



The European Vending Association

TEMPERATURE MEASUREMENT PROTOCOL

EVA – TMP

April 2004

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Acknowledgements and thank you

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History of the document and contacts

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Executive Summary

The EVA Temperature Measurement Protocol was written in order to test the effectiveness of the refrigeration system of refrigerated food vending machines to maintain air temperature.

Temperature limits may vary from one country to another with regard to certain potentially hazardous food when stored at a certain temperature. The document was written, in the sole scope of providing operators with yet another means of comparison while buying a refrigerated vending machine.

1. Scope

1.1. This EVA testing protocol is designed to test the effectiveness of the refrigeration system of refrigerated food vending machines to maintain air temperature.

1.2. Each country defines by law the temperature limit above which certain **potentially hazardous food** may be stored at, the results generated from this protocol will be of particular use when trying to select a machine for a certain type of food.

2. Definitions

2.1. **Potentially hazardous food**: Any food which consists in whole or in part of natural or synthetic ingredients which are in a form for which laboratory evidence demonstrates a capability for supporting rapid and progressive growth of pathogenic or toxin producing micro-organisms.

Examples of **potentially hazardous food** are milk, eggs, meat, poultry, shellfish, crustacean, and their products, either raw or heat treated. Food of plant origin which is ready for consumption without the need for any further preparation or processing is also an example.

2.2. EN60335-2-75: This is the European product safety standard for vending and dispensing machines and in addition to requirements for electrical and mechanical safety includes requirements for health and hygiene.

3. Test Conditions & Set Up

3.1. Measurement sensor accuracy shall be +/- 0.5 °C, +/- 5% RH.

3.2. The machine must be configured with the maximum number of trays / levels dedicated to potentially hazardous food.

3.3. Figure 1 in annexe A shows the probe set up throughout the height of the machine. The temperature must be tested on at least every other tray and always top and bottom.

3.4. Figure 2 in annexe A shows the distribution of probes at each level dependent upon the type of machine (drum or tray).

3.5. On a drum machine each level to be tested should have 4 locations selected for the probes. These should be equidistant from each other at mid depth inside each compartment as shown in annexe A figure 2.

3.6. On a spiral food machine 50% of the space must be configured with single selections and 50% with double selections. On each tray 5 sensors will be positioned as shown in annexe A figure 2.

3.7. On other types of food machines the arrangement of sensors needs to be consistent with those described above.

3.8. No food is used for the testing, it is air temperature that is measured.

4. Tests

4.1. Tests shall be conducted at both the following ambient conditions:

- +32 °C +/- 2 °C, 65% RH +/- 5%.
- +15 °C +/- 2 °C, 45% RH +/- 5%.

4.2. Set thermostat for target temperature maintenance.

4.3. Switch on machine.

4.4. Wait for at least 6 hours after the first switch of the thermostat.

4.5. Start to record temperature at all probes for 24 hours.

4.6. A sampling frequency of at least 1 measurement per minute per probe must be used.

5. Reporting

5.1. Two sets of graphs shall be provided one set for each of the ambient test conditions expressed in section 4.1.

5.2. There shall be one graph for each level being tested with all probes on that level being presented on the one graph. For example on an eight drum food machine there would be 5 graphs. An example is presented in Annex B for one of the test conditions at $+32\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, 65% RH $\pm 5\%$.

NOTE: There will periodic peaks of temperature shown on the graphs, these are caused by the defrost cycle of the refrigeration unit.

5.3. There shall be a front page to the report giving information relating to the product under test. A completed example is presented in annex C.

5.4. There should be a graphical representation showing where each probe is located. An example is shown in Annex D.

ANNEX A – Probe Locations On Trays And Drums

FIGURE 1.

