

TESTING LABORATORY

PROCESS: 20164000102

TEST REPORT Nº 20164000102/30

Page 1 of 7

**PRODUCT TESTED:** Chair for educational institutions.

**TRADE NAME :** NAUTILUS **MODEL :** ERGOS 06

**TEST STANDARD :** **AS/NZS 4610.2:1999** "Furniture – School and educational – Chairs – Strength, durability and stability", **Sections:** 6.4, 6.7 e 6.11

**APPLICANT:** NAUTILUS – INDÚSTRIA E COMÉRCIO DE MOBILIÁRIO, LDA  
RUA NOSSA SRA. DA LIVRAÇÃO, Nº 1250-1300  
APARTADO 162 - GONDOMAR  
4515 – 161 – FOZ DO SOUSA  
PORTUGAL

**MANUFACTURER:** NAUTILUS – INDÚSTRIA E COMÉRCIO DE MOBILIÁRIO, LDA  
RUA NOSSA SRA. DA LIVRAÇÃO, Nº 1250-1300  
APARTADO 162 - GONDOMAR  
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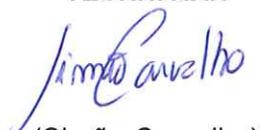
**REQUEST :** Order nº ENF A/2152996 of 2015-12-28  
E-mail of 2016-06-07

**DATE OF THE RECEPTION OF THE SAMPLE :** 2016-06-08  
2016-07-01

**DATE OF THE END OF THE TESTS :** 2016-07-04

**DATE OF THE REPORT:** 2016-07-04

TECHNICIAN

  
(Simão Carvalho)

TECHNICAL RESPONSIBLE

  
(Pedro Castro)

## 1. INTRODUCTION

The following sections of this report contain a description of the sample and the results of tests carried out at the request of the applicant, identified with the relevant sections of the standard AS/NZS 4610.2:1999.

Tests carried out to size 6, severe test level.

All tests carried out with ambient temperature of  $23 \pm 2$  °C and relative humidity  $50 \pm 5$  %hr.

## 2. SAMPLE DESCRIPTION

Chair for educational institutions:

- **Model:** ERGOS 06;
- **Dimensions:** 500 x 500 x 460 mm;
- **Colour:** light blue;
- **Size:** 6;
- **Material composition:** ADSTIF 840R (90%) and MOPLÉN 548P (10%).

**NOTE:** Information of the applicant's responsibility,



## 3. TEST PLAN

Tests according AS/NZS 4610.2:1999					
Sample	Reference	Initial inspection (6.2)	Back static load test (6.4)	Tipping forward on one front leg test (6.7)	Seat shell impact and frame detachment tests (6.11)
90/10	ERGOS 06	X	X	X	X

**NOTE:** Test plan defined by the applicant

Technician:



(Simão Carvalho)

#### **4. INSPECTION CRITERIA**

According Clause 5 of AS/NZS 4610.2:1999.

Prior to initial testing in accordance with Paragraph A4 Appendix A of AS/NZS 4610.2:1999 and after each test, the chair shall not show any of the following failure criteria:

- a) Any fracture of any member, joint or component;
- b) Any fracture, i.e. cracking through the thickness of a shell;
- c) Any loosening, shown to be permanent by hand pressure applied to suitable members, of joints intended to be rigid;
- d) Any deformation of any part of the article involving permanent change of the original dimensions by more than 5% or any cracks that will adversely affect its appearance or strength;
- e) Any impairment of the operation of any mechanical part;
- f) Any clearly audible noise developed during testing.

#### **5. INSPECTION PROCEDURE**

According Appendix A of AS/NZS 4610.2:1999.

##### **5.1 INITIAL INSPECTION PROCEDURE**

According Paragraph A.4 of AS/NZS 4610.2:1999.

The procedure shall be as follows:

- a) Immediately before commencement of testing inspect each chair thoroughly for any breakages or defects in members, joins or attachments and tighten all screws and other fittings.

