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Comparison of hygrothermal measurements and calculations in a multi-family wooden house in the Swedish town of Växjö

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2013

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1

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221 00 Lund
+46 46-222 00 00

8.29 Position 29

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in the exterior bathroom wall facing north on the seventh floor.

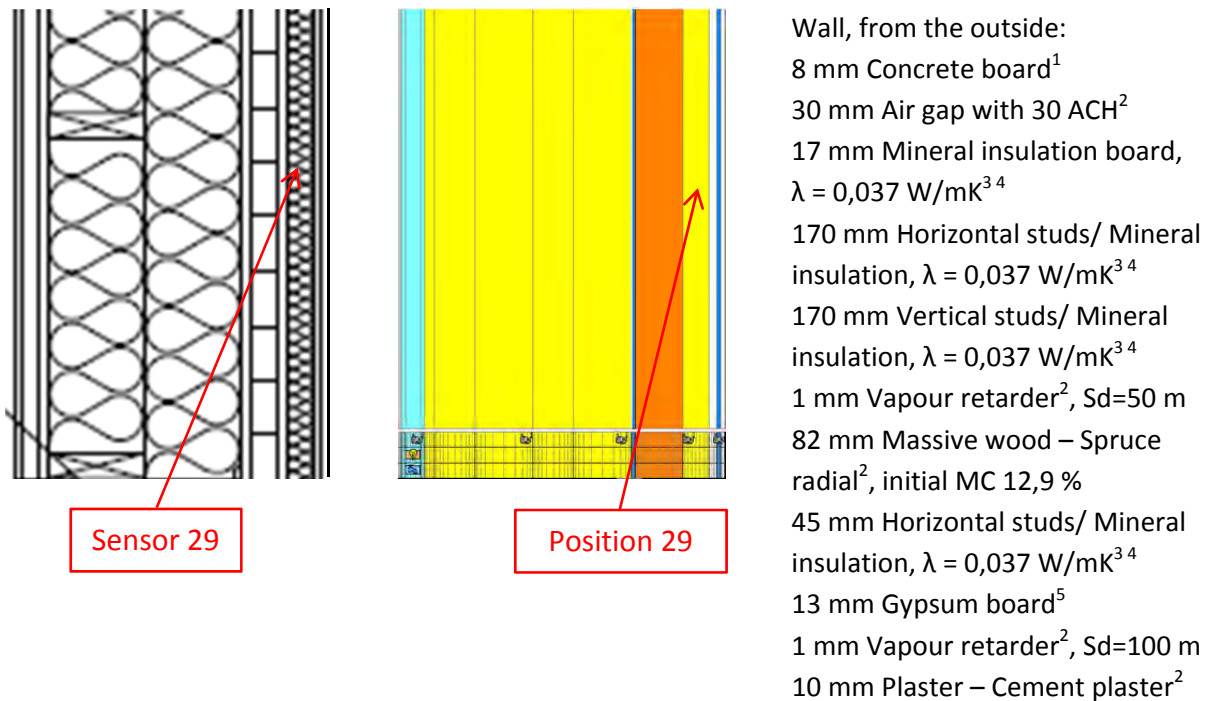


Figure 8.29.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

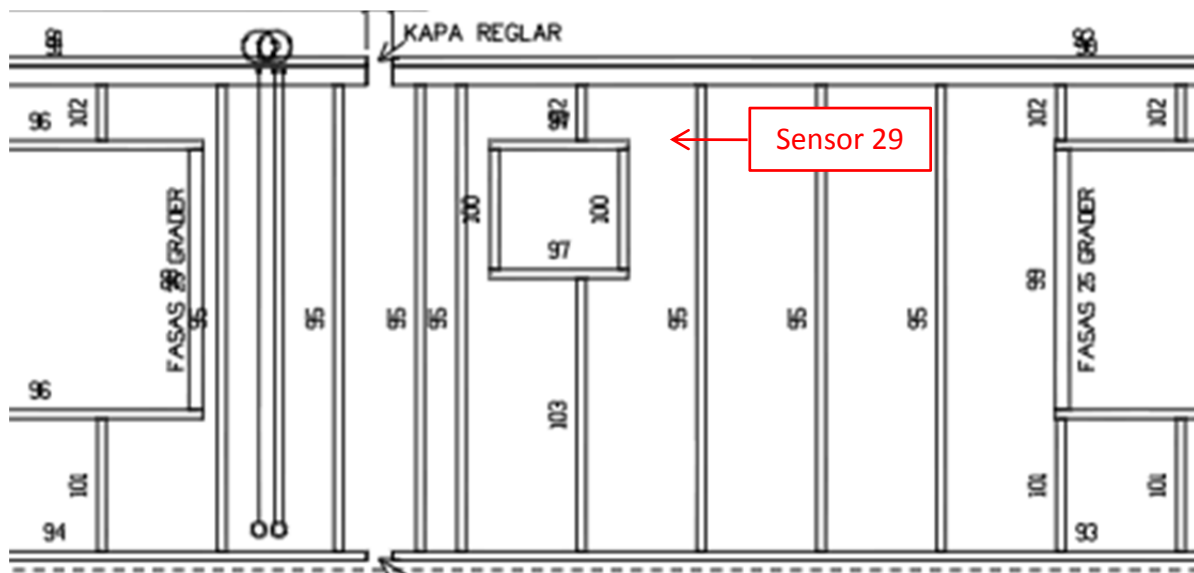


Figure 8.29.2. Location of the studied position.



Figure 8.29.3. Location of the studied position.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors. However, this position was less affected of those factors compare to other studied positions.