Sensors should be placed alternately but in any case in the top and bottom drum or tray

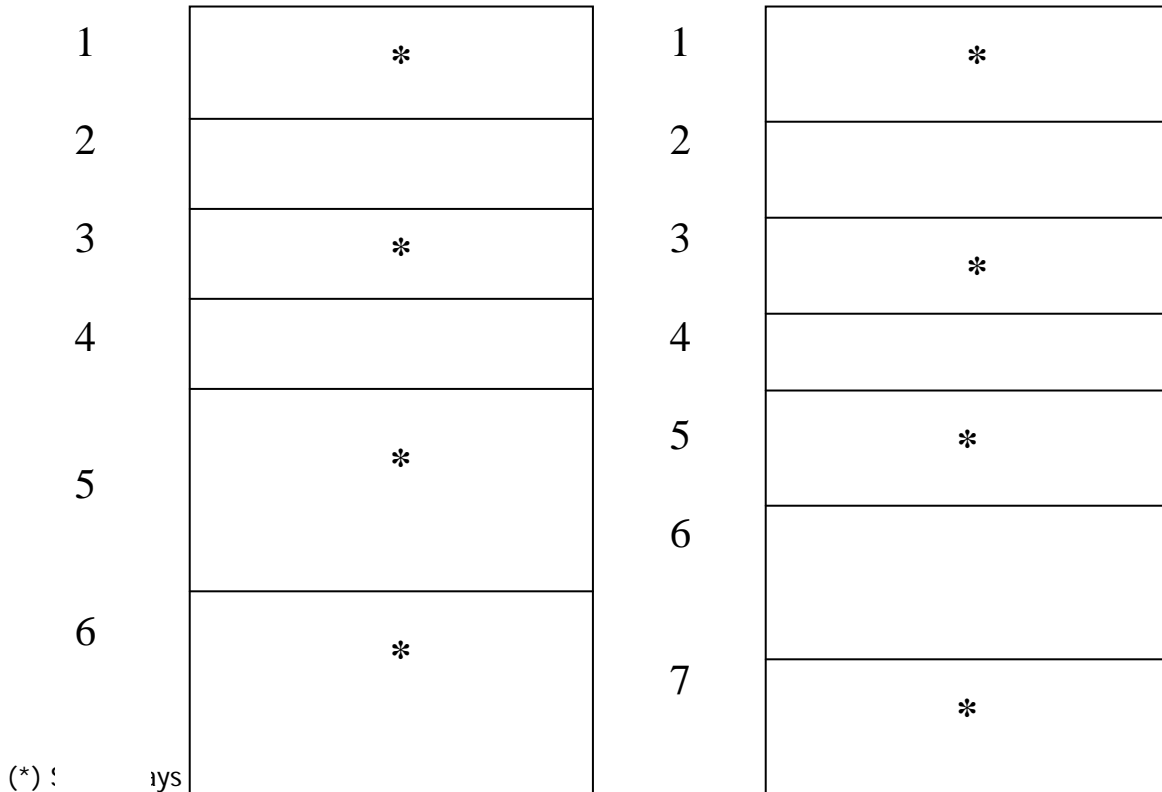
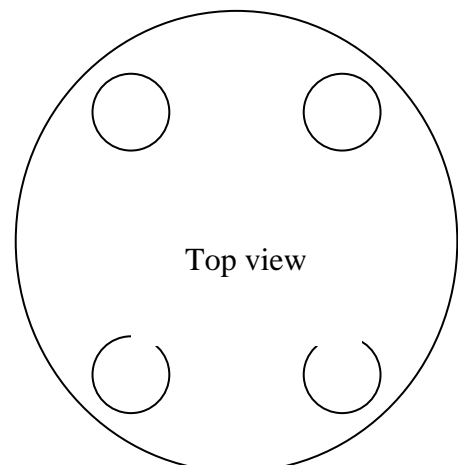
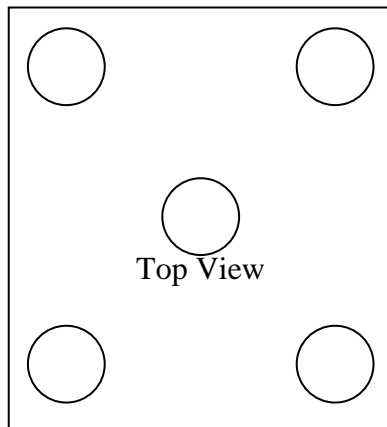


FIGURE 2.

