1st Annual Meeting of the Asian and Pacific Network for Testing of Agricultural Machinery

18th of September 2014
Beijing, China

Michael Ryan
Namal Samarakoon
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Sandro Liberatori
Natascia Maisano
The future of the Agricultural Mechanization in Asia and the Pacific

towards a sustainable use of farm machines
Global Harmonisation of Standards, Test procedures and Certification

- **Standards**
  
  As defined by ISO: “document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, processes and services are fit for their purpose”.....
  
  .... and CEM adds: “standards are created by bringing together all interested parties such as manufacturers, consumers and regulators of a particular material, product, process or service”

- **Test procedures**
  
  A test is a procedure for critical evaluation

- **Certification**
  
  The provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements”
International Networks for Testing
ENAMA is a founder member of ENTAM (European Network for Testing of Agricultural Machines). It's an international effort to guarantee independent and harmonised testing systems.

Regarding the voluntary or compulsory testing in the field of agricultural engineering ENTAM testing stations assess:

- performances
- safety
- environmental protection
- animal welfare requirements in animal husbandry
**ENTAM Main activities**

- **Studies and researches**: improving the performance of agricultural machinery and sharing best practices;
- **Innovation**: development of best technologies;
- **Standardisation**: common testing activity and mutual recognition of the tests on the basis of common testing procedures or methodologies;
- **Certification**: in accordance with OECD Codes.

ENTAM is currently made up of 11 members, 1 honorary witness (FAO) and 4 observer members (INTA, AFMSPTC, CEA, VIM) respectively from Argentina, Bulgaria, Brazil, Russia.
Sprayer type: Trained Field Crop Sprayer
Trade mark: CAFFINI
Model: Prestige 2800/24

Manufacturer: Caffini spa
Via Marconi, 2
I - 37050 Palù (VR)

Test report: 05/157
October 2009

Free download of the complete test report under: www.ENTAM.net
or: www.ENAMA.it
**Description of implement**

The implement is a trailed sprayer for use on herbaceous crops. The sprayer is attached to the tractor through the towing hook (steering drawbar optional). The axel is fitted by hydraulic suspension.

The frame of the machine is made of painted steel, the main and auxiliary tanks are made of polyethylene. A gauge is located on the front left of the main tank. The liquid level is indicated by a transparent external tube with float. Agitation is through hydraulic stirrers located on the bottom of the tank. The tank is completely emptied using a valve located on the left side. Access to the main tank is through an ad hoc raised platform situated on the left side. The implement has a range of models, having a main tank nominal capacity of 2200, 2800 and 3300 l. The implement is powered through the tractor PTO having a rated speed of 540 rpm.

The implement has a diaphragm pump located in front of the main tank. Pressure regulation and liquid dispensing are controlled using electrically operated controls that can be placed in the tractor cab.

There are 2 filters: one suction filter, which can be inspected even if the main tank is full, and one pressure filter.

The boom, having a working width of 18, 21, 24, 27 and 28 m, is made out of painted steel. During transport it is folded on the side of the tank using ad hoc supports used to block the implement. The boom optionally can be fitted with air assistance. The air flow is obtained by a 800 mm axial fan hydraulically driven.

The boom is attached to the support frame through a parallelogram connection, while the boom support is a collapsible trapezoidal joint. Adjusting of the boom position and opening-closing operations are electro-hydraulically operated through a control panel that can be positioned close to the driver’s seat or using directly the tractor’s hydraulic distributors. The blocking of boom oscillation is automatic when the boom is being closed.

Liquid is sprayed under pressure. The nozzle holders are equipped with a diaphragm antidrip device. The valves for managing the hydraulic circuit (spraying/cleaning) are located in the front left side.

The pressure gauge for checking operating pressure is positioned on the front of the main tank. It has a diameter of 100 mm, end scale of 25 bar and is in intervals of 0.1 bar.

An induction hopper is installed on the left side of the machine for the pre-mixing of chemical products.

