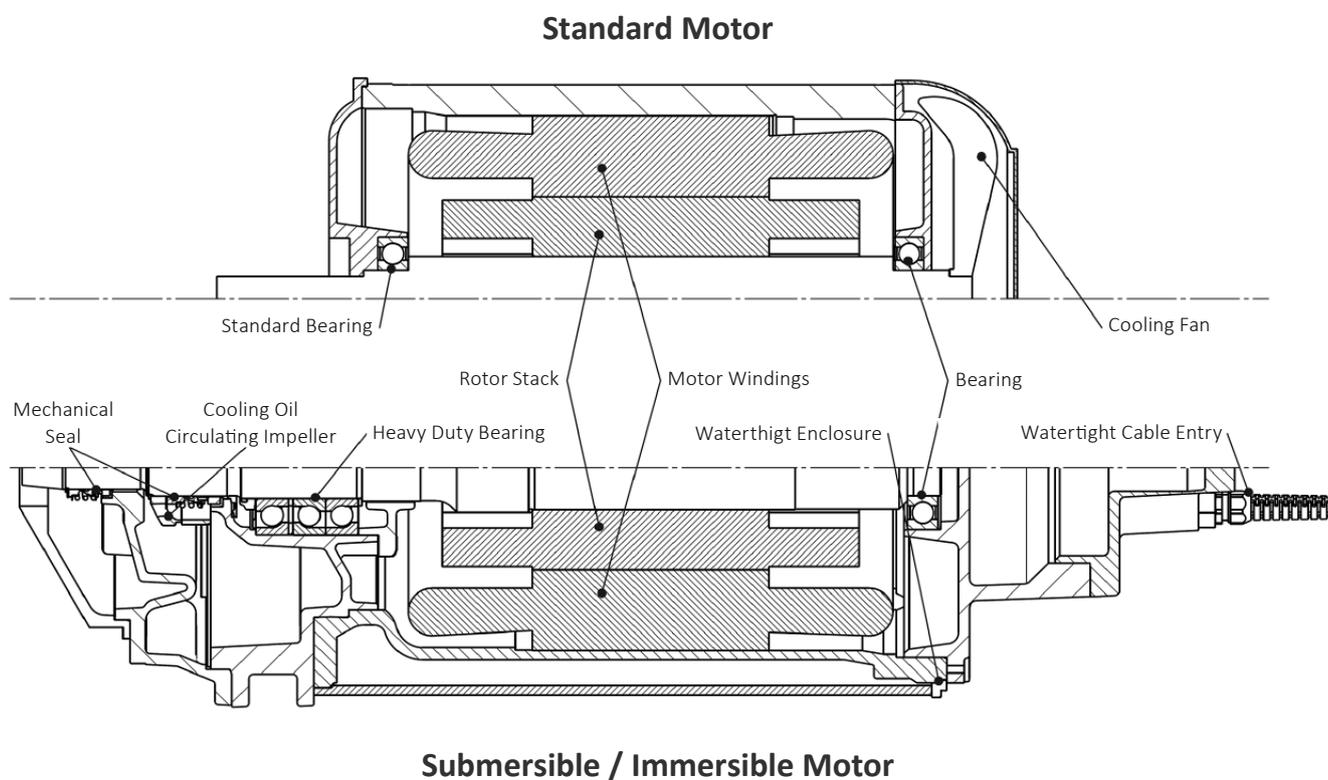
- IE1 – Standard Efficiency
- IE2 – High Efficiency
- IE3 – Premium Efficiency
- IE4 – Super Premium Efficiency

## EcoDesign Directive

The European Commission EcoDesign Directive is the result of the Europump Working Group and it defines since 2011 efficiency levels for single stage centrifugal pumps driven by standard electric motors. In this standard, submerged pumps and/or with integrated motors are explicitly excluded.