Year 2009

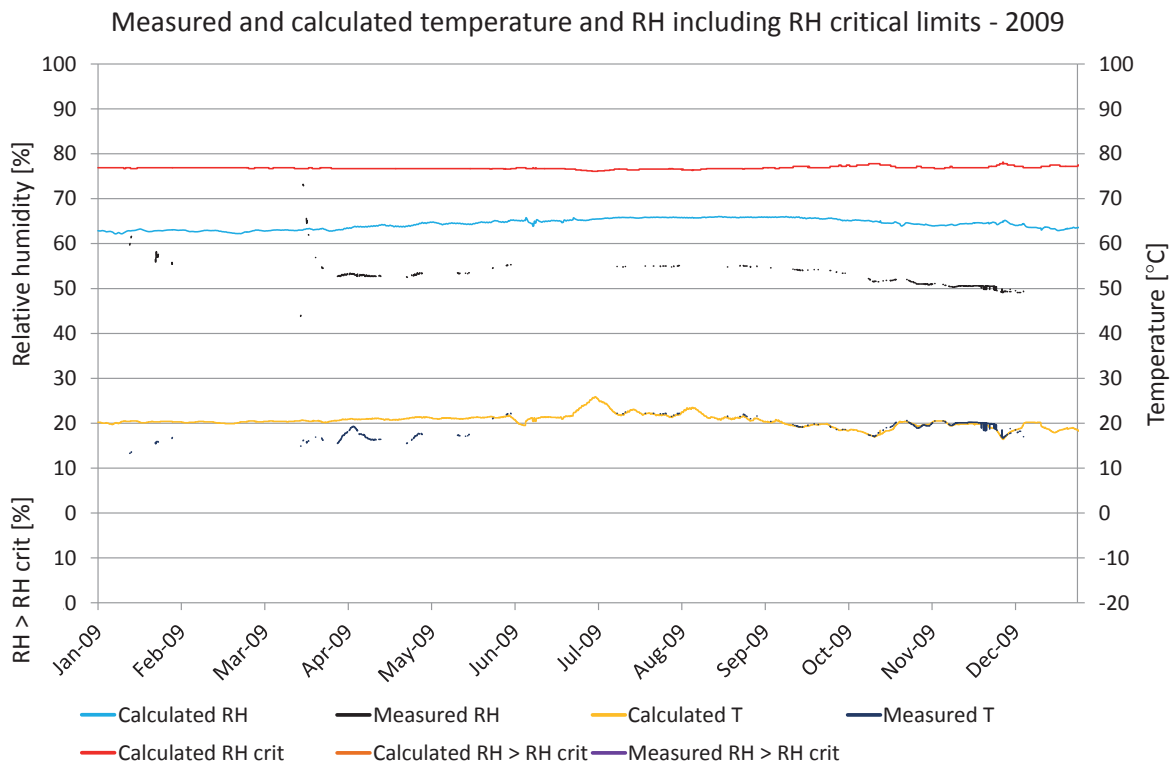


Figure 8.29.4. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

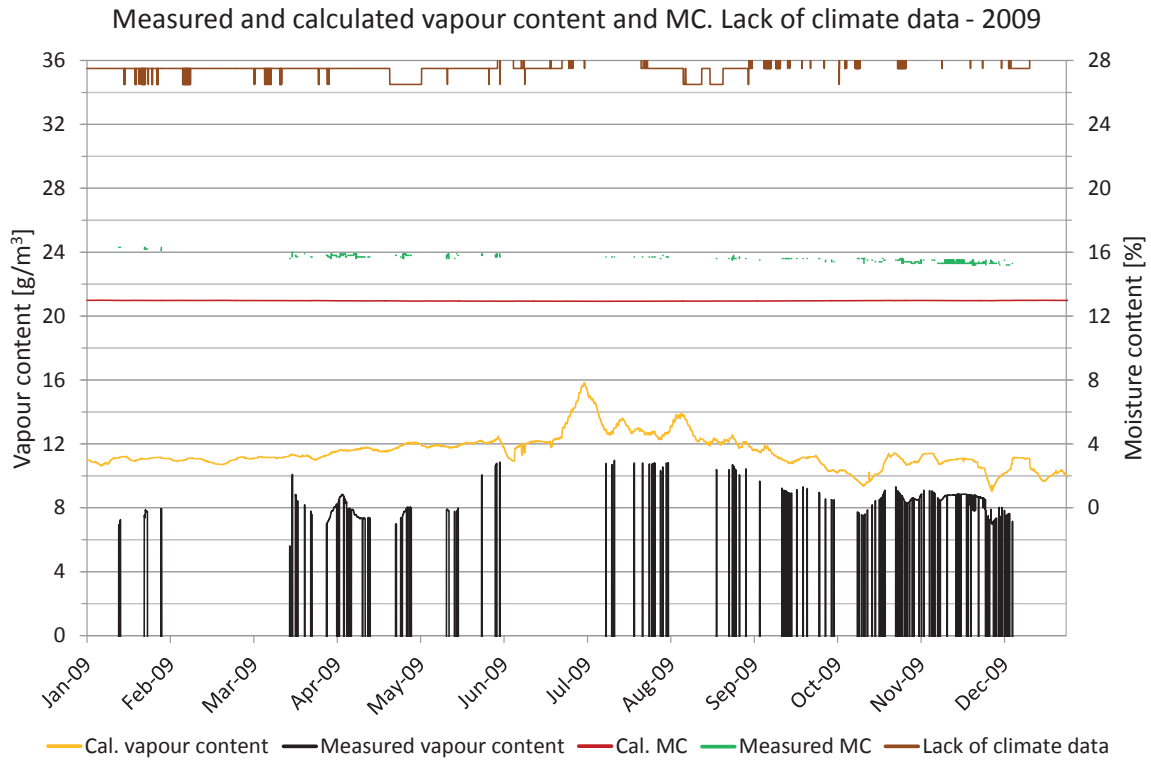


Figure 8.29.5. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

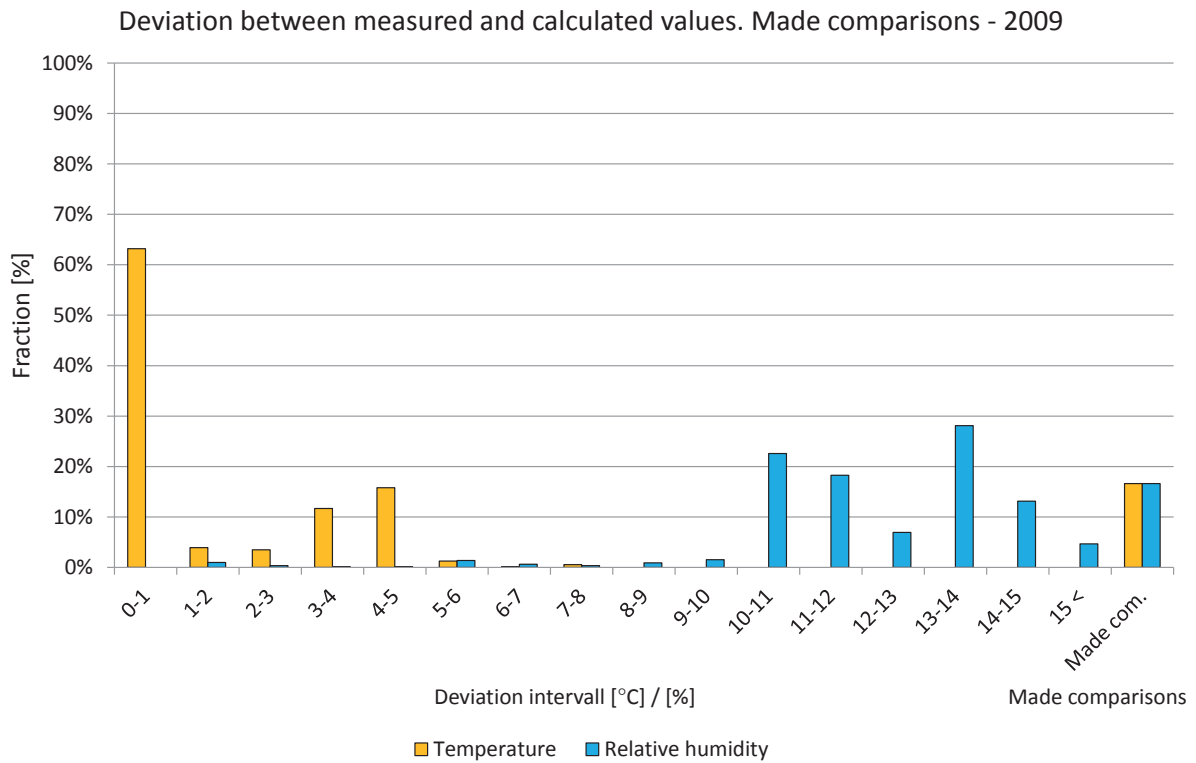


Figure 8.29.6. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

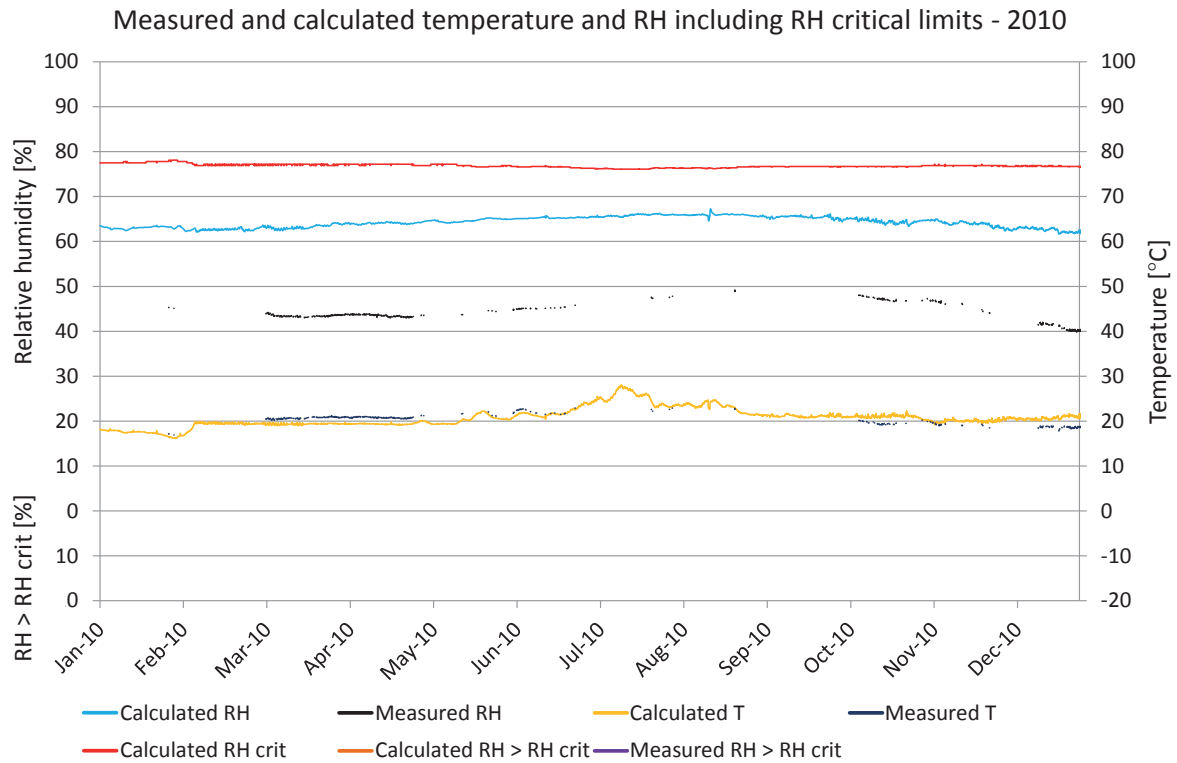


Figure 8.29.7. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RHcrit for calculated values (red), calculated RH > RHcrit (light brown), measured RH > RHcrit (purple).

