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Test Report

Personal Fall Arrest Equipment
ANSI/ASSE Z359.11-2014
Full Body Harness

Report no:	2.19.05.02
Client:	Ningbo Hailo Wind Systems Co., Ltd. No.12 Pushun Road, Beilun District Ningbo City 315803 China
Manufacturer:	Ningbo Hailo Wind Systems Co., Ltd.
Client orders and dates received:	T/0509A (19 June 2018) T/0562 (24 April 2019)
Models:	1360001001 (size: S-M) 1360001002 (size: L-XXL)
Dates of tests:	29 June 2018 to 31 December 2018 and 23 May 2019

Signed: 

Issued: 29 May 2018

Steven Sum, Laboratory Manager

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Summary of assessment *

Clause	**Requirement**	**Assessment** (See Key)
3.1	Design requirements	Ltd
3.1.10	Static Feet First – Lanyard parking attachment element	Pass
3.2	**Attachment Element Requirement**	
3.2.1	Dorsal	Pass
3.2.1.3.1	Dynamic Feet First	Pass
3.2.1.3.2	Dynamic Head First	Pass
3.2.1.3.3	Static Feet First	Pass
3.2.1.3.4	Fall Arrest Indicator	Pass
3.2.2	Sternal	Pass
3.2.2.3.1	Dynamic Feet First	Pass
3.2.2.3.2	Static Feet First	Pass
3.2.2.3.3	Fall Arrest Indicator	Pass
3.2.3	Frontal	Pass
3.2.3.1.1	Dynamic Feet First	Pass
3.2.3.1.2	Static Feet First	Pass
3.2.4	Shoulder	
3.2.4.1.1	Static Feet First	
3.2.5	Waist, Rear	
3.2.5.2.1	Static Feet First	
3.2.6	Hip	Pass
3.2.6.1.1	Static Feet First	Pass
3.2.7	Suspension Seat	
3.2.7.1.1	Static Feet First	
3.3	**Component Requirements**	
3.3.1	Load bearing straps	Ltd
3.3.1.2	Strap tensile test	Pass
3.3.1.5	Strap tensile test (after abrasion conditioning)	Pass
3.3.2	Thread and Stitching	Ltd
3.3.3	Connecting Components	NAs
3.3.1.2	Strap tensile test (soft loops)	
3.3.1.5	Strap tensile test (soft loops - after abrasion conditioning)	

Clause	**Requirement**	**Assessment** (See Key)
5.1	Marking requirements	Ltd
5.2	Instructions requirements	Ltd

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.

Submission details

Product	Quantity	Date received	INSPEC specimen no. (2F098+)
Webbing (red color), part no. 291	16 m	20 June 2018	01A to 01J (cut into 10 straps)
Webbing (black color), part no. 256	16 m		02A to 02J (cut into10 straps)
Full body harness, model 1831018.3	27	13 August 2018	03 to 29
Full body harness, model 1831018.4	01		30
Full body harness, model 1831018.3	03	6 December 2018	31 to 33

Procedures

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

Testing was performed in accordance with ANSI Z359.11-2014 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.

Testing was performed at INSPEC's laboratory in Kunshan, China.

Result details

3 Requirements

3.1 Design Requirements

Specimen 2F09803 was assessed.

3.1.1	The specimen permanently incorporated a dorsal attachment element.	Pass
	The specimen did incorporate other attachment elements. The other attachment elements were located at the sternal, frontal and hip location.	
3.1.2	The specimen did incorporate a load bearing sub-pelvic strap.	Pass
3.1.3	All shoulder straps on the specimen came together at the dorsal location and were connected by webbing that meets the requirements of section 3.	Pass
	A connector (D-ring) was attached to the dorsal location.	
	Testing of the connector (D-ring) was not requested.	NAs
3.1.4	The specimen permanently incorporated a waist belt as a means to control the separation of the shoulder straps on the back of the full body harness.	Pass
	When the specimen was mounted on to the torso as per manufacturer's instructions, some portion of the waist belt was located between datum levels G and K.	Pass
3.1.5	The specimen was not equipped with modular components or assemblies designed for the removal of different attachment elements.	NAp
3.1.5.1	This clause was not applicable.	NAp
3.1.5.2	The specimen was not equipped with an attachment element extender, therefore this clause is not applicable.	NAp
3.1.6	The specimen was not integrated into a vest or garment.	NAp
3.1.7	The specimen was equipped with a fall arrest indicator.	Pass
	The fall arrest indicator deployed during dynamic testing defined in section 3.2 when attached to the dorsal attachment element.	Pass
	It was possible to inspect visually the fall arrester indicator.	Pass
3.1.7.1	The specimen was equipped with fall arrest indicators for the sternal attachment element.	
	The fall arrest indicators deployed when tested according to 4.3.6	Pass
3.1.8	The specimen was not equipped with connecting subsystem combinations.	NAp
3.1.9	The specimen did include strap retainers (keepers) which serve to control the loose ends of straps.	Pass

3.1.10 Static Feet First Test - Lanyard Parking Attachment Element

Specimens 2F09803 to 2F09805 were assessed.