The inspection shall include the following:

- i) distance between front legs at lowest point;
  - ii) distance between rear legs at lowest point;
  - iii) distance between front and rear legs on both sides of chair at lowest point;
  - iv) diagonal distance between opposite pair of legs at lowest point;
  - v) the distance between the arms if arms are fitted; and
  - vi) the distance between a mark placed on the front edge of the seat and a mark placed on the top of the back.
- b) Tighten fittings in self-assembly chairs before testing.
  - c) Carry out a dimensional check of the chair especially at points likely to suffer permanent deformation as a result of testing.

##### **5.2 FINAL INSPECTION PROCEDURE**

According Paragraph A.5 of AS/NZS 4610.2:1999.

On completion of testing, re-measure all those measurements taken in Paragraph A.4 of AS/NZS 4610.2:1999. Note any of the criteria that differ from those from the initial measurements.

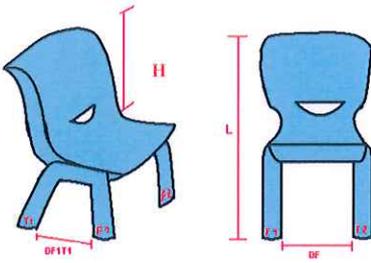
Technician:



(Simão Carvalho)

## 6. TEST RESULTS

NOTE: Tests carried out according AS/NZS 4610.2:1999.

Clause 6 - PERFORMANCE REQUIREMENTS - STRENGTH	NOTES	RESULT																				
<p><b>6.2 - Initial inspection</b></p> <p>The chair shall be inspected and measured in accordance with Appendix A and shall not show any of the failure criteria listed in Clause 5.</p>	<p>Initial inspection according Clause 5</p> <p>The sample does not have any defects or damages that could affect the results of the tests.</p> <p>Initial inspection according Appendix A - Dimensional check</p>  <table border="1" data-bbox="853 1093 1109 1393"> <thead> <tr> <th colspan="2">Dimensions (mm)</th> </tr> </thead> <tbody> <tr> <td>DF</td> <td>428</td> </tr> <tr> <td>DT</td> <td>436</td> </tr> <tr> <td>DF1T1</td> <td>408</td> </tr> <tr> <td>DF2T2</td> <td>407</td> </tr> <tr> <td>DF1T2</td> <td>620</td> </tr> <tr> <td>DF2T1</td> <td>618</td> </tr> <tr> <td>H</td> <td>363</td> </tr> <tr> <td>L</td> <td>763</td> </tr> <tr> <td>M</td> <td>462</td> </tr> </tbody> </table> <p>DF - distance between front legs at lowest point;  DT- distance between rear legs at lowest point;  DF1T1 and DF2T2 - distance between front and rear legs on both sides of chair at lowest point;  DF1T2 and DF2T1 - diagonal distance between opposite pair of legs at lowest point;  H - Chair back height;  L - total height of the chair;  M - distance between a mark placed on the front edge of the seat and a mark placed on the top of the back.</p>	Dimensions (mm)		DF	428	DT	436	DF1T1	408	DF2T2	407	DF1T2	620	DF2T1	618	H	363	L	763	M	462	
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Technician:



