

Test Report

EN 149 : 2001 + (A1 : 2009)

Report no: 1.11.11.39

Client: INSPEC Representative Office
Room 515 Huawen Plaza
No. 999, West Zhongshan Road
Changning District
Shanghai 200051
China

Client order: TA11/0188a

Order(s) received: 21 October to 11 November 2011

Manufacturer: Shanghai Zhongzhi Health Articles Co., Ltd

Model(s): ZH3310, ZH3310V, ZH4310 and ZH4310V

Date(s) of tests: 25 October to 11 November 2011

Signed:



Peter Threlfall, Laboratory Supervisor

Issued: 16 November 2011

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Summary of assessment*

Clause		Assessment			
	Model:	ZH3310	ZH3310V	ZH4310	ZH4310V
7.4	Packaging	NT			NT
7.5	Material	Ltd	Ltd	Ltd	Ltd
7.6	Cleaning and disinfecting				
7.7	Practical performance	Ltd			NT
7.8	Finish of parts		Ltd		Ltd
7.9.1	Total inward leakage	Ltd			Pass
7.9.2	Penetration of filter material: sodium chloride		Ltd		
7.9.2	Penetration of filter material: Paraffin oil		Ltd		Ltd
7.10	Compatibility with skin				
7.11	Flammability				NT
7.12	Carbon dioxide content of the inhalation air			Pass	
7.13	Head harness	Ltd			Ltd
7.14	Field of vision	Ltd			NT
7.15	Exhalation valve(s)				Pass
7.16	Breathing resistance			Fail	Pass
7.17	Clogging				
7.18	Demountable parts				NAP
9	Marking	NT	NT	NT	NT
10	Information to be supplied by the manufacturer		NT		NT

Key

	Shading shows the clauses requested. Any other clauses were not requested.
Pass	Requirement satisfied.
Ltd	Testing requested was insufficient completely to verify compliance with the clause. Refer to the "Result details" section for more information.
Fail	Requirement not satisfied. Refer to the "Result details" section for more information.
NAs	Assessment not carried out.
NAP	Requirement not applicable.
NT	Requested but not tested due to early termination following failure.

* Assessment relates only to those specimens which were tested and are the subject of this report.

Product characteristics

Property	Characteristic			
Model	ZH3310	ZH3310V	ZH4310	ZH4310V
Classification claimed	FFP2	FFP2	FFP2	FFP2
Exhalation valve(s)	None	Single	None	Single
Usage designation	NR	NR	NR	NR

Submission details

Product	Quantity	Received	INSPEC specimen no. (1X0781 +)
ZH3310 Filtering half mask	25	17 October 2011	104 to 160
ZH3310V Filtering half mask	45		211 to 260
ZH4310 Filtering half mask	25		311 to 360
ZH4310V Filtering half mask	45		401 to 460

Procedures

The specimens detailed within the submissions above were used for the tests covered by this report.

Testing was performed in accordance with BS EN 149 : 2001 incorporating Corrigendum No. 1 (January 2003), and amendment A1 (2009) unless otherwise specified below. Reference should be made to the standard when reading this report.

Unless stated otherwise, specimens were tested in the condition as received by INSPEC.

7.7 The client instructed that practical performance testing be carried out on one specimen only of models ZH3310 and ZH4310V.

Practical performance tests were conducted in simulation of the practical use of the apparatus under the conditions prevailing in the gallery area of the laboratory. The exercises undertaken and the equipment used were as specified in the standard.

7.9.2 Filter penetration testing by the paraffin oil method was carried out using a modified Phoenix SG-20 aerosol generator and a Phoenix model JM-6000 photometer or a TEC Services' model PH-3 photometer. These give similar performance to the instruments specified.

7.16 Exhalation resistance was tested at a continuous flow of 160 l/min.

Following failure to clause 7.16, Breathing resistance, testing was terminated at the request of the client.

Result details**7.5 Material****Model ZH3310**

Specimens 120 to 122 were conditioned in accordance with 8.3.1. None of the specimens conditioned suffered mechanical failure or collapse.

Pass

Specimens 106 to 108 were conditioned in accordance with 8.3.2. None of the specimens conditioned suffered collapse.

Pass

The effects of filter media release were not assessed. Manufacturer to certify.

NAs**Model ZH3310V**

Specimens 220 to 225 were conditioned in accordance with 8.3.1. None of the specimens conditioned suffered mechanical failure or collapse.

Pass

Specimens 226 to 231 were conditioned in accordance with 8.3.2. None of the specimens conditioned suffered collapse.

Pass

The effects of filter media release were not assessed. Manufacturer to certify.