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### Sizes and weights

<table>
<thead>
<tr>
<th>extension</th>
<th>length (mm)</th>
<th>width (mm)</th>
<th>max height (mm)</th>
<th>volume (l)</th>
<th>dry matter (kg)</th>
<th>dry matter (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a PRESTIGE 2800/24</td>
<td>6000</td>
<td>2500</td>
<td>3200</td>
<td>3110</td>
<td>4150</td>
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<tr>
<td>b PRESTIGE 2800/24</td>
<td>6000</td>
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<td>3200</td>
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<td>4150</td>
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</tbody>
</table>

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### Induction hopper for loading chemical products

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### Valve unit

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### Boom attachment

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### External cleaning

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Main results of functional tests

<table>
<thead>
<tr>
<th>Residual (l)</th>
<th>15.50</th>
<th>6.70</th>
<th>5.90</th>
<th>5.90</th>
<th>5.80</th>
<th>6.80</th>
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<tr>
<td>in the tank</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>horizontal</td>
<td></td>
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<td></td>
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<tr>
<td>with back flow - with agitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with back flow - without agitation</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>without back flow - without agitation</td>
<td>6.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inclined to right</td>
<td>5.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inclined to left</td>
<td>5.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inclined to rear</td>
<td>5.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inclined to front</td>
<td>6.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the hoses: dilutable</td>
<td>9.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>dilutable residual</td>
<td>17.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>in the hoses: non-dilutable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>boom width</td>
<td>18 m</td>
<td>24 m</td>
<td>28 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.10</td>
<td>13.50</td>
<td>15.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total residual</td>
<td>26.20</td>
<td>30.60</td>
<td>32.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>boom width</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 m</td>
<td>2200 l</td>
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<td></td>
<td></td>
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<tr>
<td>24 m</td>
<td></td>
<td>2800</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 m</td>
<td></td>
<td></td>
<td>3300</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Liquid that can flow back into the main tank and can be diluted by the working tank contents.
2 Liquid that not can flow back into the main tank.

Agitator performance

- Copper oxychloride concentration measured during the tank emptying, after 16 hours standing and 10 minutes of agitation.

Fan 800 mm - 2300 rpm

<table>
<thead>
<tr>
<th>boom</th>
<th>21 m</th>
<th>24 m</th>
<th>28 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>flow rate (m³/h)</td>
<td>25 480</td>
<td>32 880</td>
<td>37 810</td>
</tr>
<tr>
<td>mean velocity (m/s)</td>
<td>6.1</td>
<td>5.9</td>
<td>4.6</td>
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<tr>
<td>mean direction</td>
<td>82° - 98°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pressure gauge

| diameter | 100 mm |
| distance between marks | 0.10 bar |
| accuracy | 0.15 bar |

Transverse distribution

Nozzle TeeJet XR11004 @ 0.60 m height

<table>
<thead>
<tr>
<th>working pressure (bar)</th>
<th>18</th>
<th>20</th>
<th>21</th>
<th>24</th>
<th>27</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>6.60</td>
<td>6.60</td>
<td>6.90</td>
<td>6.90</td>
<td>6.40</td>
<td>6.50</td>
</tr>
<tr>
<td>3.0</td>
<td>5.80</td>
<td>5.90</td>
<td>6.10</td>
<td>6.40</td>
<td>6.20</td>
<td>6.30</td>
</tr>
<tr>
<td>5.0</td>
<td>5.60</td>
<td>5.80</td>
<td>6.00</td>
<td>6.30</td>
<td>6.10</td>
<td>6.20</td>
</tr>
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</table>

Testing of Safety

The machine is endowed with CE marking, an identification plate, safety pictograms, an instruction handbook and an EC manufacturer’s declaration of conformity.

The implement meets the requirements of Enama safety regulations cat. 05.05 – Crop protection machines: Towed boom sprayers - rev. 2.4 of 1/04/2008, containing the following harmonised standards and technical specifications: UNI EN 907: 1998, UNI EN 1553: 2001, ISO 11684: 1995. The relative documentation has been filed.