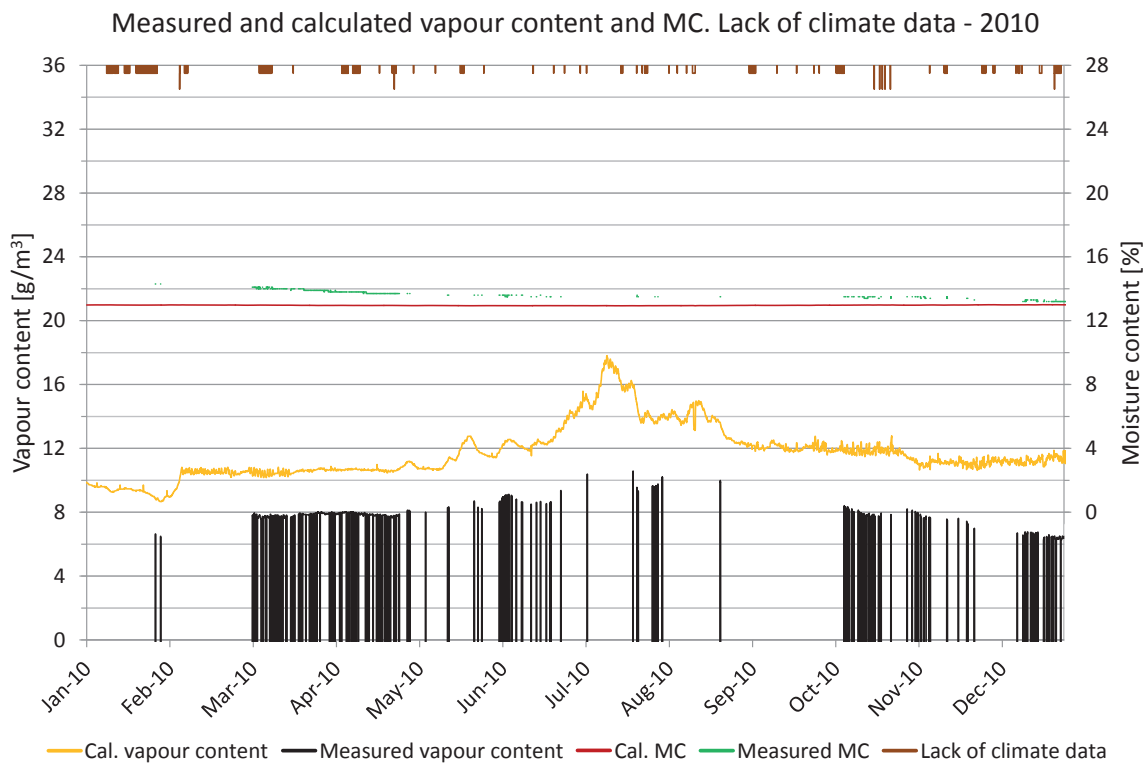


Figure 8.29.8. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

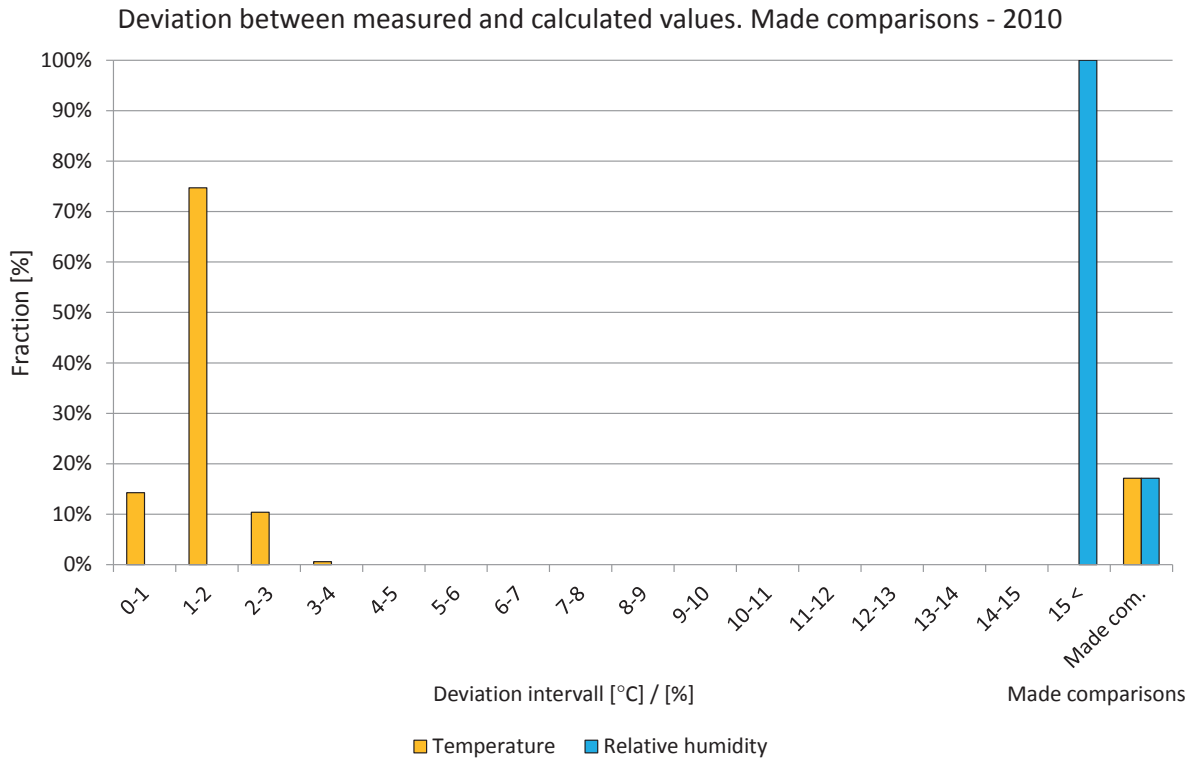


Figure 8.29.9. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

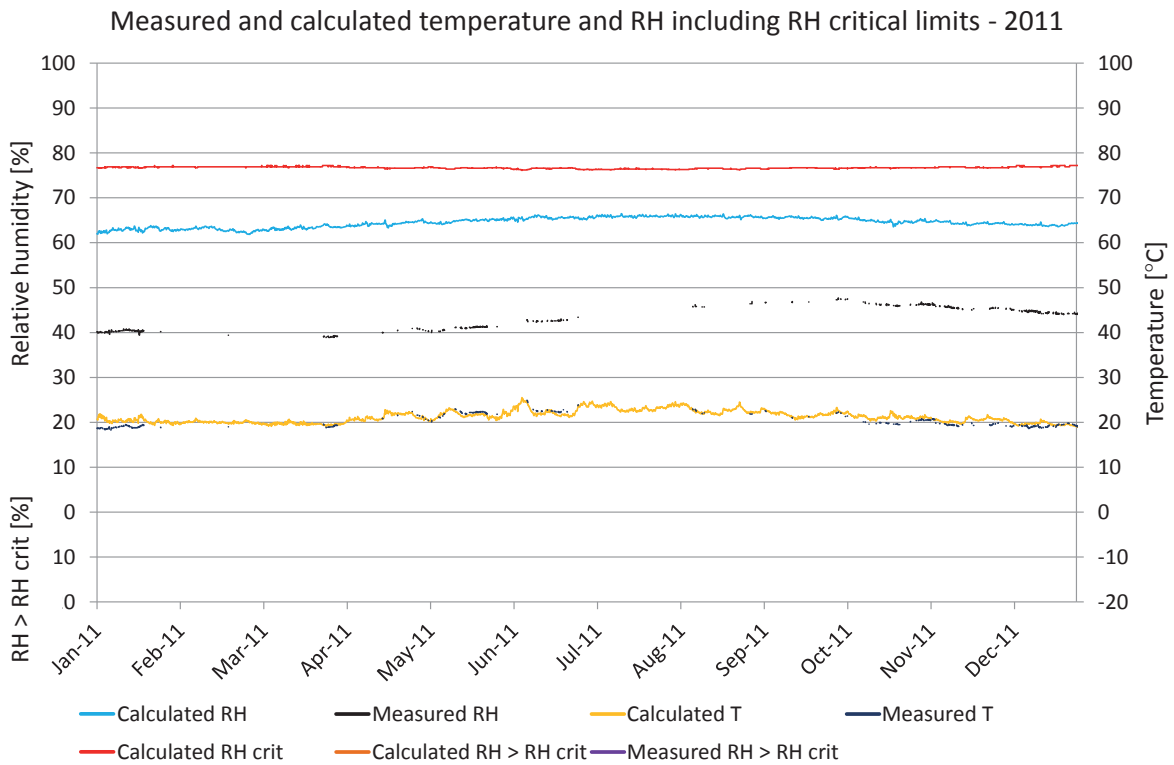


Figure 8.29.10. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

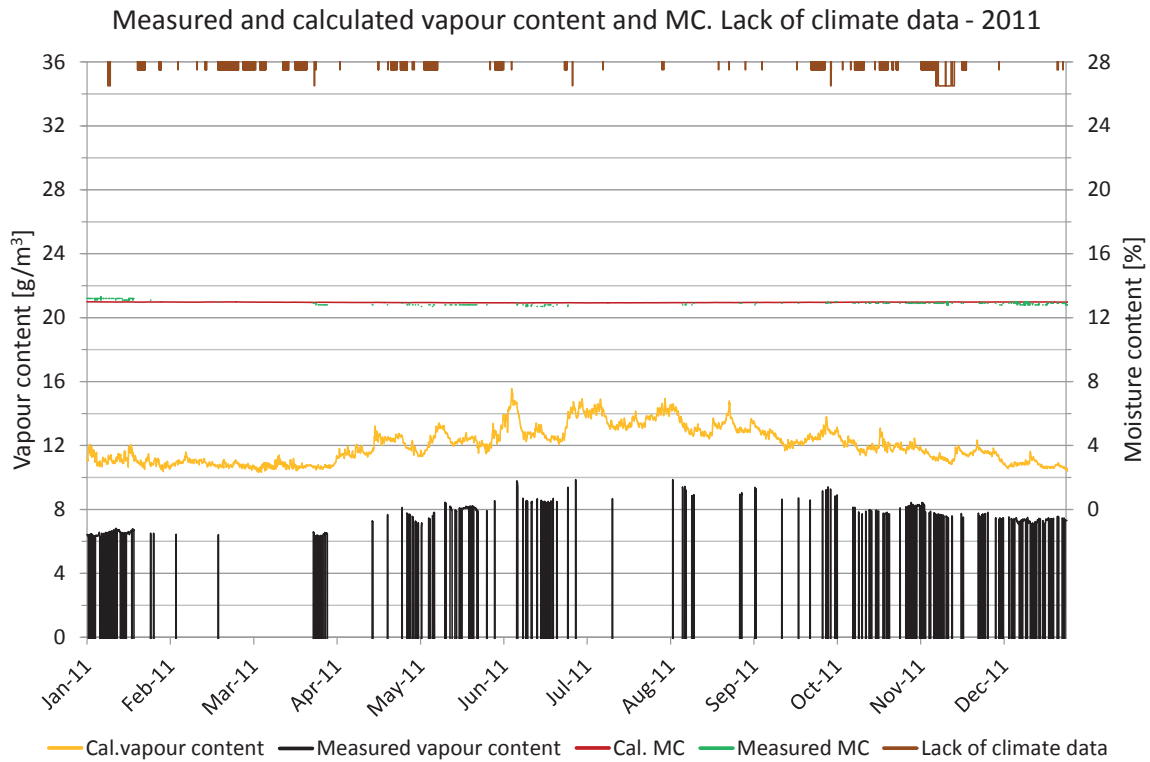


Figure 8.29.11. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

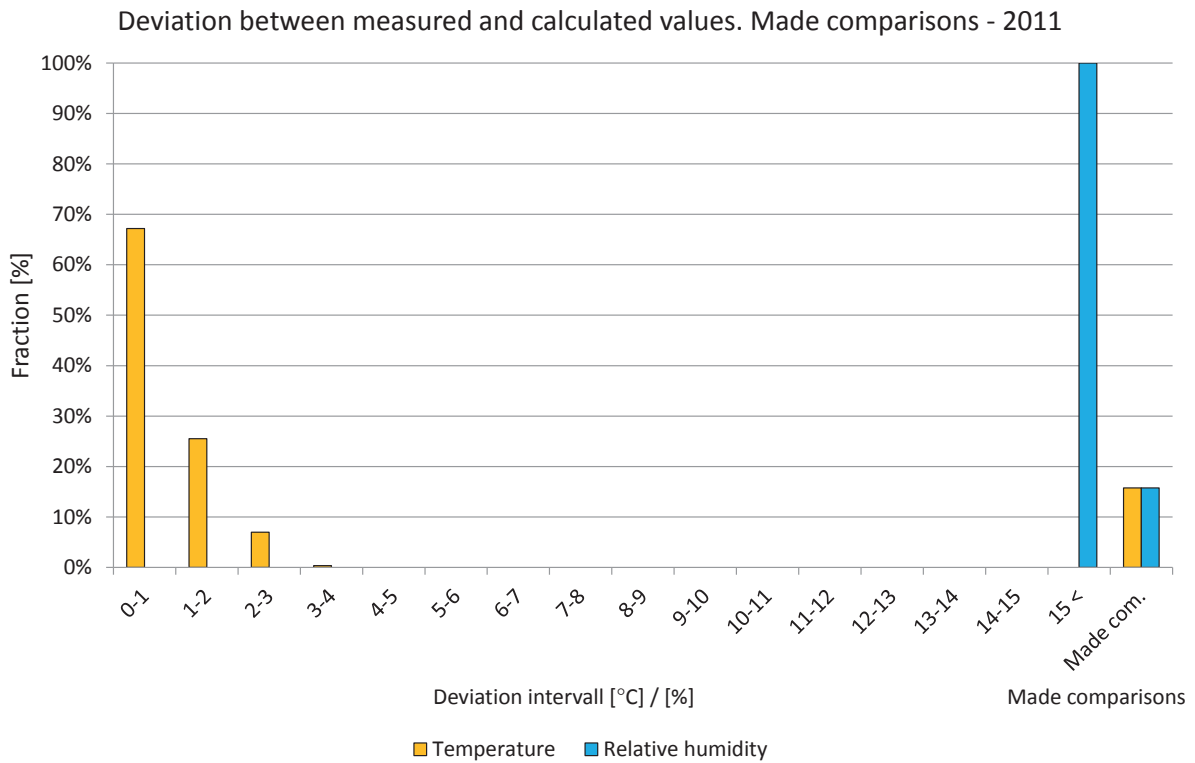


Figure 8.29.12. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.30 Position 30

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor. The influence of surrounding glass around the balcony was not included in the calculations.