The specimen was equipped with two lanyard parking attachment elements. Pass

These two lanyard parking attachment elements did not differ in design.

During the static feet first tests, the lanyard parking attachment element disengagement loads were:

Specimen 2F09803 – 22.5 pounds Pass
Specimen 2F09804 – 22.5 pounds Pass
Specimen 2F09805 – 22.5 pounds Pass

The above values were less than the maximum 120 pounds permitted.

3.1.11 It was not possible to remove elements of the full body harness that support the shoulders / upper torso from those that support the legs / lower torso. Pass

3.1.12 The dorsal, sternal and frontal single point attachment elements were located laterally within zero inch of the vertical centreline of the full body harness. Pass

3.1.13 The specimen consist of a single point sternal attachment element NAp

3.1.14 The specimen did include a sub-pelvic strap. NAp

3.2 Attachment Element Requirements

3.2.1 Dorsal

Specimen 2F09803 was assessed.

The dorsal attachment element was located in the dorsal area shown in figure 4 of the standard. Pass

The dorsal attachment element was specified in the User Instructions to be used for fall arrest. Pass

3.2.1.1 The dorsal attachment was specified in the User Instructions to be used in travel restrain or rescue.

3.2.1.2 During the dynamic performance test, it was confirmed that the design of the full body harness directed the load through the shoulder straps supporting the user and around the thighs. Pass

3.2.1.3 Dorsal Attachment Element Requirements

3.2.1.3.1 Dynamic Feet First Test

Specimens 2F09806 to 2F09808 were assessed.

During the dynamic feet first tests, the test torso was not released. Pass

The harnesses did support the test torso for a period of five minutes post fall. Pass

During this period, the angles of the test torso to vertical were:

Specimen 2F09806 - 20 degrees. Pass
Specimen 2F09807 - 20 degrees. Pass
Specimen 2F09808 - 21 degrees. Pass

These values were less than the maximum 30 degrees permitted.

3 nos. of fall arrest indicators deployed visibly and permanently. Pass

Full body harness stretch were:

Specimen 2F09806 - 5.67 inches Pass
Specimen 2F09807 - 8.39 inches. Pass
Specimen 2F09808 - 11.2 inches. Pass

Full body harness stretch stated in the manufacturer’s instructions was 18 inches.

Full body harness stretch shall not exceed 18 inches, or that which is stated in the manufacturer’s instructions, whichever is less, was satisfied

3.2.1.3.2 Dynamic Head First Test

Specimens 2F09809 to 2F09811 were assessed.

During the dynamic head first tests, the test torso was not released. Pass

The harnesses did support the test torso for a period of five minutes post fall. Pass

During this period, the angles of the test torso to vertical were:

Specimen 2F09809 - 18 degrees. Pass
Specimen 2F09810 - 15 degrees. Pass
Specimen 2F09811 - 18 degrees. Pass

These values were less than the maximum 30 degrees permitted.

3 nos. of fall arrest indicators deployed visibly and permanently. Pass

3.2.1.3.3 Static Feet First Test

Specimens 2F09812 to 2F09814 were assessed.

During the static feet first tests, the test torso was not released from the harness. Pass

During the static feet first tests, all adjusters did not slip. Pass

All straps did not show signs of tearing. Pass

3.2.1.3.4 Fall Arrest Indicator Test

Specimens 2F09803 to 2F09805 were assessed.

When tested using the dorsal attachment element, 3 nos. of fall arrest indicators deployed visibly and permanently. Pass

3.2.2 Sternal

Specimen 2F09803 was assessed.

The sternal attachment element was located in the sternal area shown in figure 4 of the standard.

3.2.2.1 The sternal attachment element was specified in the User Instructions not to be used as an alternate fall arrest attachment.

3.2.2.2 The sternal attachment was specified in the User Instructions to be used for rescue.

During the dynamic performance test, it was confirmed that the design of the full body harness directed the load through the shoulder straps supporting the user and around the thighs. Pass

3.2.2.3 Sternal Attachment Element Requirements

3.2.2.3.1 Dynamic Feet First Test

Specimens 2F09815 to 2F09817 were assessed.

