FAQ : **" Are your *(Air Filled, Surface Water Cooled; Integrated Mono Shaft)* Motors "High Efficiency" *(i.e. IE2)* or "Premium Efficiency" *(i.e. IE3)* Compliant…? "**

Answer :

As per GoI mandate in Oct 2017, sale of **IE1** ***(Standard Efficiency)*** **BARE SHAFT** motors *(for driving Bare Shaft equipments like Conventional Pumps (whose motors are not integrated into the device)* is discouraged .

a) Hence one would ***(falsely)*** **presume** that new purchases of any Motors not compliant to **IE2** ***(High Efficiency)*** are also discouraged…**!**

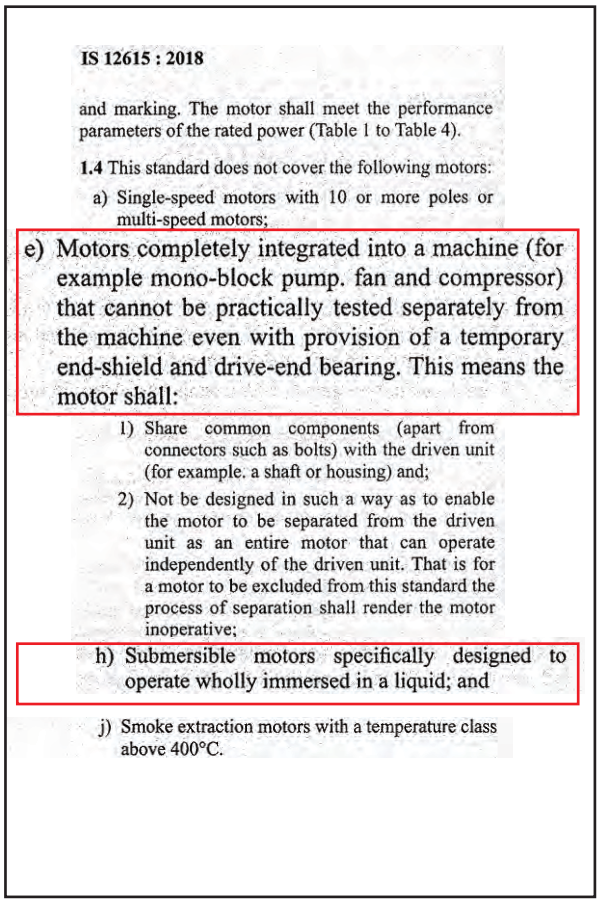
b) However, a **detailed perusal** of the **Current Standards** reveals important **exclusions** :

For e.g. **"Clause no 1.4 of IS 12615"**, and **"Clause no 1 of IEC 60034-30-1 and IEC 60034-30-2"** clearly mentions that

I) ***"..motors completely integrated with the driven machine (for e.g. pumps, fans...."*** **are excluded ..!**

ii) ***"Submersible motor specially designed to operate wholly immersed in a liquid...."*** **are also excluded ..!**

Standards cutout are shown below for more understanding



IS 12615 : 2018

and marking. The motor shall meet the performance parameters of the rated power (Table 1 to Table 4).

1.4 This standard does not cover the following motors:

a) Single-speed motors with 10 or more poles or multi-speed motors;

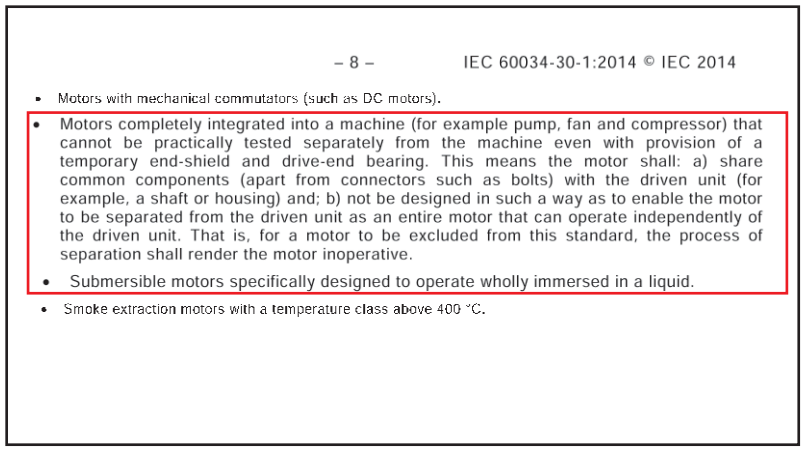
e) Motors completely integrated into a machine (for example mono-block pump. fan and compressor) that cannot be practically tested separately from the machine even with provision of a temporary end-shield and drive-end bearing. This means the motor shall:

1) Share common components (apart from connectors such as bolts) with the driven unit (for example. a shaft or housing) and;