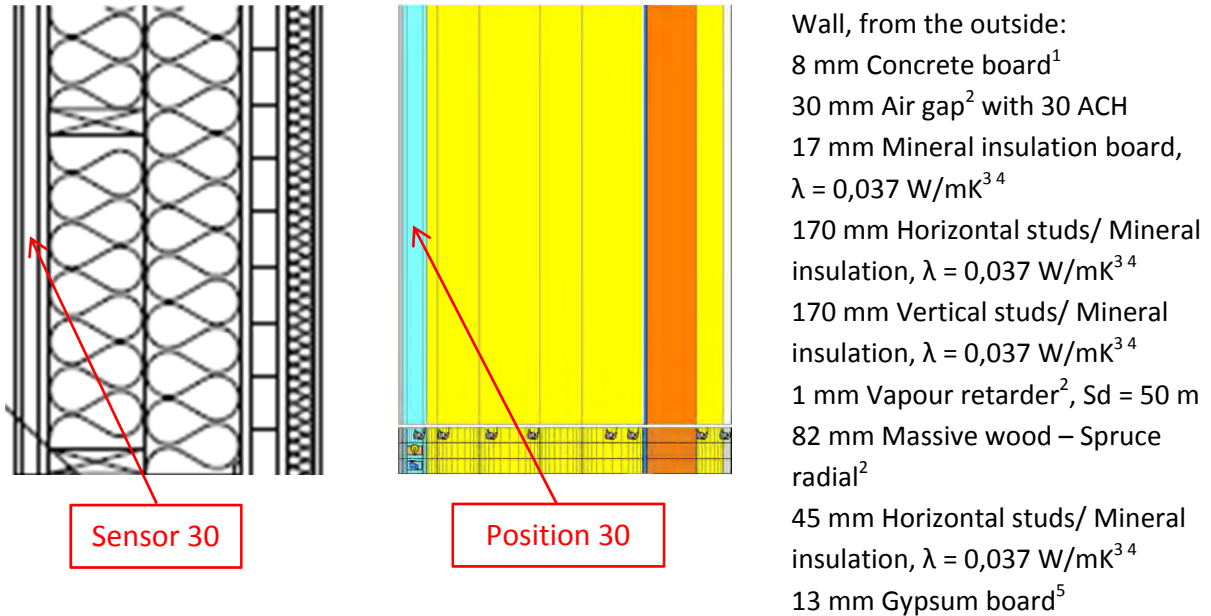


Figure 8.30.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

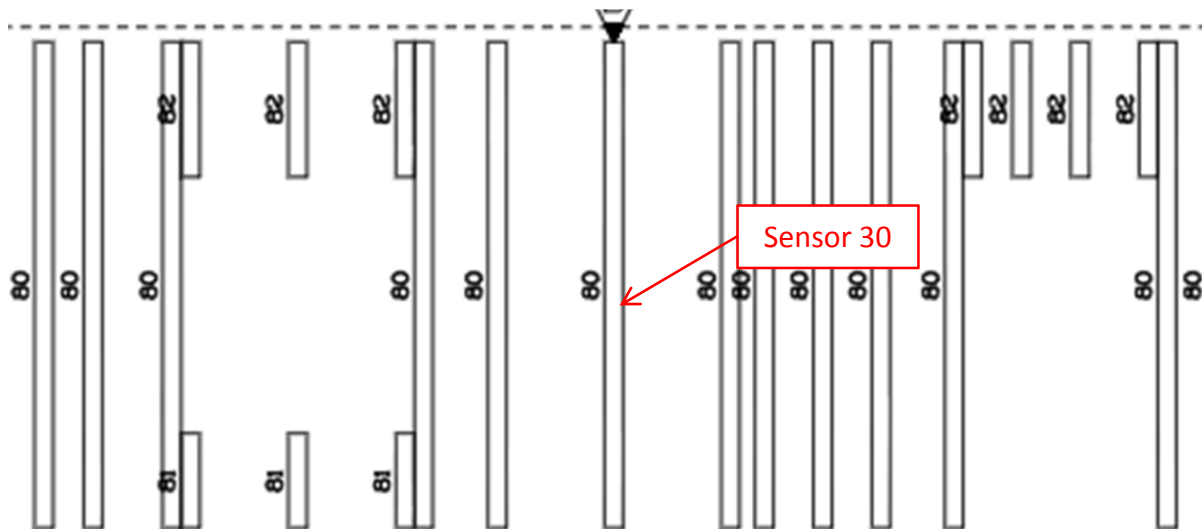


Figure 8.30.2. Location of the studied position.

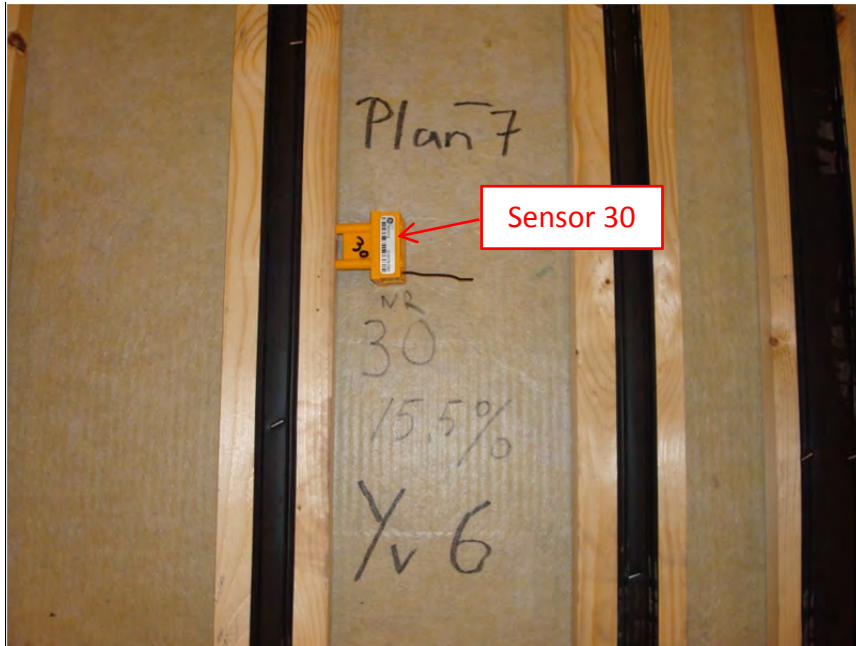


Figure 8.30.3. Location of the studied position.



Figure 8.30.4. Location of the studied position. The balconies were further on surrounded by glass.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2008

