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GOVERNMENT APPROVED TEST LABORATORY

IN TERMS OF ARP 0108: "REGULATORY REQUIREMENTS FOR EXPLOSION PROTECTED APPARATUS"

IA CERTIFICATE

Date Issued: **02 May 2017**
*Expiry date: **02 May 2020**

Issue: 0

Ex – Type Examination Certificate

Certificate Number:	**S-XPL/17.0488 X**
Equipment:	**The HGF and W50 Range Range of Induction Motors**
Model / Type:	**Frame Sizes 315 to 630, W50 Range of Induction Motors – Frame Sizes 315 to 450.**
Applicant:	**Zest WEG Electric (Pty) Ltd** **PRIVATE BAG X 10011** **SANDTON** **2146**
Manufacturer:	**WEG Equipamentos Eletricos S.A**
Serial No:	All serial numbers imported between issued- and expire date and all serial numbers covered by a valid report or acceptable product certification mark.

Supplied by
Zest WEG Electric (Pty) Ltd
Identified by Inspection Authority number
S-XPL/17.0488 X

And as described in the Explolabs file number **XPL/18489/17.0488** is hereby certified "Explosion Protected **Ex nA IIC T4 (T3 when anti-condensation heaters are fitted) Gc Ex tc IIIB T125°C Dc IP (see schedule) Ex tb III C T125°C Db IP6X (see schedule)**", having been examined and inspected in accordance with the relevant requirements of South African Standards.

SANS 60079-0: 2012 Ed 5 **IEC 60079-0: 2011 Ed 6**	Explosive atmospheres Part 0: Equipment — General requirements
SANS 60079-15: 2010 Ed 4 **IEC 60079-15: 2010 Ed 4**	Explosive atmospheres Part 15: Equipment protection by type of protection "n"
SANS 60079-31: 2014 Ed 2 **IEC 60079-31: 2013 Ed 2**	Explosive atmospheres Part 31: Equipment dust ignition protection by enclosure "t"

Risk of ignition provided:

Protection afforded	Equipment Protection Level (EPL) / Group	Performance of protection	Conditions of operation	T class or Max Surface Temp (°C)
Enhanced	Gc Group II	Suitable for normal operation	Equipment remains functioning in zone 2	T3 200ºC

High	Db Group III	Suitable for normal operation and frequently occurring disturbances or equipment where faults are normally taken into account	Equipment remains functioning in zones 21 and 22	T125ºC
Enhanced	Dc Group III	Suitable for normal operation	Equipment remains functioning in zone 22	T125ºC

This certification indicates compliance with R10.1 of the Mines Health and Safety Act and/or EMR 9(2) of the Occupational Health and Safety Act, provided that the apparatus is used as relevant in accordance with:

i) SANS 10086 and IEC/SANS 61241-14 requirements as applicable;
ii) Any conditions mentioned in the above report;
iii) Any relevant requirements and codes of practice enforced in terms of the Mine Health and Safety Act or Occupational Health and Safety Act; and
iv) Any restrictions and conditions enforced by the Chief Inspector of Mines or the Principal Inspector or the Chief Inspector: Occupational Health and Safety.
v) A revision certificate replaces all previous version of the certificate.
vi) * - Only covers equipment Imported between the "Issued" and "Expire" dates.
vii) If and when your QAN (Quality Assurance Notification) Certificate for your equipment manufacturer expires during the valid period of the IA Certification (issued for your equipment) and a new certificate is not submitted the existing IA Certification will then be cancelled. It is thus the client's responsibility to always submit the updated and valid QAN certificate(s) to Explolabs (Pty) Ltd.

1. GENERAL

The HGF Range of Induction Motors has shaft centre heights ranging from 315 to 630mm (and NEMA equivalent) and comprises cast iron frames for horizontal or vertical, foot and/or flange mounting. The range covers 2 to 14 poles, 3 phase windings for 50 or 60Hz and is designed for connection to supplies upto 15kV and duty type S1 or S2.

