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Acoustic Verification Report

Invacare XPO₂™ Portable Oxygen Concentrator
Type XPO100B-EU

for



INVACARE Deutschland GmbH

Kleiststrasse 49
D-32457 Porta Westfalica
Germany

Date: 2013-12-10

Our reference:
IS-ATC2-MUC/js

Document:
Report Invacare
VR.600010074.002.12 - Revision
2.docx

Report No.
VR.600010074.001.11 –
Revision 2.0

This document consists of
8 Pages.
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Industrie Service

Object: Measurement of the Acoustic Noise Emission Data of
a Portable Oxygen Concentrator
Type XPO100B-EU
according to 3/2007 MDS-Hi

Client: **INVACARE Deutschland GmbH**

Kleiststrasse 49
D-32457 Porta Westfalica
Germany

TÜV Report No.: VR.600010074.002.12

TÜV Order No.: 600 010 074

Date: 2013-12-10

Revision: Rev. 2.0

Organisation: **TÜV SÜD Industrie Service GmbH**

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Table of Revision:

Revision	Date	Author	Description
1.0	2012-05-23	Tobias Fleckenstein	Issue
2.0	2013-12-10	Tobias Fleckenstein	Change section 6: Flow rate to 5 l/min Change section 7: Continuous flow -> Pulse flow

1. Scope

The scope is to determine the operation sound pressure level of a portable oxygen concentrator (XPO₂TM V Series, Type: XPO100B-EU) manufactured by Invacare Corporation, 2102 East Lake Mary Blvd. Sanford, FL 32773, USA.

2. Standards and Directives

The oxygen concentrator was tested according to the following standards:

Prüfmethode 14-1; 3/2007 MDS-Hi: 2007-03-14, Nachweis der Betriebslautstärke bei Sauerstoffkonzentratoren / Abfüllstationen

DIN EN ISO 3744:2011-02, Bestimmung der Schalleistungspegel von Geräuschquellen aus Schalldruckmessungen

3. Test Object

The operating noise of the following test object (EUT) was determined:



Picture 1: Test object



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Product designation: XPO₂™ Portable Oxygen Concentrator
Type: XPO100B-EU
Serial number: 12DF040351

The test object can be supplied on 3 different ways:

1. Internal Battery

2. External Battery Pack,

Manufacturer: Invacare Corporation,
2102 East Lake Mary Blvd. Sanford, FL 32773

Type: Model #XPO110B-EU
14.8 V, 5200 mAh Lithium Battery

Serial number: 12DF040351

3. Net Supply (100 – 240 V AC) via alternating current adapter, Output: 18V DC / 3.33 A

All supply possibilities have been used to determine the operation noise of the EUT.



4. Description of test facility

Test Date: 2012-05-23

Test room:

The sound pressure level tests were performed in an anechoic chamber at TÜV SÜD Industrie Service GmbH, Westendstrasse 199, 80636 Munich, which fulfils the requirements of the ISO 3745, accuracy class 1. The anechoic chamber is quality tested as part of the accreditation according to DIN EN ISO 17025.

The acoustic quality of the measurement fulfils the accuracy grade 2 in accordance with ISO 3744.

The background sound pressure levels are less than 20 dB(A). Therefore, no correction K_{1A} was used.

5. Measuring devices

<i>Description</i>	<i>Manufacturer</i>	<i>Type</i>	<i>S/N</i>	<i>Accuracy</i>	<i>Calibration validity</i>
Sound Level Meter	Norsonic	131	1313137	IEC 61672 class 1	12/2011
Mikrophon	Norsonic	1228	00845	IEC 61672 class 1	12/2011
Pre-amplifier	Norsonic	1207	12610	IEC 61672 class 1	12/2011
Sound Calibrator	Brüel & Kjaer	4231	2560032	IEC 60942 class 1	12/2013

Table 1: Measuring devices

6. Test setup

The sound emission values were measured on one microphone position according to 3/2007 MDS-Hi (Patient position in 1 meter height and 1 meter distance to the front side of the device).

The measurements were taken using the frequency-weighting characteristic A and the time-weighting characteristic F.

The integration time during measurement covered at least 5 operation cycles of the oxygen concentrator. Tests have been done with all 3 supply options (see chapter 3). Batteries (internal and external) have been fully charged before operation. Net supply is defined to 230VAC German standard.

After heat up phase of about 5 minutes, the sound pressure levels were measured at 5 different flow rate settings. Setting 5 (Maximum) is equivalent to 5 l/min flow rate.



Picture 2: Test setup



7. Measurement results

The determined operational noise of the tested Oxygen Concentrator Type XPO100B-EU is as follows:

#	Description	Supply	EUT setting	L _{AF} [dB(A)]	Measurement Time [sec]
1	Pulse flow	Internal Battery	1	42,9	35
2	Pulse flow	Internal Battery	2	44,0	35
3	Pulse flow	Internal Battery	3	48,2	35
4	Pulse flow	Internal Battery	4	49,3	35
5	Pulse flow	Internal Battery	5	52,2	35
6	Pulse flow	Ext. Battery Pack	1	43,0	35
7	Pulse flow	Ext. Battery Pack	2	44,1	35
8	Pulse flow	Ext. Battery Pack	3	48,4	35
9	Pulse flow	Ext. Battery Pack	4	49,3	35
10	Pulse flow	Ext. Battery Pack	5	52,3	35
11	Pulse flow	Net Supply	1	42,9	35
12	Pulse flow	Net Supply	2	43,9	35
13	Pulse flow	Net Supply	3	48,3	35
14	Pulse flow	Net Supply	4	49,7	35
15	Pulse flow	Net Supply	5	52,1	35

Table 2: Measurement results