nuiTHELMA

TEST CERTIFICATE
UNMANNED TESTING OF UNDERWATER BREATHING APPARATUS
(Tests carried out in accordance with NORSOK U-101:1999)

Name of test centre: NUI / NUI-Thelma

Date: 2012.09.20 Number of pages in this certificate: 3

Name of underwater breathing apparatus tested: Amron BIBS Mask model 450M

Maker of underwater breathing apparatus:
Amron International, Inc., 1380 Aspen Way, Vista, CA 92081-8349 USA

Tests carried out for: Amron International, Inc

Tests carried out: July 2012

Reference to report: Amron450M-report, NUI-Thelma, 2012

Units

Unit 1:.....450A

Unit 2:.....450D

Unit 3:.....450E

Unit 4:.....450F

Unit 5:.....450G

Certified depth range based on this certificate:

With air from 10 msw to 50 msw, with heliox from 10msw to 450msw

Tests carried out by: Name: Hallvard Persvik

Signature: .....

Position: Test Technician

Date: 24 September 2012

nuiTHELMA
Postboks 23 Ytre Laksevåg
5848 Bergen
Org. Nr: 984 610 394

Tests supervised by: Name: Bård Holand

Signature: .....

Position: Senior Engineer

Date: 24 September 2012

Test Certificate verified by:

Name: Trond Bøe Myklebust

Signature: .....

Position: Surveyor, DNV

Date: 24 September 2012

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WORK OF BREATHING AND RELATED FACTORS

a) *Test depths* (msw) (Boldface appropriate figure(s)): 0, **10,** 20, **30**, 40, **50**, 60, 100, 150, 200, 250, 300, 350, 400

b) *Breathing mixture:* Air

c) *Supply pressure*: 0.8 – 1.2 MPa

d) *Return line negative pressure*: 0.1 – 0.35 MPa

a) *Test depths* (msw) (Boldface appropriate figure(s)): 0, **10,** 20, 30, 40, **50**, 60, **100**, 150, **200**, 250, **300**, 350, 400, **450**

b) *Breathing mixture:* Heliox 1.6-20%

c) *Supply pressure*: 0.6 – 1.25 MPa

d) *Return line negative pressure*: 0.1 – 0.35 MPa

e) *Manner of rigging the breathing apparatus and the position of the demand valve (Note: See Subclause 6.3.2):*

In dry chamber, filled with 1% heliox
Supply from high pressure gas quads >Tescom Supply Regulator (4432-64J281) > quick connectors
Exhaust: Divex Back Pressure Regulator (RP700) > atmosphere

f) Temperature of ambient gas in the test chamber: 25°C

g) *Temperature and relative humidity of the inspired breathing mixture*
(Note: See Subclause 5.9, 6.2.7, 6.2.10, 6.3.10 and 6.3.11

Measured Temperature: 25°C

Estimated Relative humidity <<1% ("dry")

h) *Does the UBA incorporate a heating device* No

i) *Does the UBA incorporate a humidifier?* No

j) *Work of Breathing*
(Air at 50 msw) (See Subclause 5.2 and 5.3)

RMV	***Work of breathing (in J/l)***					
l/min	*Max <180msw*	*Measured value*				
		Unit 1	*Unit 2*	*Unit 3*	*Unit 4*	*Unit 5*
7.5	*0.8*	*0,52*	*0,56*	*0,64*	*0,56*	*0,56*
15.0	*1.1*	*0,62*	*0,58*	*0,75*	*0,62*	*0,65*
22.5	*1.4*	*0,63*	*0,62*	*0,78*	*0,67*	*0,68*
40.0	*3.0*	*0,65*	*0,63*	*0,76*	*0,75*	*0,68*
62.5	*5*	*2,97*	*1,64*	*1,12*	*2,75*	*1,48*

Comments (Note: See Subclause 5.2)
All within requirements

k)Respiratory pressure (Ideally less than ± 1.5kPa but never greater than ± 2.5kPa
(Air at 50 msw) (See Subclause 5.3 and 5.5)