# Why are IEC levels not applicable for submersible pumps?

Why does this directive not apply for submerged pumps with integrated motors? This relates to the different type of design of the motors. A submersed motor cannot be tested independently of the pump so therefore it always includes its own friction losses. Testing the motor decoupled from the hydraulic part would create issues with cooling and venting. Additionally due to its requirement to operate submerged, the pump and motor contain a double mechanical seals (with their losses) as well as a heavier bearing arrangement because the motor bearing also has to withstand all the forces imposed by the pump – and this creates additional losses. No standard in the world currently reflects this or provides a test method to certify these additional losses.



## Misleading the customers

Unfortunately a lot of pump manufacturers today claim that their submersible motors are IE3 certified. They are misleading consultants and customers! Most of them then state in small print, that this standard does not apply at all. Unfortunately this now leads more and more customers to specify submerged motors that meet IE3 efficiency levels.

**If a tender document specifies that wastewater pumps must comply with IE3, then it is impossible for any manufacturer to supply such a pump. There is no applicable standard available regarding the efficiency for submerged integral motors on wastewater pumps.**

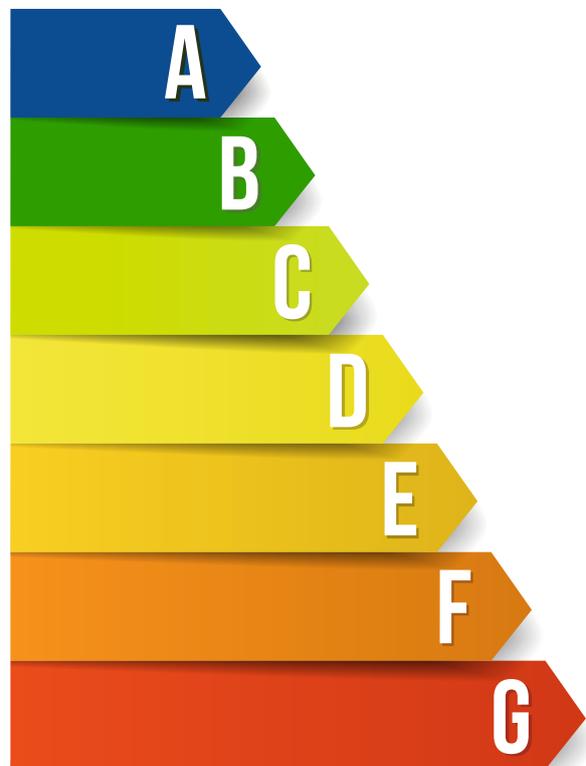


### A energy efficiency standard for submersible pumps

This lack of standardization and the abuse of the existing standards make it obvious that a common standard for submersible pump efficiency is required. The European Union and Europump (with participation from Hidrostal) are currently discussing proposals for an appropriate pump/motor efficiency standard. As the manufacturers are aware that the motor efficiency is only one piece of the overall energy efficiency puzzle, they are focusing on the Extended Product Approach with the new energy efficiency index (EEI).

### Alternative approach

Reliable pump manufacturer (such as Hidrostal) tell their customers, that it is not possible to build an IE3 submersible pump. Nevertheless we accept that there is a high interest in maximizing the efficiency level. Hidrostal supports our customers by selecting the most efficient pump for their specific problem, which results in more sustainability than any other solution. Of course, we also care about the electric motor efficiency. Traditionally Hidrostal pumps have been the overall most efficient packages for the customer. In order to compare the motor efficiency, it is possible to calculate the additional losses generated with the different (submersible, integrated) design and call it "IE3 equivalent". However it is explicitly still not allowed to label such a pump or motor IE compliant!