The W50 Range of Induction Motors has shaft centre heights ranging from 315 to 450mm (and NEMA equivalent) and comprises cast iron frames for horizontal or vertical, foot and/or flange mounting. The range covers 2 to 14 poles, 3 phase windings for 50 or 60Hz and is designed for connection to supplies upto 11kV and duty type S1 or S2.

Refer to the Annex to this certificate for the full description of the equipment.

The HGF Range of Induction Motors has shaft centre heights ranging from 315 to 630mm (and NEMA equivalent) and comprises cast iron frames for horizontal or vertical, foot and/or flange mounting. The range covers 2 to 14 poles, 3 phase windings for 50 or 60Hz and is designed for connection to supplies up to 15kV and duty type S1 or S2.
The W50 Range of Induction Motors has shaft centre heights ranging from 315 to 450mm (and NEMA equivalent) and comprises cast iron frames for horizontal or vertical, foot and/or flange mounting. The range covers 2 to 14 poles, 3 phase windings for 50 or 60Hz and is designed for connection to supplies up to 11kV and duty type S1 or S2.

Bearing Arrangements

Spigot housings are machined at either end of the stator frame into which the machined spigots of cast iron end frames are fitted. The end shields carry the bearing arrangements which may be roller bearing or sleeve bearing and be grease, oil lubricated or oil mist lubricated. Optional bearing insulation is available and the bearing housings made from cast iron. The bearing housings provide a degree of protection of at least IP55 for equipment Group II and IP65 for equipment Group III applications.

Stator
The stator core packs are built from insulated steel laminations which are clamped together for machines upto 560 and welded for machines size 630. The wound and impregnated stator assembly is secured in the stator frame by an interference fit and rotation is further prevented by the use of dowels (only for HGF motors).

Rotor

The rotor core packs which are built from insulated steel are keyed onto the steel shaft, located at one end by a shoulder and at the other by a circlip (only for copper rotor bars). The laminations may be drilled to allow for radial and/or axial cooling air circulation. The rotor cage is either cast

aluminium or built up from copper bars. When a built up rotor is used the cooper bars are forced into the slots to give an interference fit and the end rings are brazed to the bars.
Balancing of the rotor is achieved either by fixing washers to cast studs on the aluminium rotors only or by fastening washers to the end rings or by fastening weight balances on the balancing disc of the rotor for both aluminium and copper rotors.

Terminal Boxes

The motors are fitted with separate bolt-on terminal boxes which are manufactured from cast iron or steel and fitted with bolt-on covers incorporating a gasket which is glued to one surface. The following component certified terminal boxes can also be fitted when applicable.

Manufacturer	Type of terminal box	Certificate Number(s)	Zone(s) of use
Quartzelec Limited	PSN Phase Segregated	IECEx SIR 10.0146U Ex nA IIC Gc Ex tc IIIC IP66 Dc (IECEx only)	Zone 2 / 22
	PSE Phase Segregated	IECEx SIR 10.0147U Ex e IIC Gb Ex tc IIIC IP66 Dc (IECEx only)	Zone 1 / 22
Weidmuller	Empty enclosure Type TB MH	IECEx KEM 10.0015U Ex e IIC Gb Ex tb IIIC Db	Zone 1 / 21

Main terminal boxes may contain insulators, copper bars, current transformers (C.Ts), surge arrestors and capacitors to form single or double cable arrangements of air insulated and phase segregated versions. Neutral connections may also be included as part of the main terminal box or as a separate unit.

Auxiliary terminal boxes contain IECEx component certified terminals. Details of which are shown below:

Manufacturer	Type	Certificate Number
Weidmuller	W Series	IECEx ULD 05.0008U
	Z Series	IECEx ULD 05.0009U
	SAK and EK Series	IECEx KEM 06.0014U
Phoenix	Series USLKG	IECEx KEM 06.0035U
	Series ST 2.5 ; STTB 2.5	IECEx KEM 06.0051U
	Series ST 4 and 6	IECEx KEM 06.0050U Issue2
	Series ST 10, 16 and 35	IECEx KEM 06.0033U Issue2
	Type MBK	IECEx KEM 07.0008U Issue2
	Series UT	IECEx KEM 06.0027U Issue3
	Type UK	IECEx KEM 06.0029U Issue3
	Type UK ... N	IECEx KEM 06.0034U Issue3
	Type MSLKG 2.5	IECEx KEM 07.0017U Issue1
WEG Drives & Controls	Type BTWP* and BTWP*T	IECEx FTZU 12.0005U
	Type BTWI* and BTWI*T	IECEx FTZU 12.0006U
	Type BTWI 6, BTWI 10, BTWI 6T and BTWI 10T	IECEx FTZU 12.0007U
Klemsan	Series TB MVK; PIK; PYK; PUK.	IECEx FTZU 10.0011U
	Series TB AVK	IECEx FTZU 10.0012U Issue1

Any size of terminal box can be fitted to any of the frame sizes within the range as long as they are suitable rated for their intended use and it is physically possible to do so.
Note: The use of ATEX Certified boxes and terminals is justified in the report.

Ventilation

Various methods of cooling are used including externally ventilated or totally enclosed versions of air to air or air to water, with or without silencing. In addition, forced ventilation may be used with separately IECEx certified motors and optionally an IECEx certified encoder or brake may be attached to the main motor shaft.
External fans when used are manufactured from polypropylene, cast iron, bronze, welded steel or aluminium containing less than 6% magnesium.

Windings
Low voltage motors are wound using polyester-imide enamel wire with the overhangs suitably insulated and tied with fibreglass. High voltage motors are wound using either enamelled copper wire with a polyester and glass fibre covering or bare wire with two layers of special mica tape.
Motors with rated voltages above 4160V have tape applied to protect against corona effects and also have stress relief tape applied.
After winding, the high voltage motors are vacuum impregnated with a bi-component epoxy resin.

Use of Variable Voltage Variable Frequency Drives

The range of HGF / W50 Motors can be operated with frequency inverters (variable speed drives) in the following condition:
- With WEG PWM inverters (variable speed drives) or equivalent brand, voltages up to 690V, with carrier frequency from 2,000 Hz up to 20,000 Hz, with a frequency range up to 100 Hz or in accordance with manufacturer's recommendations.

- With WEG PWM inverters (variable speed drives) or equivalent brand, voltages from 690V up to 6600V, with filter system that ensures a sinusoidal supply. For this application, motor does not need to be oversized but if the system filter is not used it is necessary to reinforce the motor insulation to that of a higher voltage insulation system.

- With WEG PWM inverters (variable speed drives) or equivalent brand, voltages from 690V to 6600V, with filter system that ensures a sinusoidal curve with output frequencies from 50 Hz up to 100 Hz, the harmonic distortion must be of max. 1.5% between phases and of max. 4.5% in the line current or in accordance with manufacturer's recommendations, resulting in a maximum additional estimated temperature rise of 5K.

- When motors are operated below 50 or 60 Hz (nominal frequency) with constant torque loads, a de-rating factor as per WEG's De-rating calculations for Motors fed by Inverters shall be applied.

- Motors shall be fitted with thermal protective devices which shall be connected into the motor control circuit in order to maintain the T3 or T4 temperature class and/or the T125°C or T160°C surface temperature for dust applications.

- Auxiliaries The auxiliaries which may be fitted to this range of machine are:-
- Vibration monitoring sensors.
- Winding and bearing temperature detectors comprising RTD's, thermocouples, thermistors or thermostats.

The following are IECEx component certified temperature detectors that can be used.

Manufacturer	Type	Certificate Number
EPHY-MESS GnbH	Temperature Sensor Type M-xx/DSH	IECEx PTB 10.0064U
	Rigid Resistive Slot Thermometer Type NWT-ST...	IECEx PTB 10.0065U
	Temperature Sensor Type M-OK/ZS and KTY/ZS	IECEx PTB 11.0100U

- Anti-condensation heaters.
The following are IECEx component certified heaters that can be used.