NAs**Model ZH4310**

Specimens 320 to 322 were conditioned in accordance with 8.3.1. None of the specimens conditioned suffered mechanical failure or collapse.

Pass

Specimens 317 to 319 were conditioned in accordance with 8.3.2. None of the specimens conditioned suffered collapse.

Pass

The effects of filter media release were not assessed. Manufacturer to certify.

NAs**Model ZH4310V**

Specimens 423 to 425 were conditioned in accordance with 8.3.1. None of the specimens conditioned suffered mechanical failure or collapse.

Pass

Specimens 406 to 410, 417 to 419, 429 to 431, 433, 439, 440, 446 and 447 were conditioned in accordance with 8.3.2. None of the specimens conditioned suffered collapse.

Pass

The effects of filter media release were not assessed. Manufacturer to certify.

NAs**7.7 Practical performance****Model ZH3310****Specimen and subject details:**

Specimen	Subject
148	INH
149	-

Pass**NAs**

No adverse comments were made following testing.

7.8 Finish of parts**Model ZH3310V**

None of the specimens used in the limited laboratory testing undertaken showed evidence of sharp edges or burrs.

Ltd**Model ZH4310V**

None of the specimens used in the limited laboratory testing undertaken showed evidence of sharp edges or burrs.

Ltd**7.9.1 Total inward leakage (%)****Model ZH3310**

Subject	Specimen	Cond	Walk	Head side/ side	Head up/down	Talk	Walk	Mean
RMH	104	AR	0.84	1.29	1.44	1.60	0.96	1.23
SMC	105	AR	0.88	1.34	2.26	1.37	0.76	1.32
JAD	106	TC	0.92	1.05	1.82	1.81	1.01	1.32
NL	108	TC	0.19	0.20	0.18	1.10	0.17	0.37
KDS	156	TC	1.80	2.28	2.82	1.70	1.74	2.07
Maximum permitted			11					8

All 25 individual exercise results were not greater than 11%.

Ltd

All 5 individual wearer arithmetic means were not greater than 8%.

Ltd

Subject AH was excluded from the test panel as they were unable to achieve a satisfactory fit.

Model ZH4310V

Subject	Specimen	Cond	Walk	Head side/side	Head up/down	Talk	Walk	Mean
ED	401	AR	0.65	1.26	3.44	0.45	1.08	1.37
SM	402	AR	0.31	9.55	6.70	2.70	1.15	4.08
NL	403	AR	0.33	0.32	0.66	0.68	0.40	0.48
DSR	404	AR	9.43	11.13	11.93	6.43	10.72	9.93
INH	405	AR	4.96	4.02	2.28	2.79	2.16	3.24
SMC	406	TC	9.13	7.61	7.69	4.80	6.49	7.15
SS	408	TC	1.85	3.48	2.67	2.97	1.28	2.45
KV	409	TC	5.01	6.17	5.20	4.71	6.36	5.49
GW	410	TC	0.26	0.25	0.28	3.87	0.23	0.98
BH	456	TC	2.24	3.06	4.22	2.54	3.20	3.05
Maximum permitted			11					8

48 out of 50 individual exercise results were not greater than 11%.

Pass

9 out of 10 individual wearer arithmetic means were not greater than 8%.

Pass

Subject KDS was excluded from the test panel as they were unable to achieve a satisfactory fit.

Subject facial dimensions:

Subject	Face Length (mm)	Face Width (mm)	Face Depth (mm)	Mouth Width (mm)
RMH	116	146	102	49
SMC	118	131	109	52
JAD	113	136	120	54
NL	106	140	116	51
KDS	102	128	98	49
AH	119	113	115	50
ED	114	138	100	47
SM	117	130	103	42
DSR	114	142	135	52
INH	125	153	95	58
SS	108	148	120	58
KV	106	143	133	56
GW	117	133	120	53
BH	120	139	108	54

7.9.2 Penetration of filter material**Model ZH3310V****Sodium chloride**

Specimen	Condition	Penetration (%)		
		After 3 mins	Max during exposure	
211	A.R.	Not tested		NAs
212				NAs
213				NAs
220	S.W.	0.29		Pass
221		0.23		Pass
222		0.24		Pass
226	M.S. + T.C.	Not tested	Not tested	NAs
227				NAs
228				NAs
Maximum permitted		6.0		

Paraffin oil:

Specimen	Condition	Penetration (%)		
		After 3 mins	Max during exposure	
214	A.R.	Not tested		NAs
215				NAs
216				NAs
223	S.W.	1.17		Pass
224		1.35		Pass
225		0.99		Pass
229	M.S. + T.C.	Not tested	Not tested	NAs
230				NAs
231				NAs
Maximum permitted		6.0		

