

REPORT ON EXPOSURE TO ELECTROMAGNETIC FIELDS

No. 1721221STO-003, Ed. 1

EQUIPMENT

Equipment:	Wireless sensor
Type/Model:	Level Sensor for Tork EasyCube™
Manufacturer:	Essity Hygiene and Health AB
Tested by request of:	Essity Hygiene and Health AB

SUMMARY

Based on the assessment in this statement, the equipment is determined to **comply** with the requirements according to the following standards:

EN 62479 (2010)
CFR 47 Part 2 §1.1310
RSS-102 Issue 5

Date of issue: 2018-03-27

Tested by:



Daniel Nilsson

Approved by:



Matti Virkki

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Revision History

Edition	Date	Description	Changes
1	2018-03-27	First release	

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1 CLIENT INFORMATION

This assessment has been done by request of:

Company	Essity Hygiene and Health AB
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	Mölnåls
	SE-405 03 Göteborg
	SWEDEN
Name of contact	Rickard Holmersson

2 EQUIPMENT

2.1 Identification of the equipment

Equipment:	Wireless sensor
Type/Model:	Level Sensor for Tork EasyCube™
Brand name:	Essity
Manufacturer:	Essity Hygiene and Health AB
Transmitter frequency range:	2405 MHz
Measured output power to antenna*:	2.6 dBm
Antenna gain:	+3 dBi
Measured duty cycle*:	0.7 %
Separation distance:	20 cm
Handheld or portable:	☒ Yes ☐ No
Exposure conditions:	☐ Controlled environment (occupational) ☒ Uncontrolled environment (general population)
Region of body:	☐ Head or trunk ☒ Limbs

*Test report reference for measurements: 1721221STO-002, Ed. 1

3 TEST SPECIFICATIONS

3.1 Standards

EN 62479 (2010): Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

CFR 47: Code of Federal Regulations Title 47: Telecommunications

RSS-102: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standards.

4 TEST SUMMARY

The test has been carried out at the Intertek Semko AB premises in Kista, Sweden.
The results in this report apply only to sample tested:

Test	Result
RF Exposure, single transmitter	PASS
RF Exposure, multiple simultaneous transmitters	NA ¹

1. EUT only has a single transmitter

5 RF EXPOSURE, SINGLE TRANSMITTER

Result:	PASS
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5.1 Calculations

EIRP: $+2.6 \text{ dBm} + (3.0) \text{ dBi} = +5.6 \text{ dBm}$

Conversion dBm to W:

Conducted: $1 \text{ mW} * 10^{\left(\frac{2.6 \text{ dBm}}{10}\right)} = 1.82 \text{ mW}$

EIRP: $1 \text{ mW} * 10^{\left(\frac{5.6 \text{ dBm}}{10}\right)} = 3.63 \text{ mW}$

Time averaged maximum power:

Conducted: $1.82 \text{ mW} * 0.007 = 0.013 \text{ mW}$

EIRP: $3.63 \text{ mW} * 0.007 = 0.025 \text{ mW}$

Power density:

$$S = \frac{EIRP * Duty Cycle}{4 * \pi * (User distance^2)} = \frac{0.025}{4 * \pi * 20^2} = 5 \times 10^{-6} \text{ mW/cm}^2$$

5.2 Limits

Reference: EN 62479 Annex A, Table A.1: Table A.1 – Example values of SAR-based P_{max} for some cases described by ICNIRP, IEEE Std C95.1-1999 and IEEE Std C95.1-2005

Guideline / standard	SAR limit, SAR_{max} W/kg	Averaging mass, m g	P_{max} mW	Exposure tier	Region of body
ICNIRP	2	10	20	General public	Head and trunk
	4	10	40	General public	Limbs
	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
IEE Std C96.1-1999	1,6	1	1,6	Uncontrolled environment	Head, trunk, arms, legs
	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled environment	Extremities and pinnae

For General public and head and trunk exposure: P_{max} 20 mW

Reference: CFR 47 §1.1310 Table 1: Limits for maximum permissible exposure (MPE), (B) Limits for general population/uncontrolled exposure

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* 900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* 100	30
1.34-30	824/f	2.19/f	* 180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

For general population and 1.500 – 100 000 MHz: Power density 1 mW/cm²

Reference: RSS-102 Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $22.48/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2405 MHz this is equal to: $1.31 \times 10^{-2} 2405^{0.6834}$ W = 2.67 W

5.3 Results

Standard	Value	Unit	Limit	Result
EN 62479	0.025	mW	< 20	PASS
47 CFR 1.1310	5×10^{-6}	mW/cm ²	< 1	PASS
RSS-102	0.025	mW	< 2670	PASS