During the dynamic feet first tests, the test torso was not released. Pass

The harnesses did support the test torso for a period of five minutes post fall. Pass

During this period, the angles of the test torso to vertical were:

Specimen 2F09815 - 42 degrees. Pass
Specimen 2F09816 - 44 degrees. Pass
Specimen 2F09817 - 43 degrees. Pass

These values were less than the maximum 50 degrees permitted.

Both fall arrest indicators for the sternal attachment element deployed visibly and permanently. Pass

Full body harness stretch were:

Specimen 2F09815 - 8.4 inches Pass
Specimen 2F09816 - 11.2 inches. Pass
Specimen 2F09817 - 10.2 inches. Pass

Full body harness stretch stated in the manufacturer's instructions was 18 inches.

Full body harness stretch shall not exceed 18 inches, or that which is stated in the manufacturer's instructions, whichever is less, was satisfied.

3.2.2.3.2 Static Feet First Test

Specimens 2F09818 to 2F09820 were assessed.

During the static feet first tests, the test torso was not released from the harness. Pass

During the static feet first tests, all adjusters did not slip. Pass

All straps did not show signs of tearing. Pass

3.2.2.3.3 Fall Arrest Indicator Test

Specimens 2F09831 to 2F09833 were assessed.

Each specimen incorporated two fall arrest indicators for the sternal attachment element.

When tested using the sternal attachment element, both fall arrest indicators deployed visibly and permanently. Pass

3.2.3 Frontal

Specimen 2F09803 was assessed.

The frontal attachment element was located in the frontal area shown in figure 4 of the standard. Pass

The frontal attachment element was specified in User Instructions not to be used as an alternate fall arrest attachment.

The frontal attachment was specified in the User Instructions to be used for work positioning. Pass

3.2.3.1 Frontal Attachment Element Requirements

3.2.3.1.1 Dynamic Feet First Test

Specimens 2F09821 to 2F09823 were assessed.

During the dynamic feet first tests, the test torso was not released. Pass

The harnesses did support the test torso for a period of five minutes post fall. Pass

There was no fall arrest indicator incorporated into the harness intended to deploy if a fall occurs on the frontal attachment element. NAp

Full body harness stretch were:

Specimen 2F09821 - 8.4 inches Pass
Specimen 2F09822 - 8.7 inches. Pass
Specimen 2F09823 - 8.4 inches. Pass

Full body harness stretch stated in the manufacturer’s instructions was 18 inches.

Full body harness stretch shall not exceed 18 inches, or that which is stated in the manufacturer’s instructions, whichever is less, was satisfied.

3.2.3.1.2 Static Feet First Test

Specimens 2F09824 to 2F09826 were assessed.

During the static feet first tests, the test torso was not released from the harness. Pass

During the static feet first tests, all adjusters did not slip. Pass

All straps did not show signs of tearing. Pass

3.2.6 Hip

Specimen 2F09803 was assessed.

The hip attachment elements were specified in the User Instructions to be used as a pair.	Pass
The hip attachment elements were specified in the User Instructions to be used solely for work positioning or travel restrain.	Pass
The hip attachment elements were specified in the User Instructions not to be used for fall arrest.	Pass

3.2.6.1 Hip Attachment Element Requirements

3.2.6.1.1 Static Feet First Test

Specimens 2F09827 to 2F09829 were assessed.

During the static feet first tests, the test torso was not released from the harness.	Pass
During the static feet first tests, all adjusters did not slip.	Pass
All straps did not show signs of tearing.	Pass

3.3 Components Requirements

3.3.1 Load Bearing Straps

Specimen 2F09803 was assessed.

3.3.1.1	The minimum width of the load bearing straps was 44 mm. This is more than the minimum 41 mm specified.	Pass
3.3.1.2	The straps 2F09801A to 2F09801E and 2F09802A to 2F09802E withstood a tensile test of 5,000 pounds applied for 1 minute without breaking.	Pass
3.3.1.3	The material and characteristics of load-bearing straps were not assessed. Manufacturer to certify.	NAs
3.3.1.4	The ends of load bearing straps were sealed so as to prevent fraying.	Pass
3.3.1.5	Following abrasion conditioning, the straps 2F09801F to 2F09801J and 2F09802F to 2F09802J withstood a tensile test of 3,600 pounds applied for 1 minute without breaking.	Pass
3.3.1.6	Straps in contact with metal connectors at attachment elements were protected from wear.	Pass
	There were no tongue buckles incorporated into the specimens.	NAp
3.3.1.7	There were no buckle and eyelet type adjusters used in the specimens.	NAp

3.3.2 Thread and Stitching

Specimen 2F09803 was assessed.