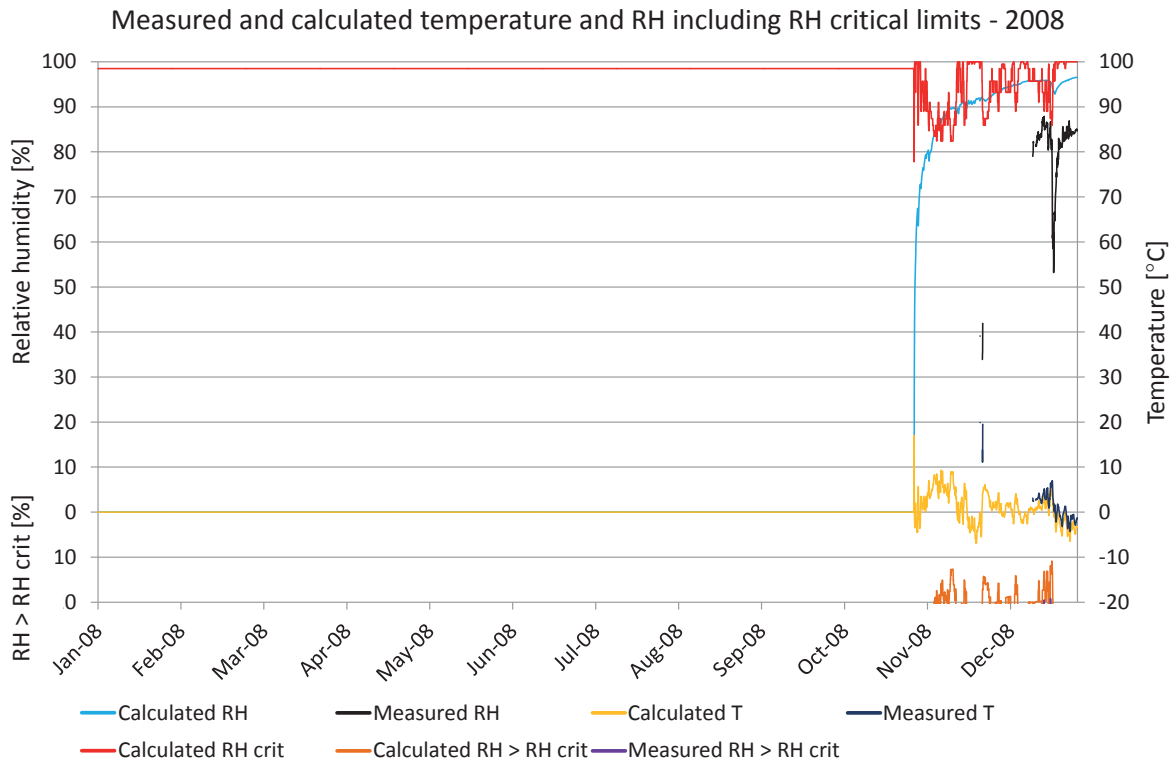


Figure 8.30.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

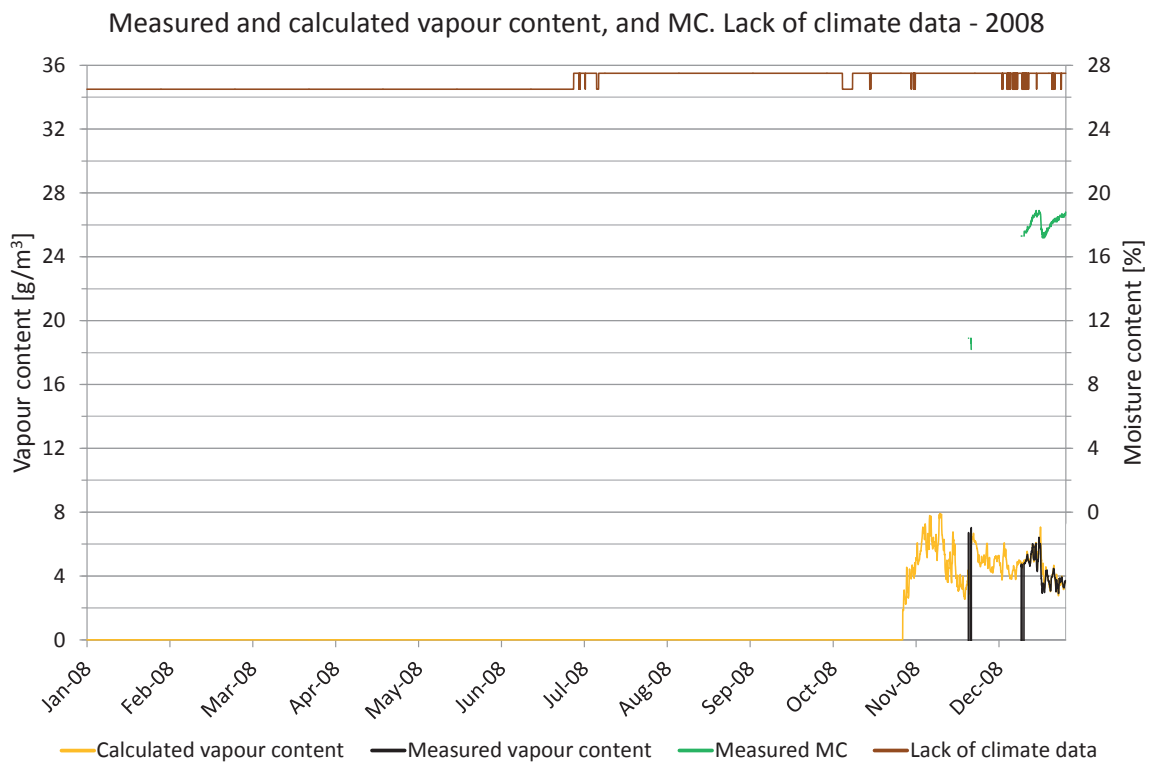


Figure 8.30.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

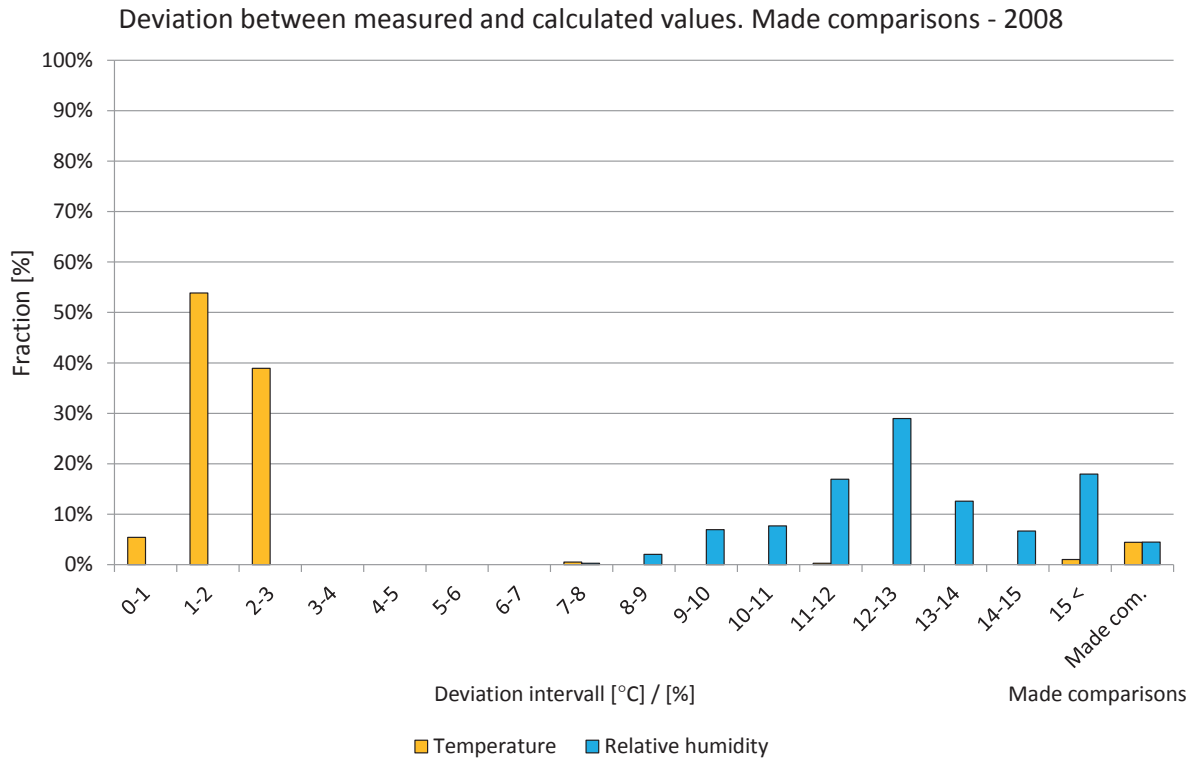


Figure 8.30.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

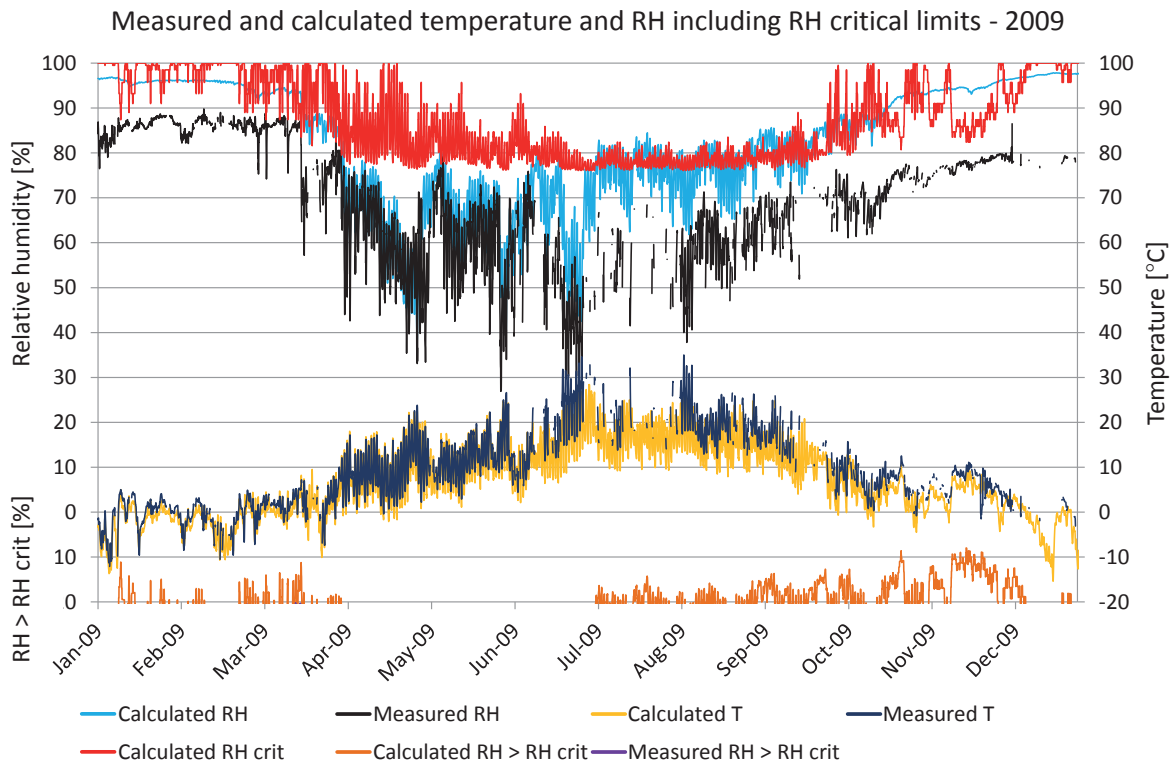


Figure 8.30.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

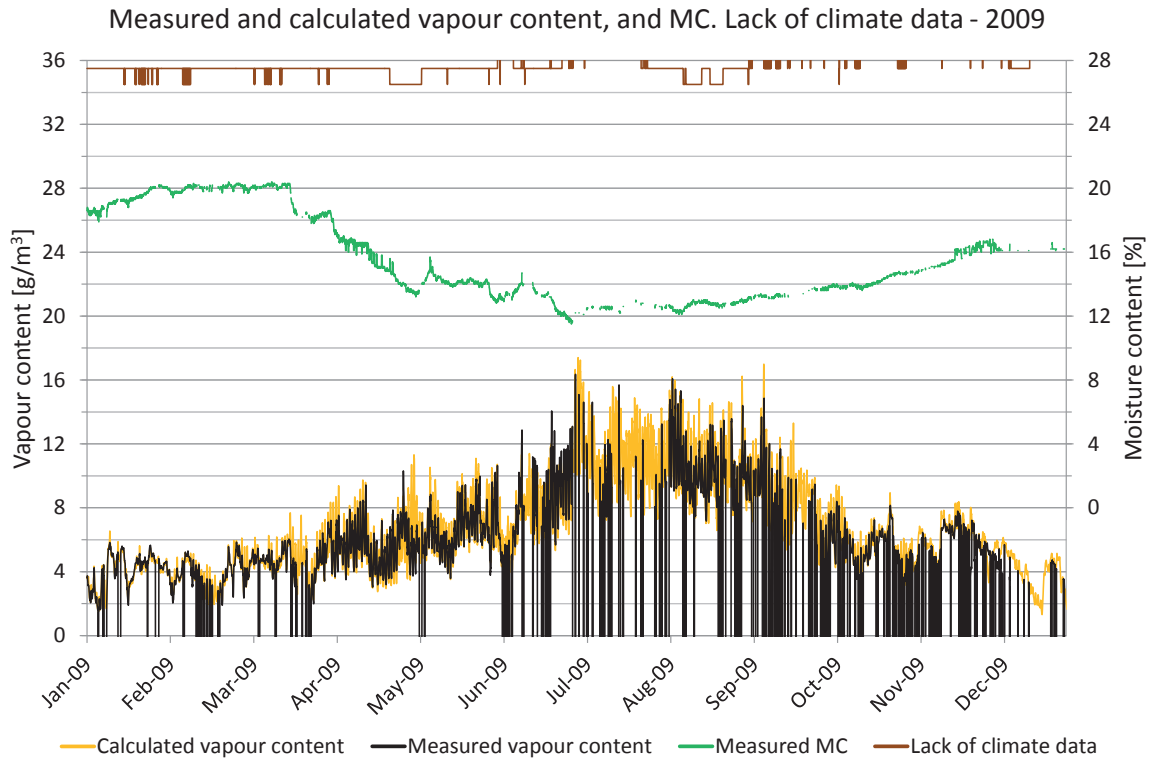