2) Not be designed in such a way as to enable the motor to be separated from the driven unit as an entire motor that can operate independently of the driven unit. That is for a motor to be excluded from this standard the process of separation shall render the motor inoperative;

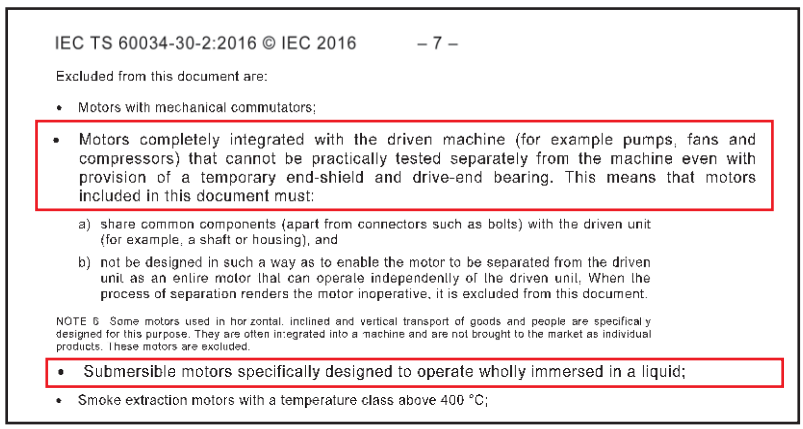
h) Submersible motors specifically designed to operate wholly immersed in a liquid; and

j) Smoke extraction motors with a temperature class above 400°C.



– 8 – IEC 60034-30-1:2014 © IEC 2014

- Motors with mechanical commutators (such as DC motors).
- Motors completely integrated into a machine (for example pump, fan and compressor) that cannot be practically tested separately from the machine even with provision of a temporary end-shield and drive-end bearing. This means the motor shall: a) share common components (apart from connectors such as bolts) with the driven unit (for example, a shaft or housing) and; b) not be designed in such a way as to enable the motor to be separated from the driven unit as an entire motor that can operate independently of the driven unit. That is, for a motor to be excluded from this standard, the process of separation shall render the motor inoperative.
- Submersible motors specifically designed to operate wholly immersed in a liquid.
- Smoke extraction motors with a temperature class above 400 °C.



IEC TS 60034-30-2:2016 © IEC 2016 – 7 –

Excluded from this document are:

- Motors with mechanical commutators;
- Motors completely integrated with the driven machine (for example pumps, fans and compressors) that cannot be practically tested separately from the machine even with provision of a temporary end-shield and drive-end bearing. This means that motors included in this document must:

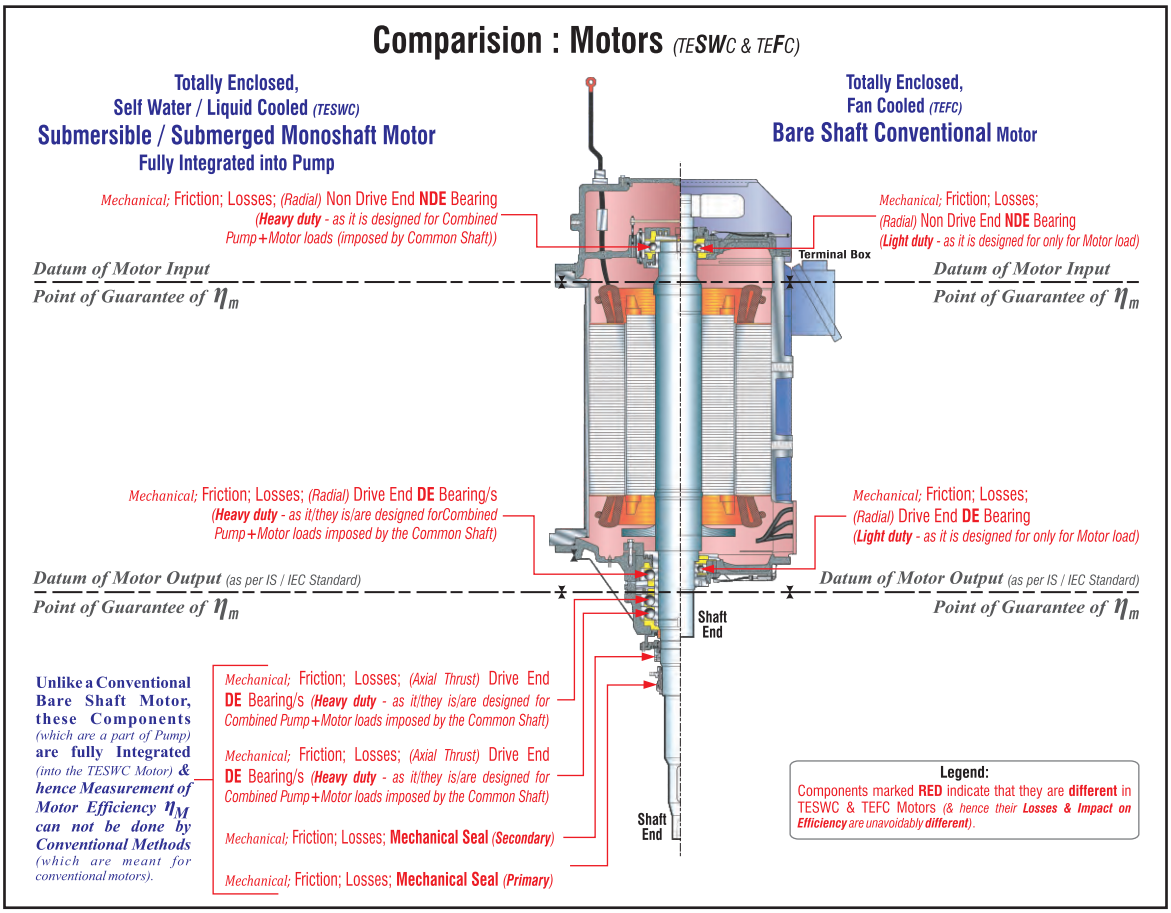
a) share common components (apart from connectors such as bolts) with the driven unit (for example, a shaft or housing), and