Model ZH4310V**Paraffin oil**

Specimen	Condition	Penetration (%)		
		After 3 mins	Max during exposure	
414	A.R.	Not tested		NAs
415				NAs
416				NAs
423	S.W.	1.58		Pass
424		1.24		Pass
425		1.69		Pass
429	M.S. + T.C.	Not tested	Not tested	NAs
430				NAs
431				NAs
Maximum permitted		6.0		

7.12 Carbon dioxide content of the inhalation air**Model ZH4310****Pass**

Specimen	CO ₂ (%)
335	0.63
336	0.62
337	0.58
Maximum permitted	1.0

7.13 Head harness**Model ZH3310**

The head harness was designed to allow the particle filtering half-mask to be donned and removed easily during limited practical performance and limited total inward leakage testing.

Ltd

The head harness was self-adjusting and there were no adverse comments regarding security following limited practical performance and limited total inward leakage testing.

Ltd

The product satisfied the total inward leakage requirements for the limited testing carried out. See 7.9.1 for results.

Ltd

Model ZH4310V

The head harness was designed to allow the particle filtering half-mask to be donned and removed easily during total inward leakage testing.

Ltd

The head harness was self-adjusting and there were no adverse comments regarding security following total inward leakage testing.

Ltd

The product satisfied the total inward leakage requirements. See 7.9.1 for results.

Pass

Practical performance testing was not carried out.

NAs**7.14 Field of vision****Model ZH3310**

There were no adverse comments following limited practical performance tests.

Ltd**7.15 Exhalation valve****Model ZH4310V**

There were no observed problems during testing of function in all orientations. See 7.16 for results.

Pass

The valve was protected against dirt and mechanical damage by a shroud.

Pass

The product satisfied leakage requirements. See 7.9 for results.

Pass

There were no observed problems when assessing operation after high exhalation flow. See 7.16 for results.

Pass

The valve housing withstood 10N applied for 10s. Specimens 432 (A.R.), 433 (T.C.) and 434 (M.S.) were tested.

Pass**7.16 Breathing resistance****Model ZH4310**

Specimen	Condition	Inhalation resistance (mbar)		Exhalation resistance (mbar)
		At 30 l/min	At 95 l/min	At 160 l/min
311	A.R.	Not requested		2.52
312				2.26
313				2.63
317	T.C.	Not requested		2.16
318				2.24
319				2.24
320	S.W.	Not requested		2.43
321				3.19
322				2.58
Maximum permitted				3.0

Pass**Pass****Pass****Pass****Pass****Pass****Pass****Fail****Pass**

Model ZH4310V**Pass**

Specimen	Condition	Inhalation resistance (mbar)		Exhalation resistance (mbar)
		At 30 l/min	At 95 l/min	At 160 l/min
411	A.R.	0.42	1.66	1.63
412		0.33	1.30	1.31
413		0.32	1.44	1.55
417	T.C.	0.47	1.62	1.64
418		0.38	1.49	1.59
419		0.48	1.61	1.65
423	S.W.	0.54	1.75	1.80
424		0.45	1.62	1.40
425		0.51	1.71	1.45
438	A.R. + F.C.	0.30	1.28	1.33
439	T.C. + F.C.	0.31	1.36	1.45
440		0.45	1.57	1.24
Maximum permitted		0.7	2.4	3.0

7.18 Demountable parts**Model ZH4310V**

No demountable parts were used.

NAp

Estimates of the uncertainty of measurement

Clause	Test	Uncertainty
7.4	Packaging	-
7.5	Material	*
7.6	Cleaning and disinfecting	-
7.7	Practical performance	*
7.8	Finish of parts	-
7.9.1	Total inward leakage	$\pm 4.7\%$
7.9.2	Penetration of filter material - Sodium chloride	$\pm 4.7\%$
7.9.2	Penetration of filter material - Paraffin oil	$\pm 4.1\%$
7.10	Compatibility with skin	-
7.11	Flammability	*
7.12	CO ₂ content of the inhalation air	$\pm 4.0\%$
7.13	Head harness	-
7.14	Field of vision	*
7.15	Exhalation valve(s)	*
7.16	Breathing resistance	$\pm 1.8\%$
7.17.2	Breathing resistance after clogging	$\pm 3.9\%$
7.17.3	Filter penetration after clogging - Sodium chloride	$\pm 4.7\%$
7.17.3	Filter penetration after clogging - Paraffin oil	$\pm 4.1\%$
7.18	Demountable parts	-

* The acceptance criterion for this test is a straightforward "Pass/Fail", rather than a numerical value. Consequently, as there is no value to be reported, uncertainty has not been reported either.