Explanation on testing

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel 3). This procedure was developed by the competent testing authorities of the European countries participating in ENTAM and is based on the CEN standard EN 12761 “Agricultural and forestry machinery – Plant protection equipment for the application of plant protection products and liquid fertilizers”. This test is only a technical performance test which takes place without an accompanying field test.

The test results apply only to the tested appurtenances of the sprayer. Statements on the behaviour of the sprayer with different appurtenances cannot be derived from this results.
# Responsibility and recognition

**Performing competent authority:**
Crop Protection Technology DEIafa - meccanica  
Via L. da Vinci, 44  
I -10095 Grugliasco (TO)

This test is recognized by the ENTAM members:

<table>
<thead>
<tr>
<th>ART</th>
<th>Agroscope Reckenholz-Taenikon Research Station - SWITZERLAND</th>
<th>I-43.09</th>
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<tbody>
<tr>
<td>AU/DAE</td>
<td>University of Aarhus - Department of Agricultural Engineering - DENMARK</td>
<td>AU DAE ENTAM 2009-13</td>
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<tr>
<td>Cemagref</td>
<td>Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement – FRANCE</td>
<td>CEMAGREF/ENTAM/09/025</td>
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<tr>
<td>CMA</td>
<td>Centre de Mecanització Agrària - SPAIN</td>
<td>EPH005/09</td>
</tr>
<tr>
<td>HBLFA</td>
<td>Francisco Josephinum Wieselburg - BIOMASS</td>
<td>LOGISTICS</td>
</tr>
<tr>
<td>JKI</td>
<td>Julius Kühn-Institut (formerly BBA) – GERMANY</td>
<td>ENT-I-07/09</td>
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<tr>
<td>MGI</td>
<td>MEZOGAZDASÁGI GÉPESÍTÉSI INTÉZET Hungarian Institute of Agricultural Engineering - HUNGARY</td>
<td>I-23 2009</td>
</tr>
<tr>
<td>N.AG.RE.F</td>
<td>National Agricultural Research Foundation - GREECE</td>
<td>ΑΕ/122/01/ZZ</td>
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<tr>
<td>PIMR</td>
<td>Przemysłowy Instytut Maszyn Rolniczych - Industrial Institute of Agricultural Engineering - POLAND</td>
<td>PIMR-31/ENTAM/09</td>
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</tbody>
</table>
Countries Participating in the OECD Tractor Codes 2012

[Map showing countries with different colors indicating Tractor Codes Member Countries, Future Accession Countries, and Preliminary discussions.]
OECD Codes

**Code 2**
Testing of agricultural and forestry tractor performance.

**Code 3**
Testing of the strength of *protective structures* for agricultural and forestry tractors *(dynamic test).*

**Code 4**
Testing of the strength of *protective structures* for agricultural and forestry tractors *(static test).*

**Code 5**
*Noise measurement* at the driver’s position(s).

**Code 6**
Testing of *front-mounted protective structures on narrow-track wheeled* agricultural and forestry tractors.

**Code 7**
Testing of the *rear-mounted protective structures on narrow-track wheeled* agricultural and forestry tractors.

**Code 8**
Testing of *protective structures on tracklaying tractors.*

**Code 9**
*Protective structures for telehandlers* (testing of falling-object and roll-over protective structures fitted to self-propelled variable reach all-terrain trucks for agricultural use).

**Code 10**
Testing of *Falling object protective structures*
Approval process

- Manufacturers
  - Request
- Testing Station
  - Tests performance
  - Test report submission
- Coordinating Centre (ENAMA)
  - Verification activity
  - Approval release
- OECD Secretariat
  - Monitoring
OECD Coordinating Centre

To ensure

• Test stations fulfill the Codes requirements
• Accurate and Fast Verification of test reports
• Traceability and data availability
• Guarantee and protection of all parts involved
ANTAM Structure

- Steering Committee
- Secretariat
- Technical Working Group
- Co-ordinating Centre
- Annual Meeting
- Technical subWorking Group
- Members
- Observers
ANTAM objectives

• The *Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM)* stands for the connection between UN agencies and government representatives and national testing stations of agricultural machinery of participating countries, research institutes, associations related to agricultural mechanization and farmers organizations.