Figure 8.30.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

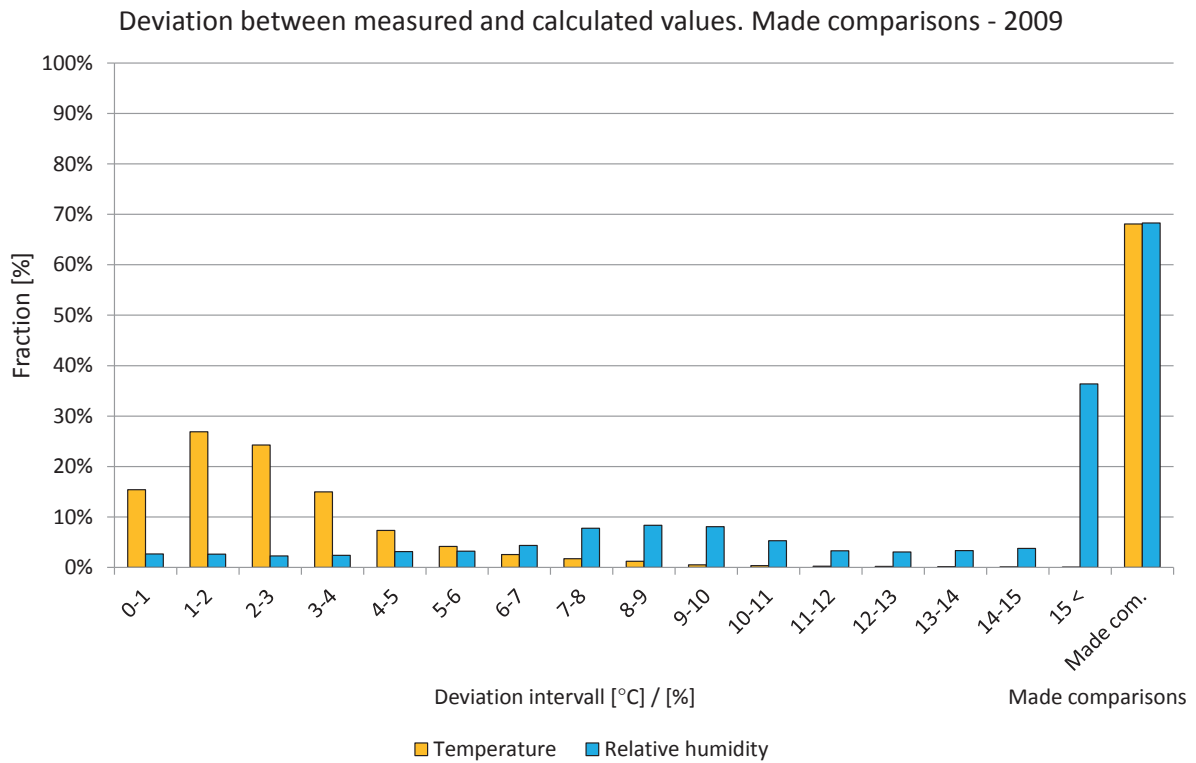


Figure 8.30.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

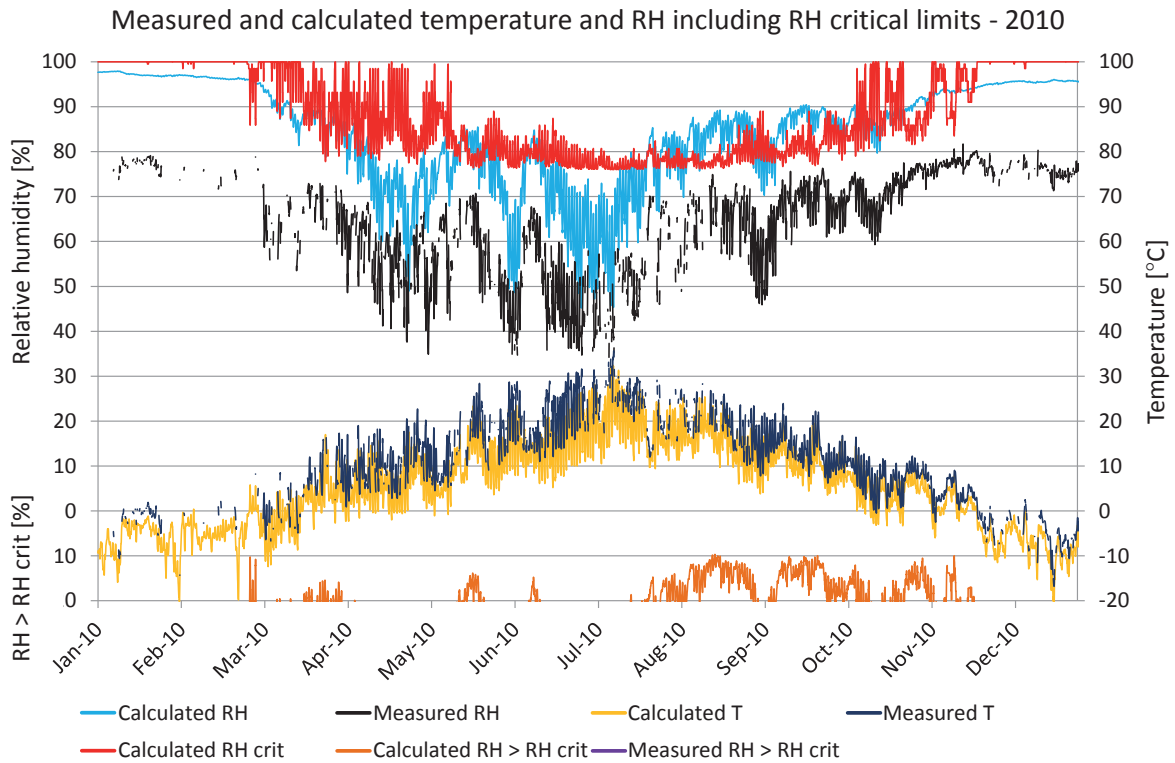


Figure 8.30.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

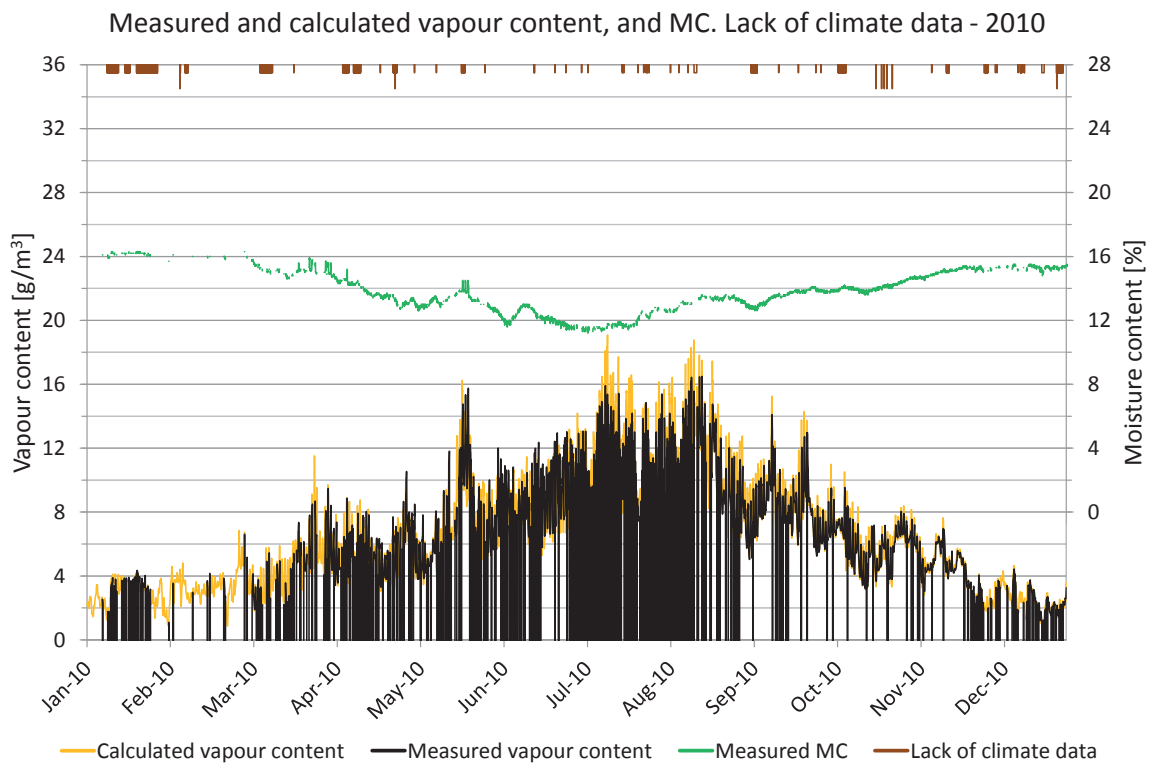


Figure 8.30.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

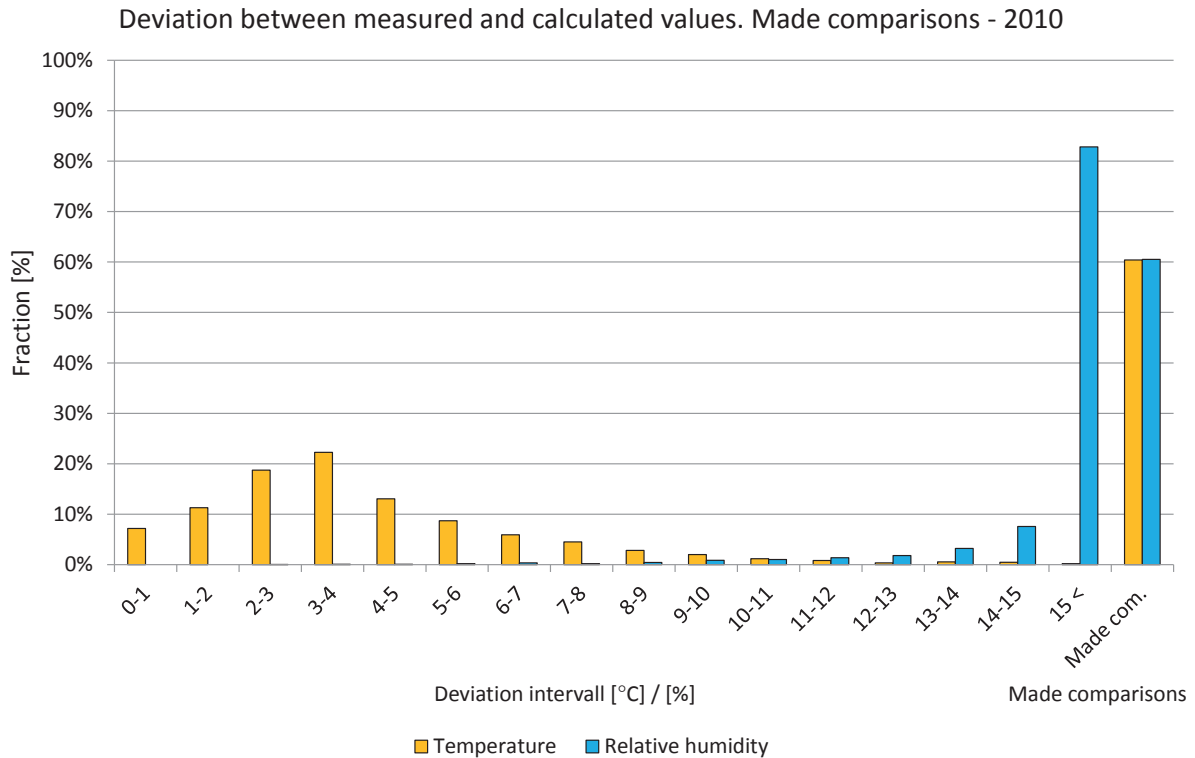


Figure 8.30.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