Manufacturer	Type	Certificate Number
Flexelec SA	RSV Anti-condensation heater	IECEx SIR 10.00151U
BARTEC GmbH	Self Limiting Heating Cable Series HSB	IECEx KEM 07.0048U

Note: In the situation where motors are fitted with IECEx equipment certified T4 anti-condensation heaters the overall motor temperature class marking can be T4. Any relevant specific conditions of use relating to the use of the heaters as part of the motor must be complied with.

Type Testing
Each motor design shall be subjected to a WEG test procedure for Ex n motors, to verify the T3/T4 temperature classification. Slight variations in motor design already tested can have the temperature class re-verified by calculation.

Ambient Temperatures
The standard temperature range of the motors is -20°C to +40°C. By the choice of suitable materials and use of the de-rating data called
up on the drawings an ambient range of -55°C to +80°C may be achieved. Individual motors must be marked according to the build of the unit.

Ingress Protection Rating
The ingress protection rating of the motors depend on the shaft seal used:

Shaft seal	IP rating
Oil	IP55 to IP66
Taconite labyrinth	IP55
Taconite labyrinth with Teflon seal / Seal ring	IP55 toIP66
Labyrinth Oil-Mist / Grease (Inproseal)	IP55 to IP65
Flange/Sleeve Bearing	IP55 to IP66

Variation 0.1
The motors can be marked with an alternative surface temperature of T160°C.

2. INSTALLATION INSTRUCTIONS

It is the manufacturer's responsibility to supply installation instructions with each unit offered for sale as required by IEC/SANS 60079-0 Clause 30.

3. SPECIAL CONDITIONS FOR SAFE USE (denoted by X after certificate number)

1. The T3 or T4 internal/external surface temperature class and the T125°C or T160°C external surface temperature classification does not include motor starting or cover motors under duty cycle conditions other then type S1 or S2.

2. The installer must ensure that any equipment certified cable glands and stopping plugs fitted to the terminal boxes are suitably IECEx certified. Any unused cable entries must be fitted with IECEx certified stopping plugs. When installed the cable gland or stopping plug must maintain the marked IP rating of the enclosure.

3. All terminal nuts and screws, whether used or not, shall be correctly tightened.

4. When tightening supply connections care should be taken to maintain clearance distances.

5. On auxiliary terminals the conductor insulation shall extend to within 1mm of the terminal throat.

6. There shall be no loose conductor strands on any terminal.

7. The current transformer secondary terminals must not be left open circuit to avoid potential high voltages.

8. Motors designed for variable frequency drives are fitted with stator winding temperature detection devices that must be connected to the motor control circuit. For other starting methods, the connection of the winding temperature detectors is optional. The stator RTDs and thermistors can be connected via a standard industrial controller provided that the controller is located in a safe area.

9. Anti-condensation heaters shall not be energised when the machine is energised.

10. Where auxiliary apparatus is fitted that is not covered by this certificate the installer and/or user, as appropriate, must ensure that it is suitable for the conditions of use and that it does not invalidate this certification.

11. Motors certified for dust only environments will have no restriction on the supply connections to any internal RTDs and thermistors.

12. When the Iris terminal box arrangement is used the motor is restricted to Zone 2 Gas use only and an ambient temperature range of -20°C to +55°C.

Based on the following documentation: IECEx BAS 10.0104X

4. CONDITIONS OF CERTIFICATION

- All production units must be covered by a QAN (Quality Assurance Notification), Product Mark Scheme or batch evaluation.

5. MARKING

The following (or similar) information have to be clearly and permanently marked on all units:

Supplier : Zest WEG Electric (Pty) Ltd
Manufacturer : WEG Equipamentos Eletricos S.A
Equipment : The HGF and W50 Range Range of Induction Motors
Model/Type : Frame Sizes 315 to 630, W50 Range of Induction Motors – Frame Sizes 315 to 450.
Serial No. : ---
Ex Rating : Ex nA IIC T4 (T3 when anti-condensation heaters are fitted) Gc Ex tc IIIB T125°C Dc IP (see schedule) Ex tb III C T125°C Db IP6X (see schedule)
IA Certificate No : S-XPL/17.0488 X

Responsible Testing Officer:

D Maree
Senior Testing Officer

Reviewed by:

H De Wet
Testing Officer

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