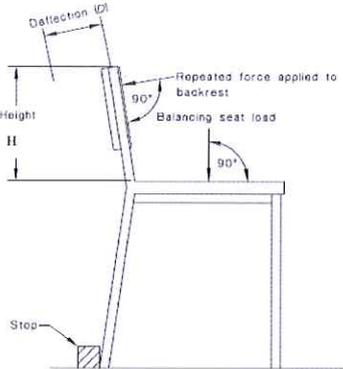
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<b>Clause 6 - PERFORMANCE REQUIREMENTS - STRENGTH (Continuation)</b>	<b>NOTES</b>	<b>RESULT</b>																														
<p><b>6.4 – Back static load test</b></p> <p>When tested in accordance with Appendix C and with the force specified in Table 1, the chair shall not show any of the failure criteria listed in Clause 5. The flexibility quotient shall not exceed 0,2.</p>  $\text{Flexibility quotient} = \frac{D}{H} \leq 0,2$ <p><math>D</math> = deflection (mm)  <math>H</math> = chair back height (mm)</p>	<p><b>Test conditions:</b></p> <p><b>Chair sizemark:</b> 6;  <b>Test level:</b> severe;  <b>Horizontal force:</b> 760 N;  <b>Balancing load:</b> 1800 N;  <b>Applications:</b> 10.</p> <p><b>Results:</b></p> <p><b>Flexibility quotient</b></p> $\text{Flexibility quotient} \left( \frac{D}{H} \right) = 0,23$ <p>(<math>D = 83</math> mm and <math>H = 363</math> mm)</p> <p><b>NOTE:</b> It is considered for acceptance rounding to one decimal place.</p> <p><b>Inspection after testing according Clause 5</b></p> <p>After test, the chair did not show any defects or damages.</p> <p><b>Inspection after testing according Appendix A - Dimensional check</b></p> <table border="1" data-bbox="746 1249 1206 1556"> <thead> <tr> <th colspan="2">Dimensions after testing (mm)</th> <th>Change of the original dimensions (%)</th> </tr> </thead> <tbody> <tr> <td><math>DF</math></td> <td>428</td> <td>0</td> </tr> <tr> <td><math>DT</math></td> <td>437</td> <td>0.2</td> </tr> <tr> <td><math>DF1T1</math></td> <td>407</td> <td>-0.3</td> </tr> <tr> <td><math>DF2T2</math></td> <td>407</td> <td>0</td> </tr> <tr> <td><math>DF1T2</math></td> <td>619</td> <td>-0.2</td> </tr> <tr> <td><math>DF2T1</math></td> <td>619</td> <td>0.2</td> </tr> <tr> <td><math>H</math></td> <td>363</td> <td>0</td> </tr> <tr> <td><math>L</math></td> <td>765</td> <td>0.3</td> </tr> <tr> <td><math>M</math></td> <td>466</td> <td>0.9</td> </tr> </tbody> </table>	Dimensions after testing (mm)		Change of the original dimensions (%)	$DF$	428	0	$DT$	437	0.2	$DF1T1$	407	-0.3	$DF2T2$	407	0	$DF1T2$	619	-0.2	$DF2T1$	619	0.2	$H$	363	0	$L$	765	0.3	$M$	466	0.9	<p style="text-align: center;">PASS</p>
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Clause 6 - PERFORMANCE REQUIREMENTS - STRENGTH (Continuation)	NOTES	RESULT																																															
<p><b>6.7 – Tipping forward on one front leg test</b></p> <p>When tested in accordance with Appendix F and with the force specified in Table 1, the chair shall not show any of the failure criteria listed in Clause 5 nor any change in the chair leg angle of more than 3°. The flexibility quotient of the leg shall not exceed 0,1 in either the longitudinal or transverse</p> $\text{Flexibility quotient} = \frac{\delta}{h} \leq 0,1$ <p><math>\delta</math> = deflection of the leg (mm)  <math>h</math> = length of the leg (mm)</p>	<p><b>Test conditions:</b></p> <p><b>Applied force:</b> 450 N;  <b>NOTE:</b> Test carried out on the F1 leg with the chair upside down.</p> <p><b>Results:</b></p> <p><b>Changes in the angles of the leg</b></p> <table border="1" data-bbox="842 757 1129 869"> <thead> <tr> <th colspan="3"><math>\alpha_t</math> (°)</th> </tr> <tr> <th>Initial</th> <th>Final</th> <th><math>\Delta</math></th> </tr> </thead> <tbody> <tr> <td>89</td> <td>88</td> <td>1</td> </tr> </tbody> </table> <table border="1" data-bbox="842 891 1129 1003"> <thead> <tr> <th colspan="3"><math>\alpha_l</math> (°)</th> </tr> <tr> <th>Initial</th> <th>Final</th> <th><math>\Delta</math></th> </tr> </thead> <tbody> <tr> <td>79,9</td> <td>79,9</td> <td>0</td> </tr> </tbody> </table> <p><math>\alpha_t</math>: angle of the leg in the transverse plane;  <math>\alpha_l</math>: angle of the leg in the longitudinal plane.