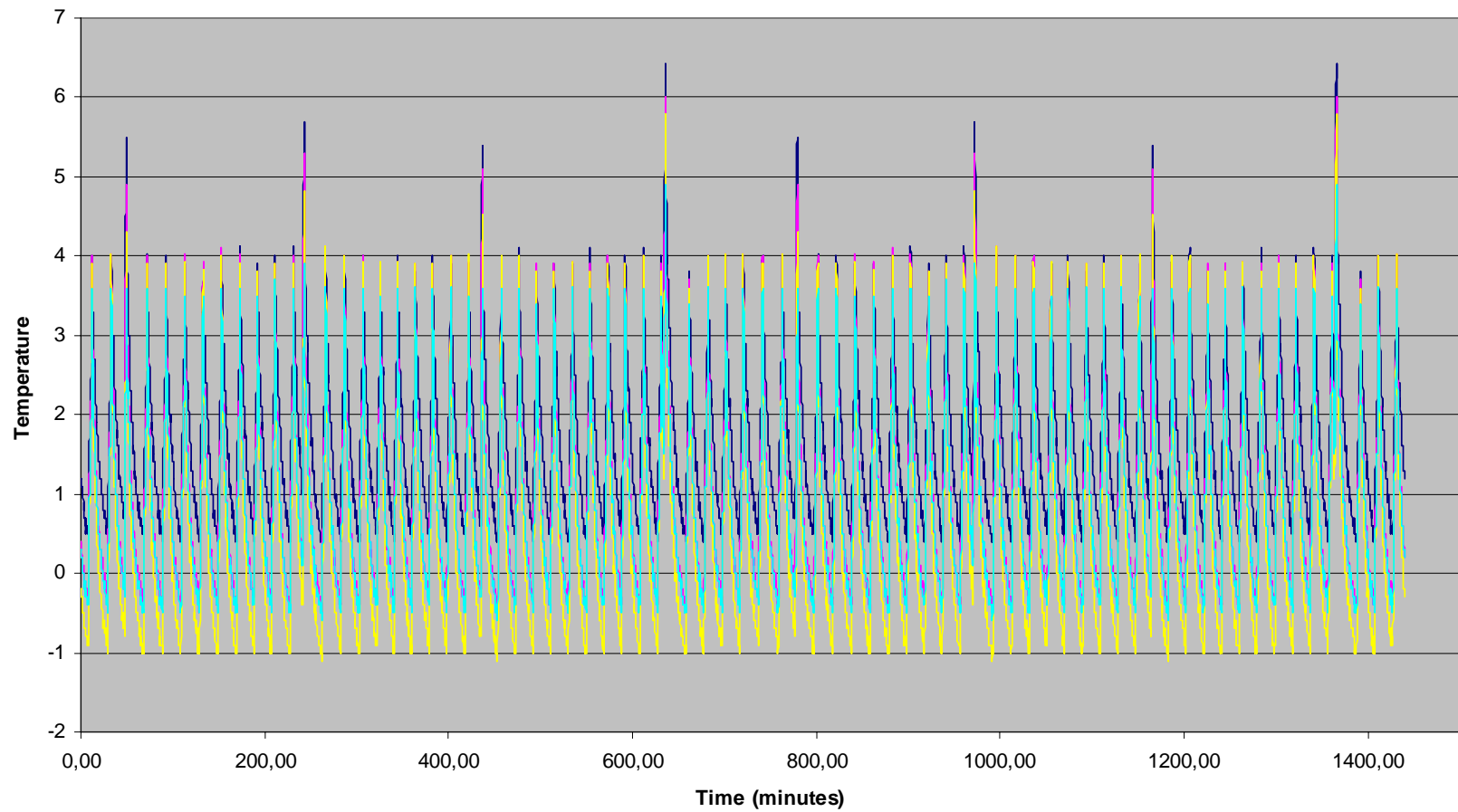
Position of the sensors on a spiral tray.

Position of sensors across 4 compartments on one drum level.