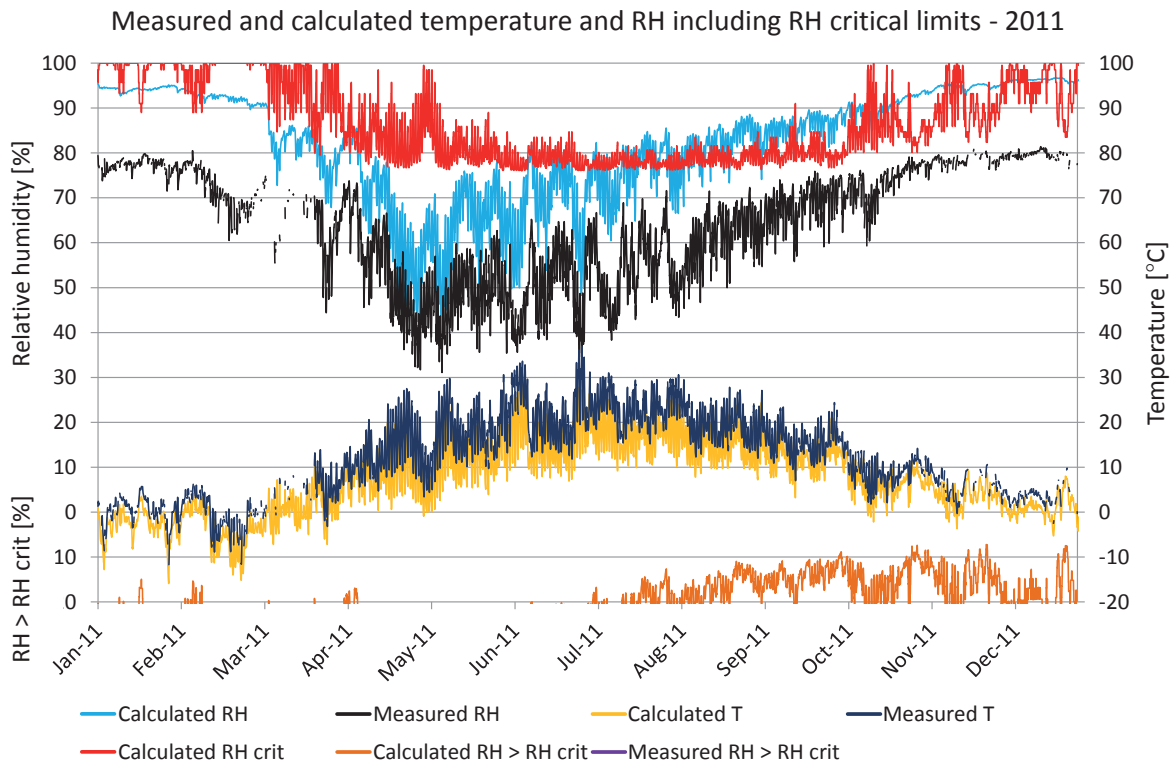


Figure 8.30.14. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

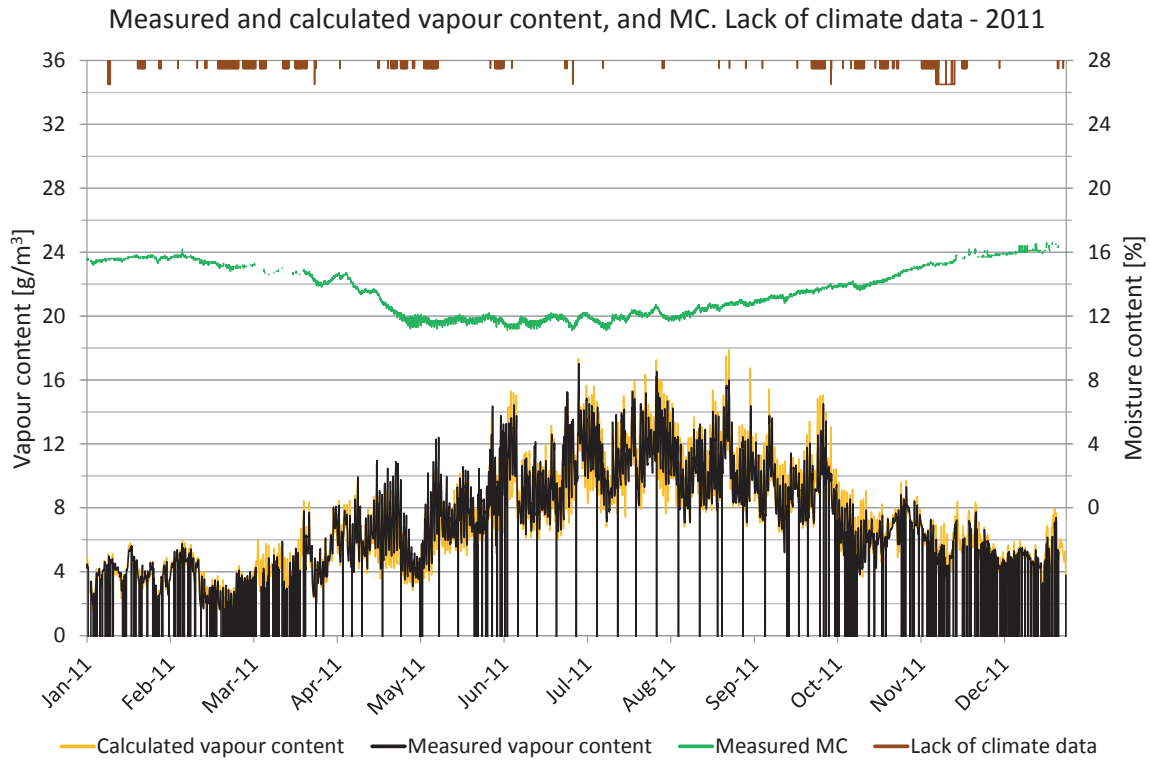


Figure 8.30.15. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

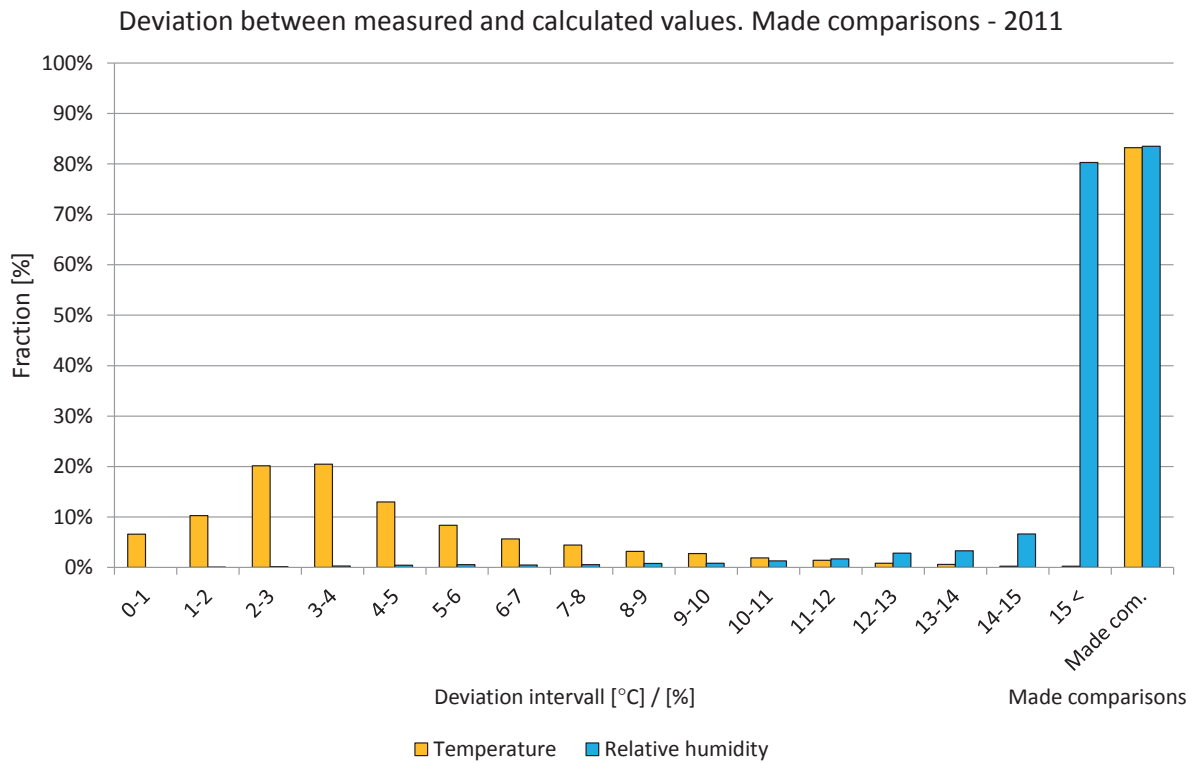


Figure 8.30.16. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.31 Position 31

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor. The influence of surrounding glass around the balcony was not included in the calculations.