• ANTAM is aimed to **promote harmonization of testing codes and standards of agricultural machinery** applied in the Asia-Pacific region that address quality, performance, occupational safety and environmental aspect of agricultural machinery.

• It provides a *regional platform* for member countries to exchange technologies, share knowledge, expertise and best practices to upgrade the existing testing capacity and promote quality of agricultural machinery.
ANTAM Function

• Be the **platform** for national testing centres/stations
• Provide a discussion forum *for developing and harmonizing testing codes and standards* of sustainable agricultural machinery
• Provide a **database and reference point** for agricultural machinery testing
• Facilitate the adoption of an **agreed methodology**
• Act as a **coordinating and independent agency** to guarantee a fair adoption of procedures and test results
• Provide information to public and private stakeholders properly
Network as Antam will help:

- **WTO Agreement on Technical Barriers to Trade:** "Development and trade for a sustainable agriculture, avoiding unnecessary obstacles"
- Overcome barriers to regional and global trade including successful strategies for stakeholders to enter new markets
- Good performing tested machines
- ** Guarantee all stakeholders (public and private)**
- Sharing of expertise
In order to make the work more efficient it is necessary to:

1 Nominate Members of the TWG

2 Identify priorities

3 Propose a clear work program

4 Identify a Technical Reference Centre acting as an independent body

5 Provide results before the 2° Annual Meeting of ANTAM
Every Member country should nominate one/two expert/s to participate in the Technical Working Group (TWG) and send her/his name and references to the Secretariat before the end of October 2014. Then the ANTAM Secretariat should prepare a list of the representatives in the TWG and organise the work.
Member Countries decided during the 2013 Meeting to consider the following priorities of machines to be included in the ANTAM activities: tractors (ROPS), sprayers (with priority to knapsack sprayers), cultivators, paddy threshers, irrigation equipment.

In this first stage to be performed during 2014 and 2015 the methodologies and tests will be developed on tractors (ROPS) and sprayers (knapsack sprayers). The Steering Committee will review the technical papers and proposals will be circulated for comments.
The Technical Working Group should approve and provide to the Secretariat before the end of April 2015 the testing procedures on ROPS for tractors and knapsack sprayers. These testing procedures should be considered as version 0.1 to be presented for official approval during the second Annual Meeting of ANTAM.
Member countries should decide on the appointment of an independent TRC centre providing the support for the technical approval of test report on the basis of the testing procedures developed by the TWG. The TRC activity may be performed by ENAMA, given its role as a founding Member of the ENTAM (*European Testing for Agricultural Machines*) network and Co-ordinating centre of the OECD Tractor Codes. ENAMA should also have a liaison role for further co-operation with OECD, ENTAM, FAO and UNIDO.
The Technical Reference Centre (TRC) will be established with the aim to check the technical content of incoming reports performed according to the ANTAM procedures and to support the Secretariat. The TRC will be an independent body not involved in the performance of ANTAM testing activity in order to assure a third party assessment. The TRC will have no decision making responsibility and will have no influence on the trade in Member countries. The TRC will provide for close relation with OECD, ENTAM and other international networks in the field of testing agricultural machines in order to improve the efficiency of ANTAM activities.
The Member countries participating in the Technical Working Groups may provide at least 1 test report regarding ROPS for tractors and knapsack sprayers based on the ANTAM testing procedure version 0.1. The Steering Committee together with the TRC should review the test reports and make suggestions on the presentation and format according to international regulations.

The second Annual meeting of ANTAM should approve the format and how to present results of the activity to stakeholder and public/private Institutions.
For further informations, visit:

http://www.entam.net/index.php
http://www.oecd.org/agriculture/code/tractors.htm
http://www.enama.it/it/index.php

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natascia.maisano@enama.it