</p> <p><b>NOTE:</b> Angles measured regarding to horizontal plane.</p> <p><b>Flexibility quotient</b></p> <p><b>Transverse</b></p> $\text{Flexibility quotient} = \frac{\delta}{h} = 0,13$ <p>(<math>\delta = 51</math> mm and <math>h = 394</math> mm)</p> <p><b>Longitudinal</b></p> $\text{Flexibility quotient} = \frac{\delta}{h} = 0,07$ <p>(<math>\delta = 28</math> mm and <math>h = 394</math> mm)</p> <p><b>NOTE:</b> It is considered for acceptance rounding to one decimal place.</p> <p><b>Inspection after testing according Clause 5</b></p> <p>After test, the chair did not show any defects or damages.</p> <p><b>Inspection after testing according Appendix A - Dimensional check</b></p> <table border="1" data-bbox="754 1682 1214 1989"> <thead> <tr> <th>Dimensions after testing (mm)</th> <th>Change of the original dimensions (%)</th> </tr> </thead> <tbody> <tr> <td>DF</td> <td>427</td> <td>-0.2</td> </tr> <tr> <td>DT</td> <td>434</td> <td>-0.5</td> </tr> <tr> <td>DF1T1</td> <td>407</td> <td>-0.3</td> </tr> <tr> <td>DF2T2</td> <td>408</td> <td>0.3</td> </tr> <tr> <td>DF1T2</td> <td>617</td> <td>-0.5</td> </tr> <tr> <td>DF2T1</td> <td>617</td> <td>0.2</td> </tr> <tr> <td>H</td> <td>364</td> <td>0.3</td> </tr> <tr> <td>L</td> <td>765</td> <td>0.3</td> </tr> <tr> <td>M</td> <td>466</td> <td>0.9</td> </tr> </tbody> </table>	$\alpha_t$ (°)			Initial	Final	$\Delta$	89	88	1	$\alpha_l$ (°)			Initial	Final	$\Delta$	79,9	79,9	0	Dimensions after testing (mm)	Change of the original dimensions (%)	DF	427	-0.2	DT	434	-0.5	DF1T1	407	-0.3	DF2T2	408	0.3	DF1T2	617	-0.5	DF2T1	617	0.2	H	364	0.3	L	765	0.3	M	466	0.9	<p style="text-align: center; font-size: 24px;">PASS</p>
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<p>6.11 - Seat shell impact and frame detachment tests</p> <p>When tested in accordance with Appendix J, the chair shall not show any of the failure criteria listed in Clause 5.</p>	<p>Results:</p> <p>Inspection after testing according Clause 5</p> <ul style="list-style-type: none"> <li>- Impact test to top corner of back: After test, the chair did not show any defects or damages.</li> <li>- Impact test to top of back: After test, the chair did not show any defects or damages.</li> <li>- Impact test to rear face of back: After test, the chair did not show any defects or damages.</li> <li>- Impact test to front corner of seat: After test, the chair did not show any defects or damages.</li> </ul> <p>Inspection after testing according Appendix A - Dimensional check</p> <table border="1" data-bbox="751 1055 1209 1361"> <thead> <tr> <th colspan="2">Dimensions after testing (mm)</th> <th>Change of the original dimensions (%)</th> </tr> </thead> <tbody> <tr><td>DF</td><td>427</td><td>-0.2</td></tr> <tr><td>DT</td><td>435</td><td>-0.2</td></tr> <tr><td>DF1T1</td><td>407</td><td>-0.3</td></tr> <tr><td>DF2T2</td><td>407</td><td>0</td></tr> <tr><td>DF1T2</td><td>617</td><td>-0.5</td></tr> <tr><td>DF2T1</td><td>615</td><td>-0.5</td></tr> <tr><td>H</td><td>363</td><td>0</td></tr> <tr><td>L</td><td>765</td><td>0.3</td></tr> <tr><td>M</td><td>466</td><td>0.9</td></tr> </tbody> </table>	Dimensions after testing (mm)		Change of the original dimensions (%)	DF	427	-0.2	DT	435	-0.2	DF1T1	407	-0.3	DF2T2	407	0	DF1T2	617	-0.5	DF2T1	615	-0.5	H	363	0	L	765	0.3	M	466	0.9	<p>PASS</p>
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**7 – CONCLUSIONS**

For the tests carried out, the results are in accordance with the requirements of AS/NZS 4610.2:1999.

Technician:



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