Values expressed as a percentage (%) are relative.

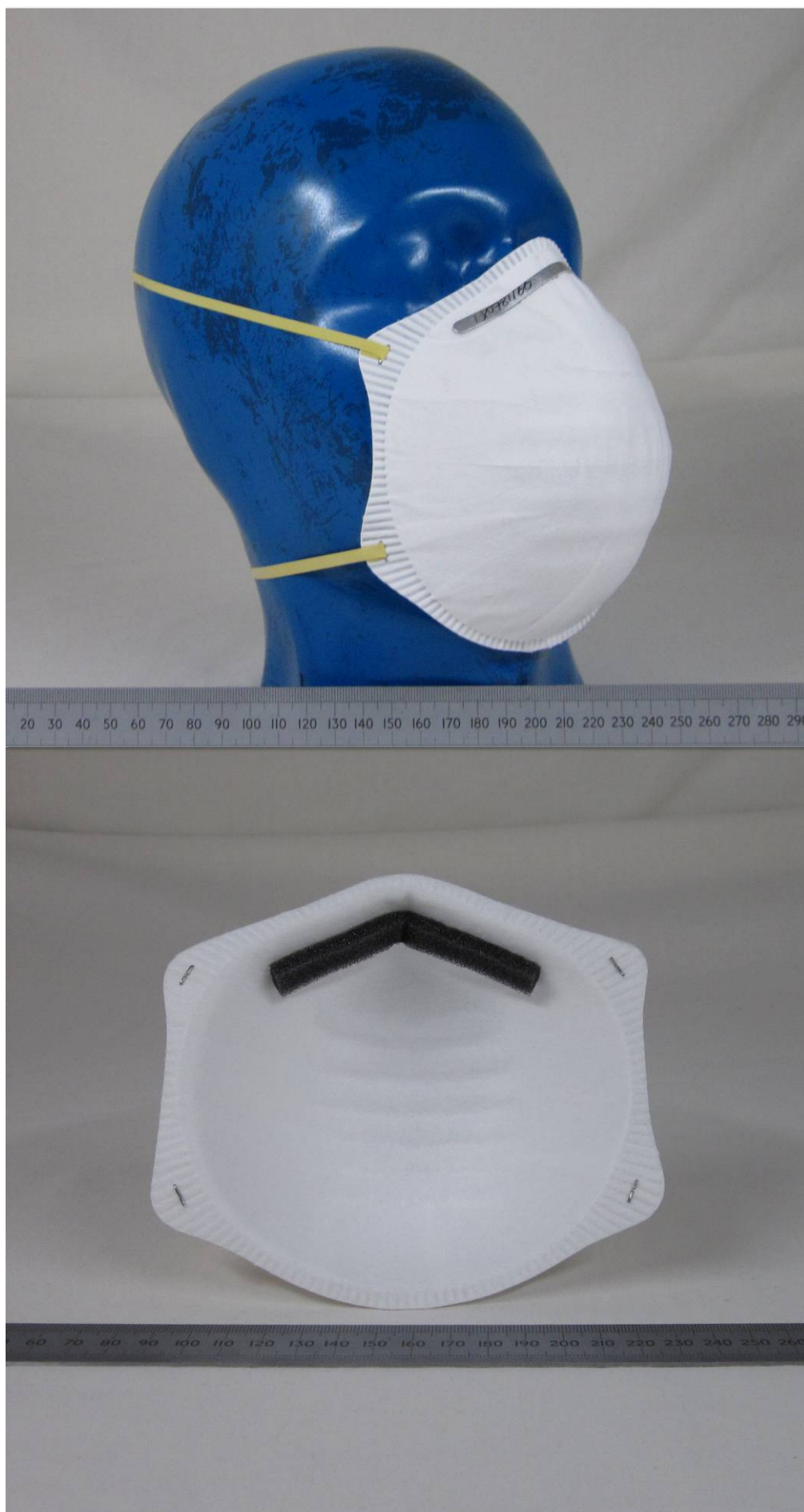
It should be noted that the above values have not been taken into account when making assessment to the pass/fail criteria.

ANNEX

This Annex comprises one section.

1. Photographs of the products tested. (4 pages)

Shanghai Zhongzhi Health Articles Co., Ltd model ZH3310 filtering half mask





Shanghai Zhongzhi Health Articles Co., Ltd model ZH4310 filtering half mask