RMV	***Respiratory pressures (in kPa)***											
l/min	*Inhaled pressures*						*Exhaled pressures*					
		Measured						*Measured*				
	Max	*Unit 1*	*Unit2*	*Unit3*	*Unit4*	*Unit5*	*Max*	*Unit1*	*Unit2*	*Unit3*	*Unit4*	*Unit5*
7.5	*-2.5*	*-0,31*	*-0,33*	*-0,45*	*-0,33*	*-0,33*	*2.5*	*0,35*	*0,48*	*0,37*	*0,37*	*0,38*
15.0	*-2.5*	*-0,41*	*-0,35*	*-0,53*	*-0,40*	*-0,41*	*2.5*	*0,40*	*0,45*	*0,43*	*0,43*	*0,42*
22.5	*-2.5*	*-0,42*	*-0,40*	*-0,55*	*-0,42*	*-0,46*	*2.5*	*0,44*	*0,44*	*0,44*	*0,48*	*0,43*
40.0	*-2.5*	*-0,43*	*-0,47*	*-0,63*	*-0,52*	*-0,53*	*2.5*	*0,51*	*0,53*	*0,49*	*0,54*	*0,49*
62.5	*-*	*-0,63*	*-0,67*	*-1,03*	*-0,71*	*-0,82*	*-*	*6,03*	*3,33*	*1,16*	*5,66*	*2,80*

Comments (Note: See Subclause 5.3)

All within requirements

j) *Work of Breathing*
(Heliox at 450 msw) (See Subclause 5.2 and 5.3)

RMV	***Work of breathing (in J/l)***					
l/min	*Max >180msw*	*Measured value*				
		Unit 1	*Unit 2*	*Unit 3*	*Unit 4*	*Unit 5*
7.5	*0.65*	*0,64*	*0,61*	*0,64*	*0,60*	*0,64*
15.0	*0.80*	*0,78*	*0,67*	*0,67*	*0,74*	*0,73*
22.5	*0.95*	*0,79*	*0,66*	*0,66*	*0,86*	*0,85*
40.0	*1.30*	*0,90*	*0,88*	*0,69*	*0,88*	*0,88*
62.5	*5*	*3,95*	*1,67*	*2*	*2,86*	*2,63*

Comments (Note: See Subclause 5.2)

All within requirements

k)Respiratory pressure (Ideally less than ± 1.5kPa but never greater than ± 2.5kPa
(Heliox at 450 msw) (See Subclause 5.3 and 5.5)

RMV	***Respiratory pressures (in kPa)***											
l/min	*Inhaled pressures*						*Exhaled pressures*					
		Measured						*Measured*				
	Max	*Unit 1*	*Unit2*	*Unit3*	*Unit4*	*Unit5*	*Max*	*Unit1*	*Unit2*	*Unit3*	*Unit4*	*Unit5*
7.5	*-2.5*	*-0,51*	*-0,41*	*-0,44*	*-0,42*	*-0,45*	*2.5*	*0,37*	*0,42*	*0,36*	*0,34*	*0,38*
15.0	*-2.5*	*-0,60*	*-0,46*	*-0,46*	*-0,56*	*-0,51*	*2.5*	*0,41*	*0,49*	*0,49*	*0,4*	*0,42*
22.5	*-2.5*	*-0,69*	*-0,44*	*-0,46*	*-0,70*	*-0,66*	*2.5*	*0,43*	*0,50*	*0,52*	*0,43*	*0,46*
40.0	*-2.5*	*-0,84*	*-0,78*	*-0,78*	*-0,79*	*-0,83*	*2.5*	*1,57*	*0,69*	*0,88*	*1,63*	*1,35*
62.5	*-*	*-4,69*	*-3,21*	*-3,29*	*-4,41*	*-4,67*	*-*	*4,85*	*1,36*	*1,47*	*3,04*	*1,35*

Comments (Note: See Subclause 5.3)

All within requirements