# References

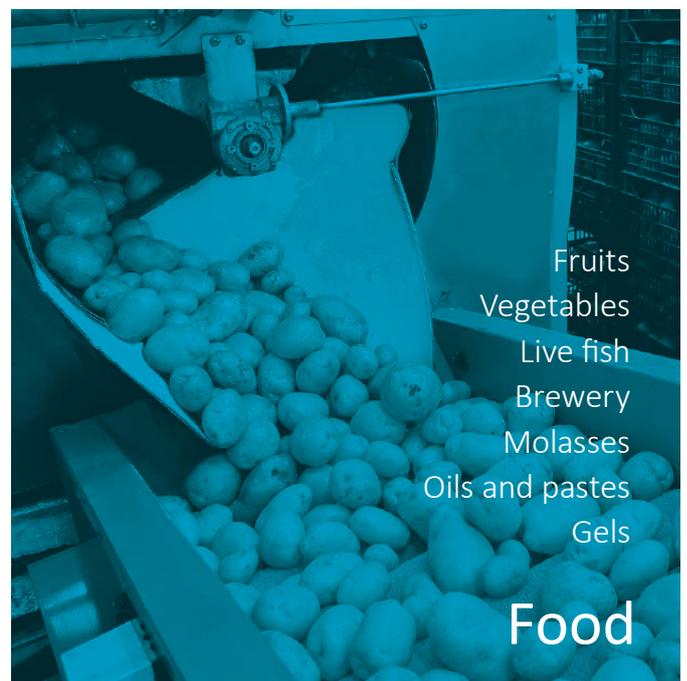
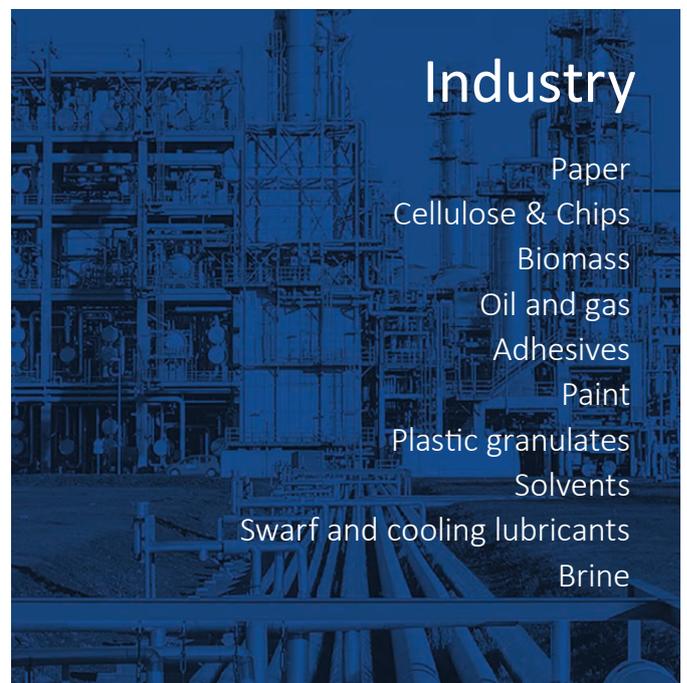
- International Electrotechnical Commission (<http://www.iec.ch/>)
- TC2 Rotating Machinery Work Programme (14) publications (<http://www.iec.ch>)
- National Electrical Manufacturers Association (NEMA) (<http://www.nema.org>)
- Europump (<http://www.europump.net/>)
- Ecodesign Preparatory Studies on pumps (<http://www.ecopumpreview.eu/>)



# Hidrostal Pump Applications

Due to their outstanding characteristics, Hidrostal pumps are used in numerous municipal and industrial sectors. They pump the most diverse fluids and materials gently and with low pulsation. Our specialists select the suitable material combinations and individually adapt every pump to the local conditions. We ensure with this process that Hidrostal pumps are successful in difficult applications and achieve the best results with respect to performance, energy efficiency and low life-cycle costs.

- clog-free pumping
- high suction capacity
- gentle delivery due to low shear forces
- high efficiency
- stable, steep pump curve
- long service life
- low pulsation
- continuous flow proportional to the speed
- high pressure stability across a wide speed range



# Hidrostal worldwide

Pumps from Hidrostal are used all around the world. Our pumps are custom -made and are specially tailored to the needs of each location. With this procedure we achieve a high level of operational effectiveness and excellent energy efficiency. It is always worth investing in a Hidrostal pump

in the long run because our pumps are low-maintenance, they almost never clog, and their long service life is unique. Depending on the location, our clients are assisted by one of our subsidiary companies or sales partners. You will find your contact at [www.hidrostal.com](http://www.hidrostal.com)



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Pioneers in Pump Technology