b) not be designed in such a way as to enable the motor to be separated from the driven unit as an entire motor that can operate independently of the driven unit. When the process of separation renders the motor inoperative, it is excluded from this document.

NOTE 6 Some motors used in horizontal, inclined and vertical transport of goods and people are specifically designed for this purpose. They are often integrated into a machine and are not brought to the market as individual products. These motors are excluded.

- Submersible motors specifically designed to operate wholly immersed in a liquid;
- Smoke extraction motors with a temperature class above 400 °C;

The reasons *(as to why Submerged/ Submersible motors are exempted from compliance)* are evident on a **side by side comparison** *(shown below)* of Conventional **Bare Shaft TEFC** motor v/s Air Filled, Self Water Cooled; **Mono Shaft TESWC** *(Submerged/ Submersible)* motor.



The comparison reveals the following **major Up-gradations** in the motor end *(of Submersible / Submerged)* :

1) **Addition** of **Extra Heavy Duty Bearings** to take care of additional **Pump Thrusts** - which would otherwise be a part of the Typical Bare Shaft pump *(i.e. it's Losses would not have been considered as a part of Conventional Bare Shaft Motor's losses)*

2) **Addition** of **Two Mechanical Shaft Seals** - which would otherwise be a part of the Typical Bare Shaft Pump *(i.e. it's Losses would not have been considered as a part of Conventional Bare Shaft Motor's losses)* &

3) Replacement of existing **Carbon Steel** Short shaft *(used in Bare Shaft TEFC motors)* by **Stainless Steel** Extended shaft *(for the installation of Pump end)*

"Obviously these up-gradations (in Submersible / Submerged Motor) though beneficial (from the point of view of Reliability); would In-Evitably SHIFT some of the Pump End Losses into the Submerged/ Submersible Motor – i.e. the Total (Motor + Pump) Losses would STILL NOT INCREASE & Client doesn't suffer a drop of OVERALL Efficiency.

However, to derive the exact Motor Efficiency would require much more Corrections to the Calculations to compensate the additional losses incurred by components 1, 2 & 3"

H. I. Patel ,VP-Tech, AMPL

Hence as per the Current Standards, strictly Ethically & Legally speaking; *(Air Filled, Surface Water Cooled; MonoShaft)* Submerged/ Submersible Motors of **ANY MAKE** can **NOT** be **IE2 or IE3 COMPLAINT ...!**

Infact, a few of the World's most reputed and respected pump manufacturers of similar pumps *(like m/s Grundfos, Hidrostal, etc)* have even published **White Papers** on this Ethical-Legal issue *(available on the internet http://www.hidrostal.co.uk/ assets/downloads/brochures/t0xkn1480516012.pdf)*

But *(if Calcuated Correctly)* Motor efficiencies of Aqua's Submerged/ Submersible pumpsets *(of course when demanded & backed up by Additional Price for the up-gradation)*, **CAN meet the Levels of Efficiency stipulated in for IE2 & IE3** in the standards - i.e. they **can be termed as EQUIVALENT** ***(but not Compliant)***.

Summary

Upon request *(& with Price Implication)*; Aqua's Submerged/ Submersible Motors can be IE2 or IE3 **Equivalent** *(i.e. match the Efficiency requirements laid down by standards)* – but **neither Aqua nor ANY manufacturer** can claim that their Submerged/ Submersible motors are IE2 or IE3 **Complaint**…!