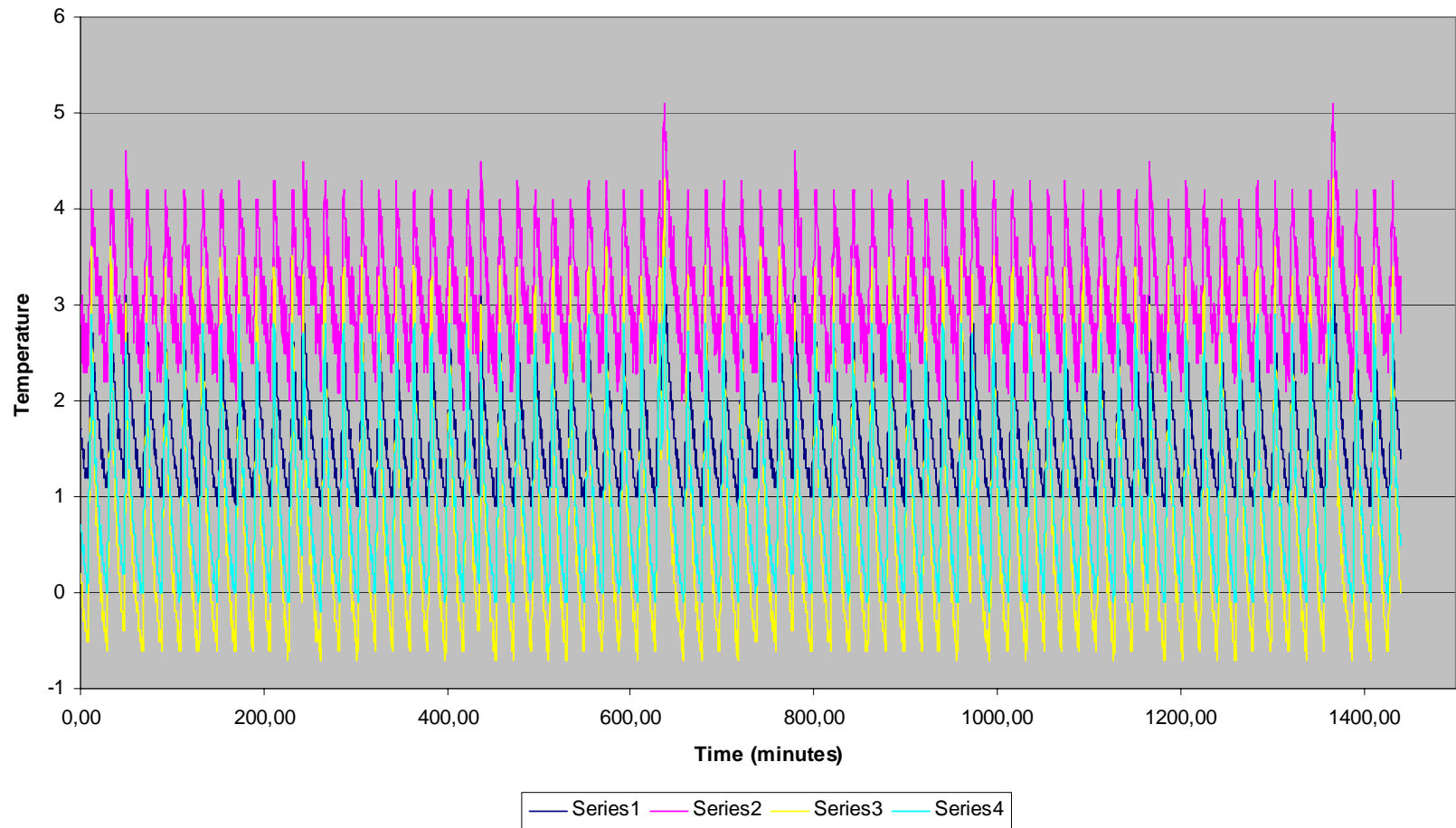


ANNEX B : Temperature tests

