VegaAIS AtoN Station: Evaluation of International Compliance for General Public Exposure to Electromagnetic Fields

45 Sale St, Freemans Bay
PO Box 91164, Victoria Street West
Auckland, New Zealand

Phone: +64 (0)9 950 4848
Fax: +64 (0)9 950 4085

www.vespermarine.com

Version History

Version	Date	Comment
1	05/01/15	First revision

Copyright Notice

Introduction

This report evaluates the requirement under the R&TTE Directive for the VegaAIS AtoN Stations to comply to the levels for public exposure to electromagnetic radiation as defined in EN 62311. The exposure assessment has been performed according to EN 50383 Section 8 to show that the VegaAIS AtoN will not generate electromagnetic emissions above the reference level as specified in EC Council Recommendation (1999/519/EC) in the VHF transmission bands used by the AIS.

It also compares this to the US requirements under the FFC Rule Parts 1.1310, 2.1091 and 2.1093 for radio frequency exposure limits for the general public.

This report is generated by Vesper Marine as the OEM manufacturer of the AIS transmitter on behalf of Vega Industries Ltd.

EUT Description

Products	VegaAIS AtoN Station
Manufacturer	Vega Industries Ltd, 17/21 Heriot Dr, Porirua 5022, New Zealand
OEM Module Manufacturer	Vesper Marine Ltd
Model Numbers	VAIS-1S, VAIS-1E, VAIS-3S, VAIS-3E
Power Supply	10-36V DC
VHF Frequency Range	156.025 – 162.025 MHz
VHF Transmit Power	41dBm (12.5W)
VHF Modulation Technique	FM GMSK
VHF Channel Spacing	25kHz
VHF Antenna Gain Specification	3dBi
Antenna Designation	Monopole
Temperature Range	-25 - +55 deg C
Intended Users	General Public
Equipment type	Fixed (non-portable)
Typical distance of use	>10m

For more details please refer to the user manual

VHF Limits

System must operate in Europe under the reference levels as outlined by the Council Recommendation 1999/519/EC and in the US under the FCC limits which can be summarized as follows:

Table 1 – International Exposure Limits

Region	Frequency Range	E-Field Strength (V/m)	H-Field Strength (A/m)
Europe	30 – 300 MHz	28	0.07
FCC	30 – 300 MHz	27.5	0.07

Furthermore EN 50385 stipulates that if the average power emitted by the system is less than 20mW, the system is deemed to comply with the standard without testing.

VHF Exposure Evaluation

Since the typical average power at the antenna permitted by IEC 62320 for an AIS AtoN can be calculated as 5.71dBm (41dBm, 3 min reporting interval, 26.67ms slot time), the VegaAIS series automatically complies with EN 50385 for a nominal antenna gain of 3dBi. However, for completeness and user manual documentation the compliance boundary is also examined assuming theoretical continuous transmission operation.

The compliance boundary can be determined from the following with the results shown in Table 2 below,

$$D = \sqrt{30 \times G \times P} / E$$

where,

D = distance from the antenna (m)

G = numerical antenna gain

P = power at the antenna (W)

E = E-Field strength (V / m)

The assumptions are as follows,

- The far field model applies
- The antenna gain is typically 3dBi
- The antenna length is typically equal to a quarter wavelength
- Nominal operating frequency of 162MHz

Table 2 – Evaluation Results

Radiating Far Field boundary*	0.23 m
E-Field at Far Field boundary	119.35 V/m
H-Field at Far Field boundary	0.32 A/m
EU Compliance Boundary	1 m
US Compliance Boundary	1 m
E-Field at Compliance Boundary	27.45 V/m
H-Field at Compliance Boundary	0.07 A/m

** The boundary between the Near and Far Fields for which at distances greater than this the Far Field model can be applied*

A maximum permissible exposure (MPE) radius of 1m is practical for system installation and will ensure the limits are never breached.

User Manual Warnings

In addition to the installation instructions in the user manual and in accordance with Section 7 of EN 50385 the following has been included in the manual under General Warnings:

“RF Emissions

Caution: This device generates and radiates electromagnetic energy. This device must be installed and operated according to the instructions contained in this handbook. Failure to do so can result in product malfunction and / or exposure to potentially harmful levels of radio frequency radiation.

Caution: Never operate the this device unless it is connected to a VHF antenna.

The system has a Maximum Permissible exposure (MPE) radius of 1m from the antenna. This has been determined assuming the maximum power of the transponder and using a standard monopole VHF antenna with a maximum gain of 3dBi and termination impedance of 50 ohms.

When installing the antenna and operating the equipment consider the following,

- *Higher gain VHF antennas will require a larger MPE radius*
- *Do not operate the unit when anyone is within the MPE radius of the antenna*
- *The antenna should not be collocated or operated in conjunction with any other transmitting antenna”*

Conclusion

The VegaAIS AtoN Station complies with the international standards for general public exposure to electromagnetic fields.