3.3.2.1	The material and characteristics of thread used was not assessed. Manufacturer to certify.	NAs
3.3.2.2	All types of stitching were not assessed. Manufacturer to certify.	NAs
3.3.2.3	Threads used for sewing the harness were white colour. This contrasted with the black and red colours of the load bearing straps.	Pass

3.3.3 Connecting Components

Specimen 2F09803 was assessed.

3.3.3.1	Testing of connecting components was not requested.	NAs
3.3.3.2	Soft loop attachments were not used.	NAp
3.3.3.3	Soft loop attachments were not used.	NAp
3.3.3.4	Soft loop attachments were not used.	NAp

5 Marking and Instructions

5.1 Marking Requirements

5.1.1	-	Markings shall be in English.	Pass
	a	The legibility and attachment of required markings shall be designed to endure for the life of the component, subsystem or system been marked. Mfr to certify.	NAs
5.1.2		*Markings were provided electronically and used for assessment*	
	b	When pressure-sensitive labels are used, they shall comply with the applicable provision of the reference in Section 7.6. Mfr to certify.	NAs
	a	The material of construction; “Polyester”	Pass
	b	The size or range of sizes; “S-M”	Pass
	c	Part number and/or model designation; “1360001001”	Pass
	d	The month and year of manufacture; “04/2019”	Pass
	e	The manufacturer’s name or logo; “Hailo”	Pass
	f	An identifying number, unique to each individual FBH produced by the manufacturer;	Pass
	g	A warning to follow Mfr instructions included with the equipment at the time of shipment from the Mfr.	Pass
5.1.3	h	A label permanently attached to the lanyard parking attachment which either states “Park Lanyard Here. See instructions.” verbally or conveys this by means of a pictogram.	NAs
	i	A label as defined in Figure 10a and 10b.	NAs
		a) The label shall be placed in a prominent location on the FBH.	NAs
		b) If the label is part of a label pack or book, the label shall be placed so that the user will see it first.	NAs
		c) The border surrounding the label text shall be no closer than 0.4 inches (10 mm) from any other markings on the FBH.	NAs
		d) The label may be modified to include the mark of the qualification body, and may include a part number located on the label outside of the border as needed by the manufacturer as defined in figure 10a and 10b.	NAp

5.2 Instruction Requirements

The instructions to users have been assessed as detail below, with reference only to the relevant requirements of the Standard.

INSPEC Technical Services has not assessed these instructions with respect to claims made by the manufacturer outside of these requirements, and therefore accepts no responsibility for the legitimacy of any such claims.

5.2.1	Instructions shall be provided to the user in English, and affixed to the equipment at the time of shipment from the manufacturer. *User Instructions were provided electronically and used for assessment*	NAs
5.2.2	**Instructions shall contain the following information:**	
a)	Annex A in its entirety, either incorporated in the Mfr's instructions, as an appendix to the Mfr's instructions, or separately provided with the product along with the Mfr's instructions.	Pass
b)	A statement that the Mfr's instructions shall be provided to the users.	Pass
c)	Manufacturer's name, address and telephone number.	Pass
d)	Manufacturer's part number and/or model designation for the equipment.	Pass
e)	Intended use and purpose of the equipment.	Pass
f)	Length of FBH Stretch $H_{\mathbf{S}}$**,** and warning to include other factors such as D-ring/ connector length, setting of the user's body and all other contributing elements when calculating fall clearance.	Pass
g)	Proper method of use and limitations of the equipment.	Pass
h)	Illustrations showing locations and markings on the equipment.	Pass
i)	Reproduction of printed information on all markings.	Pass
j)	Inspection procedures (including frequency) required to assure the equipment is in serviceable condition and operating correctly.	Pass
k)	Criteria for discarding equipment that fails inspection.	Pass
l)	Procedures for cleaning, maintenance and storage.	Pass
m)	Reference to ANSI/ASSE Z359.11 (Full Body Harnesses) and applicable regulations governing occupational safety.	Pass
n)	Acceptable use for all attachment elements (see Annex A)	Pass
5.2.3	Instructions shall require that only the equipment Mfr, or persons or entities authorized in writing by the Mfr, make repairs to the equipment.	Pass
5.2.4	Instructions shall require the user to remove equipment from service if it has been subjected to the forces of arresting a fall and will include information on inspection of load indicators.	Pass
5.2.5	Instructions shall require the user to have a rescue plan and means at hand to implement it when using the FBH for fall arrest.	Pass