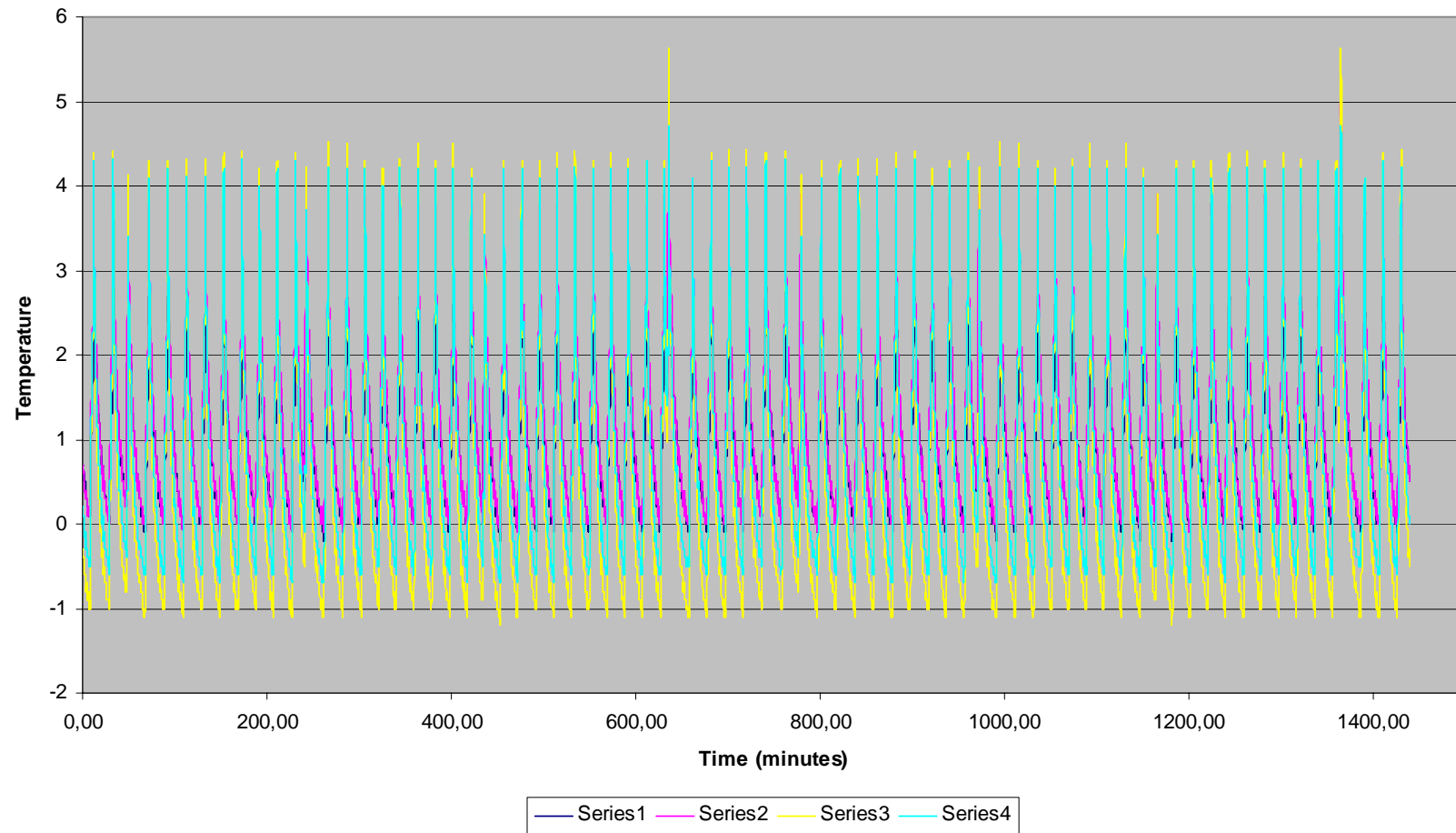
Top Drum



