Induction Motors

2-Pole Stiff Shaft

WEG Electric Machinery, WEM, builds a true stiff shaft induction motor. These motors deliver the reliability and high quality construction required in petroleum, utility, and other applications.

Induction motor driving a pump at an oil refinery.

Ranges

Output: 2,000 to 8,000 HP
Speed: Up to 3,600 RPM
Voltage: 2,300 to 13,800 VAC

Features

- In “stiff shaft” induction motors, the first lateral critical of the entire motor (including effects of actual stiffness/ softness of job bearing, bearing brackets, frame and as installed on the foundation) must be at least 15% above 2-pole synchronous speed.
- Custom engineered and manufactured to handle your high load and starting torque requirements.
- Used in variable speed applications using variable frequency power sources.
- Meets rigorous vibration requirements of API 541 standards to provide dependable operation.
- Tilting pad journal bearings are used to provide the highest possible stability under all operating conditions.
- Stiff shaft motors are built to minimize vibration at all operating speeds.

Industry Standards

WEM manufactures synchronous motors to meet all current industry standards including NEMA MG 1, IEEE 115, IEC 60034/60079, API 546, and ISO 9001:2000 standards. Third party CENELEC/ ATEX approval or CSA labeling is available upon request.

Advantages over Flexible Shaft Induction Motors

- Stiff shaft machines improve reliability by eliminating magnification of unbalance in the operating range. The stiff shaft machine can handle greater amounts of unbalance due to the fact that the response peaks are above operating speed.
- The stiff shaft induction rotor has a shorter length and larger diameter to provide operation below the first lateral critical speed.
- The stiff shaft rotor has 5-8 times stiffer construction than a flexible shaft rotor. This extremely rugged construction provides high dependability.
- Stator frame is much heavier than standard motor frames.
- Stiff shaft induction motors used in variable speed applications from zero to maximum operating speed will not pass through the first critical speed.
- Critical speed problems encountered in typical designs are avoided.

Enclosure

Typical motor enclosures are WP II (IC01/IP24), TEFV (IC37/IP44), TEWAC (IC817/IP54), and TEAAC (IC611 or IC616/IP54).

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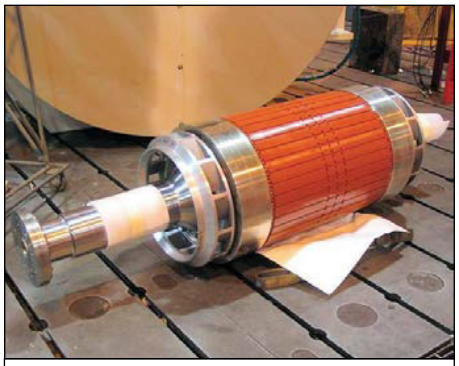
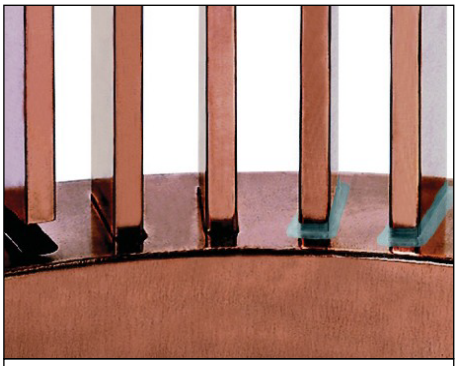
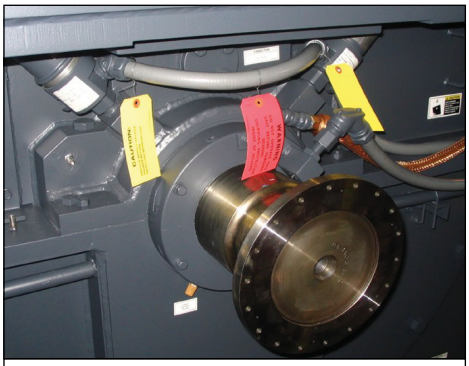


2-pole induction rotor with axial air ventilation.



Placement of rotor bars in milled end ring pockets enhance reliability.



Robust bearing bracket with all welded construction.

Stator

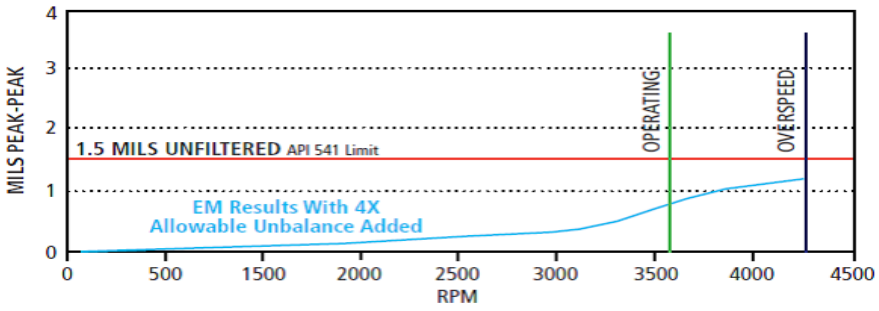
Stator Construction

The stator is composed of a supporting structure, a core of electrical laminations and insulated windings. High grade silicon steel laminations that build up the core are precision punched from core-plated sheets. Pressed and held between end plates, these laminations are stacked in the support structure and spaced for radial ventilation to ensure even cooling throughout the core. The frame is welded and machined to withstand stresses exerted by electrical and mechanical forces in the core and provide low vibration levels.

Stator Winding Insulation

The Duraguard™ insulation system is a vacuum pressure impregnated epoxy-mica insulation system that provides Class F thermal capability, outstanding dielectric properties, superior moisture and chemical resistance and the superb mechanical integrity of an epoxy resin system. It is a sealed insulation system capable of passing the water immersion test as specified by NEMA MG 1 and IEEE 115. Abrasion-resistant coating is available for protection in demanding environments.

Typical Shaft Vibration during Shop Coastdown Test



Rotor

Rotor Construction

Heavy-duty rotor construction is designed for adequate torque, high thermal capacity, mechanical rigidity, low noise level, and smooth operation. Ventilated rotor construction provides even cooling for improved thermal stability. The assembled rotor is accurately machined and dynamically balanced at rated speed to achieve lowest levels of residual unbalance.

Rotor Cage Bars

The oxygen-free copper alloy cage bars are silver brazed into special milled pocket joints in the circular end rings. The end ring joints provide greater contact and locking than other methods of attaching end rings, which significantly prolongs the life of the rotor. Each joint is ultrasonically-tested to ensure cage integrity.

Rotor laminations

Low loss, non-segmental rotor laminations are tightly anchored to the shaft. Each lamination is individually insulated to minimize stray losses.

Rotor Shaft

The shaft will be forged steel, accurately machined and smoothly finished where required.

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