5.2.6 Instructions shall provide warnings against:

a)	Altering equipment	Pass
b)	Misusing equipment	Pass
c)	Using combinations of components or sub-systems, or both, which may affect or interfere with the safe function of each other.	Pass
d)	Exposing the equipment to chemicals, heat, flames or other environmental conditions, which may produce a harmful effect and to consult the manufacturer in case of doubt.	Pass
e)	Using the equipment around moving machinery and electrical hazards.	Pass
f)	Using the equipment near sharp edges or abrasive surfaces.	Pass
g)	Exposure to light (UV degradation)	Pass

Estimates of the uncertainty of measurement

Clause	Test		Uncertainty
3.1.1	Dorsal attachment		See Note 1
3.1.2	Sub-pelvic strap		See Note 1
3.1.3	Shoulder straps		See Note 1
	Connector		See report
3.1.4	Waist belt or back strap – control of separation of shoulder straps		See Note 1
3.1.5	Modular components or assemblies, as appropriate		See Note 1
3.1.5.1	Modular components.		See report
3.1.5.2	Attachment element extender	Length	±0.04 inches
3.1.6	Full body harness integrated into a vest		See Note 1
3.1.7	Fall Arrest Indicator		See Note 1
3.1.8	Harness with attached connecting subsystem combinations		See report
3.1.9	Strap retainers (keepers)		See Note 1
3.1.10	Lanyard parking attachment element - Disengagement load		±3.4%
3.1.11	Support – shoulders/upper torso		See Note 1
3.1.12	Location of single point attachment		See Note 1
3.1.13	Sternal attachment – bilateral elements		See Note 1
3.1.14	Sub-pelvic straps		See Note 1
3.2.1	Dorsal attachment element		See Note 1
3.2.1.3.1	Dorsal attachment element	Dynamic Feet First	±3.4%
3.2.1.3.2		Dynamic Head First	±3.4%
3.2.1.3.3	Dorsal attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.1.3.4	Fall Arrest Indicator test – dorsal attachment		See Note 1
3.2.2	Sternal attachment element		See Note 1
3.2.2.3.1	Sternal attachment element	Dynamic Feet First	±3.4%
3.2.2.3.2	Sternal attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.2.3.3	Fall Arrest Indicator test – sternal attachment		See Note 1
3.2.3	Frontal attachment element		See Note 1
3.2.3.1.1	Frontal attachment element	Dynamic Feet First	±3.4%
3.2.3.1.2	Frontal attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.4	Shoulder attachment element		See Note 1

3.2.4.1.1	Shoulder attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.5	Waist, Rear attachment element		See Note 1
3.2.5.2.1	Waist, Rear attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.6	Hip attachment element		See Note 1
3.2.6.1.1	Hip attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.2.7	Suspension Seat attachment element		See Note 1
3.2.7.1.1	Suspension Seat attachment element	Static strength	See Note 1
		Slippage	±1.3%
3.3.1.1	Straps	Width	±1.3%
3.3.1.2	Straps	Static strength	See Note 1
3.3.1.3	Straps – material and characteristics		Not applicable
3.3.1.4	Straps - terminations		See Note 1
3.3.1.5	Straps (after abrasion)	Static strength	See Note 1
3.3.1.6	Straps – contact with metal connectors		See Note 1
3.3.1.7	Buckle & eyelet type adjusters	Spacing	±0.02 inches
3.3.2.1	Threads and stitching – material		See Note 1
3.3.2.2	Lock stitching		Not applicable
3.3.2.3	Stitching – contrasting colour		See Note 1
3.3.3.1	Connecting components (except soft loops)		See report
3.3.3.2	Soft loop attachments		See Note 1
3.3.3.3	Soft loop	Static strength	See Note 1
	Soft loop (after abrasion)	Static strength	See Note 1
3.3.3.4	Soft loop attachments – protection from wear		See Note 1
5.1	Marking requirements		See Note 1
5.2	Instructions requirements		See Note 1

Note 1 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.

Note 2 The uncertainty value is based on a standard uncertainty multiplied by a coverage factor k = 2, which provides for a confidence level of approximately 95%. Values expressed as a percentage (%) are relative.

Note 3 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. Photograph of the product tested. (1 page)

END OF REPORT

Ningbo Hailo Wind Systems Co., Ltd –
Full body harness, model 1360001001 (size S-M)