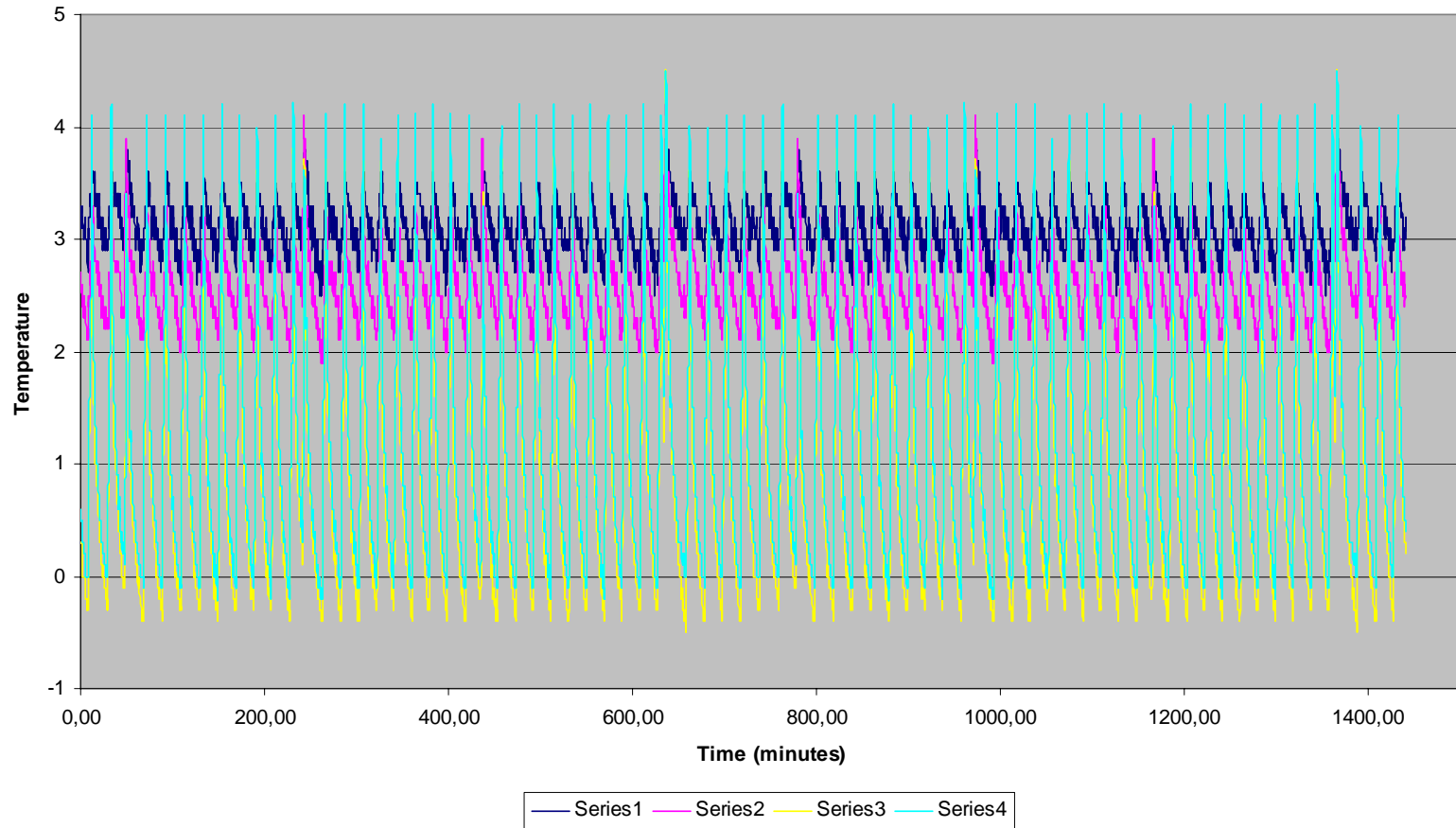
Drum 3



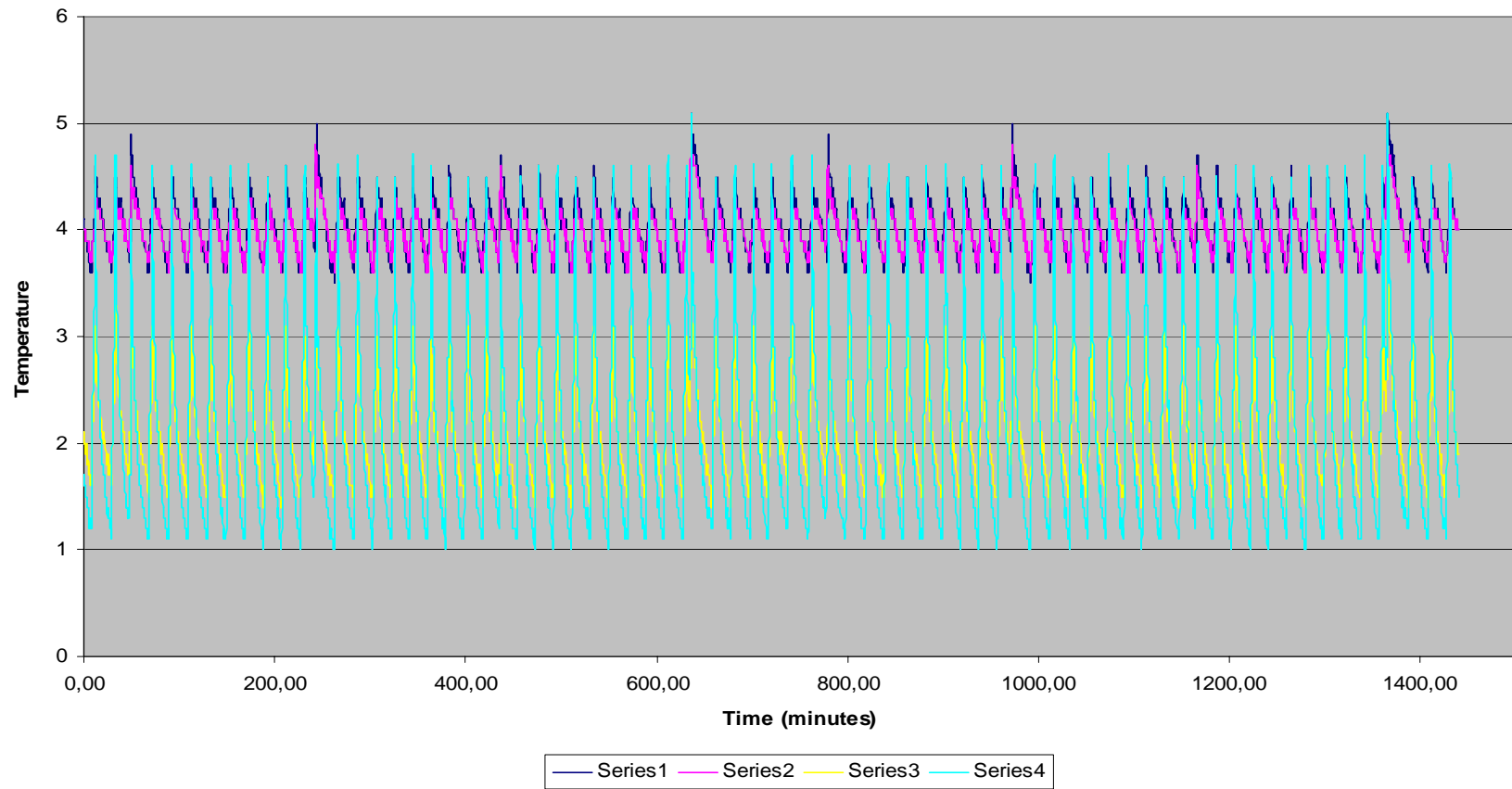
Drum 5



Drum 7



Bottom Drum (8)

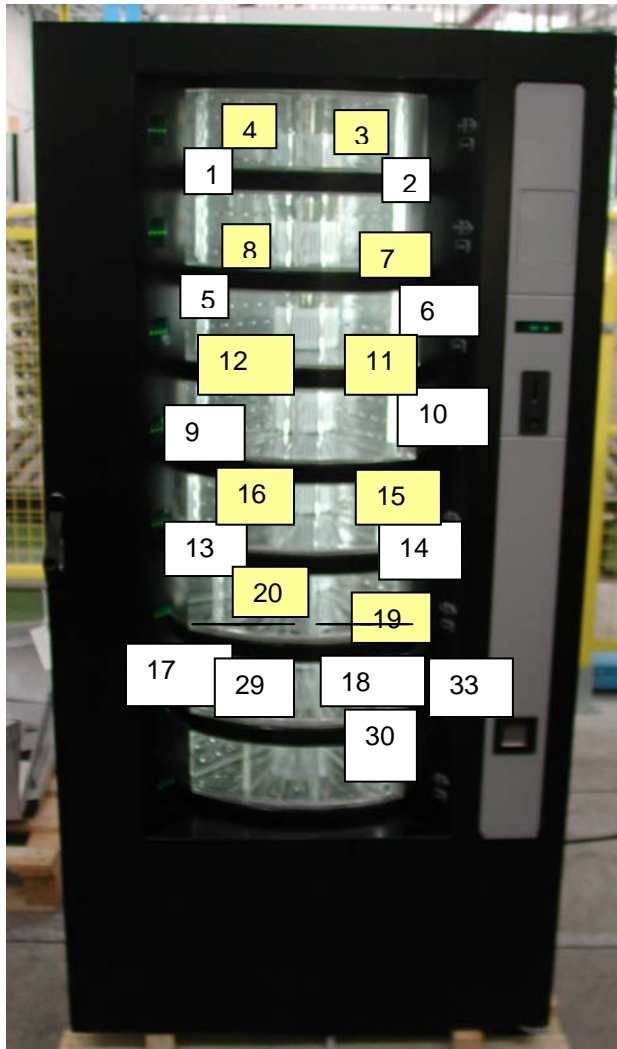


ANNEX C – Test Report Front Page example

EVA / TMP TEST REPORT.

| | |
|----------------------------|----------------------|
| MACHINE DESCRIPTION | |
| MODEL NUMBER | |
| TEST DATE | |
| COMPANY | |
| THERMOSTAT SET POINT (°C) | |
| ROOM TEMPERATURE (°C) | |
| ROOM HUMIDITY (%) | |
| COMPRESSOR TYPE | |
| REFRIGERANT TYPE | |
| REFRIGERANT QUANTITY (g) | |
| PRODUCT MEETS EN60335-2-75 | <u>YES</u> <u>NO</u> |

ANNEX D : Probe Position – Termocouple placement inside the vending machine



| NT | POSITION | NT | POSITION |
|----|--------------------|----|------------------------|
| 1 | 1 drum front left | 21 | 6 drum front left |
| 2 | 1 drum front right | 22 | 6 drum front right |
| 3 | 1 drum rear right | 23 | 6 drum rear right |
| 4 | 1 drum rear left | 24 | 6 drum rear left |
| 5 | 2 drum front left | 25 | 7 drum front left |
| 6 | 2 drum front right | 26 | 7 drum front right |
| 7 | 2 drum rear right | 27 | 7 drum rear right |
| 8 | 2 drum rear left | 28 | 7 drum rear left |
| 9 | 3 drum front left | 29 | 8 drum front left |
| 10 | 3 drum front right | 30 | 8 drum front right |
| 11 | 3 drum rear right | 31 | 8 drum rear right |
| 12 | 3 drum rear left | 32 | 8 drum rear left |
| 13 | 4 drum front left | 33 | Termostatic probe |
| 14 | 4 drum front right | | |
| 15 | 4 drum rear right | | FRONT SIDE TERMOCOUPLE |
| 16 | 4 drum rear left | | REAR SIDE TERMOCOUPLE |
| 17 | 5 drum front left | | |
| 18 | 5 drum front right | | |
| 19 | 5 drum rear right | | |
| 20 | 5 drum rear left | | |

The EVA is the vending industry's gateway to the EU

The European Vending Association represents the whole of the vending industry: machine, machine component and accessories manufacturers, ingredient suppliers and operators. The primary aim of the EVA is to optimise the industry's commercial interests within the EU legislation, serve as a forum of discussion and exchange of ideas and experience for its members as well as draft standards for the industry.

The EVA's members are 15 national associations and 52 companies. They participate through the Committees and working groups.

We will be pleased to answer your questions and send you any further information upon request.

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