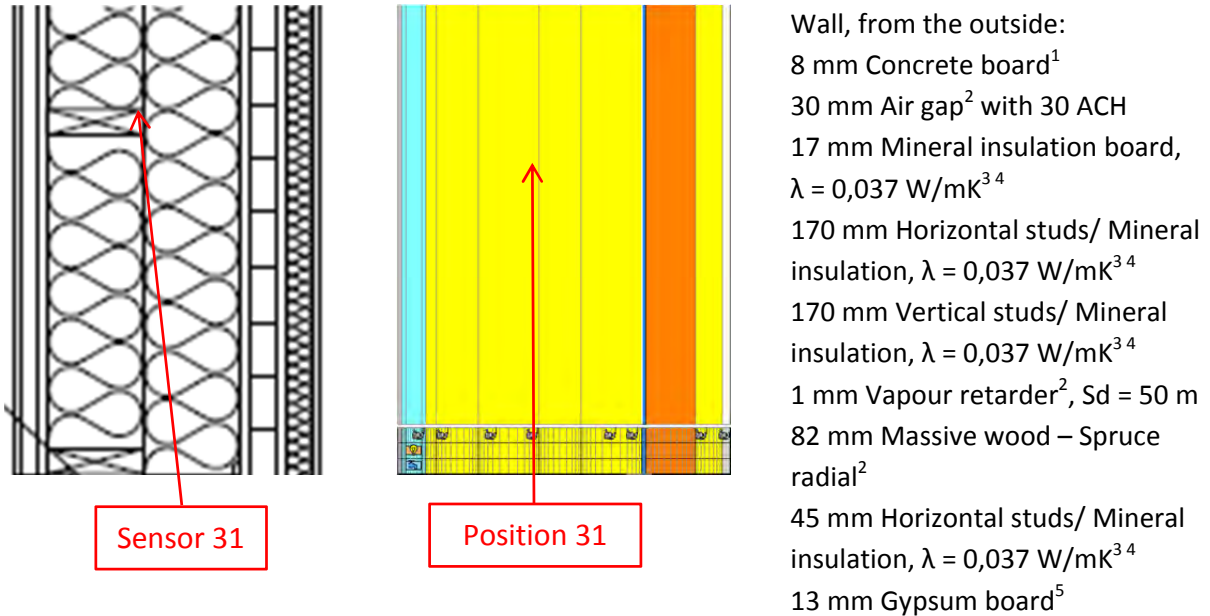


Figure 8.31.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

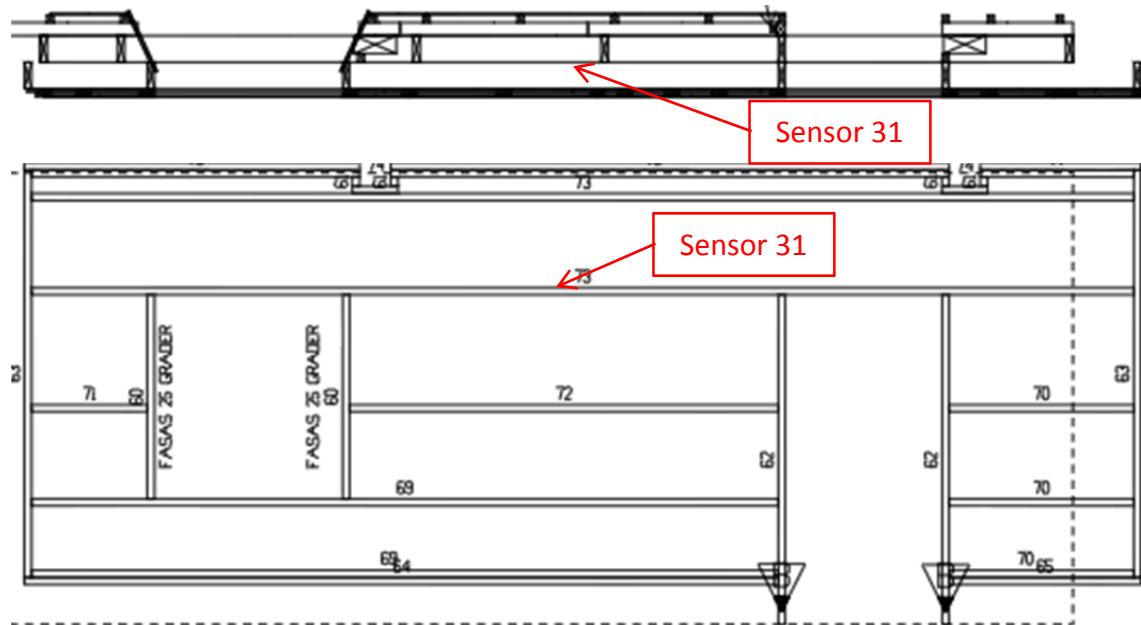


Figure 8.31.2. Location of the studied position.

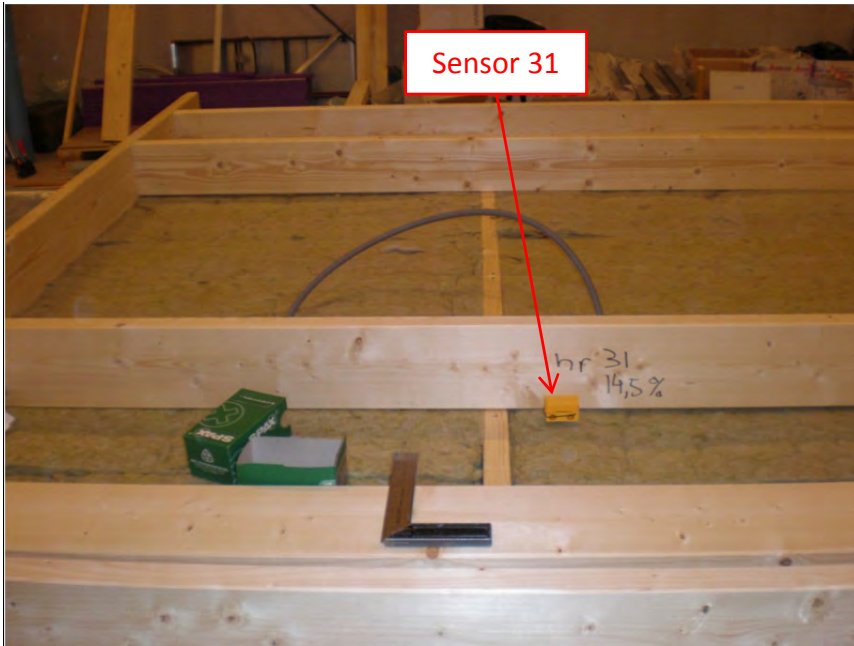


Figure 8.31.3. Location of the studied position.



Figure 8.31.4. Location of studied position. The balconies were further on surrounded by glass.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2008

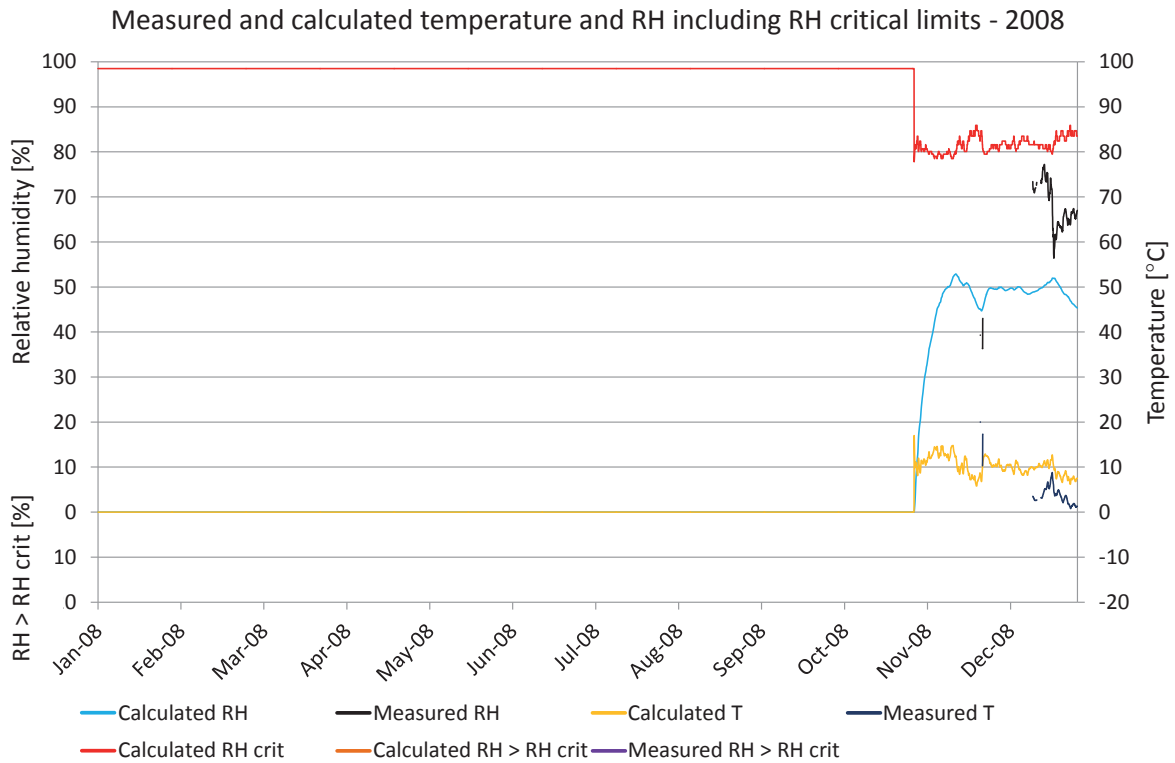


Figure 8.31.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

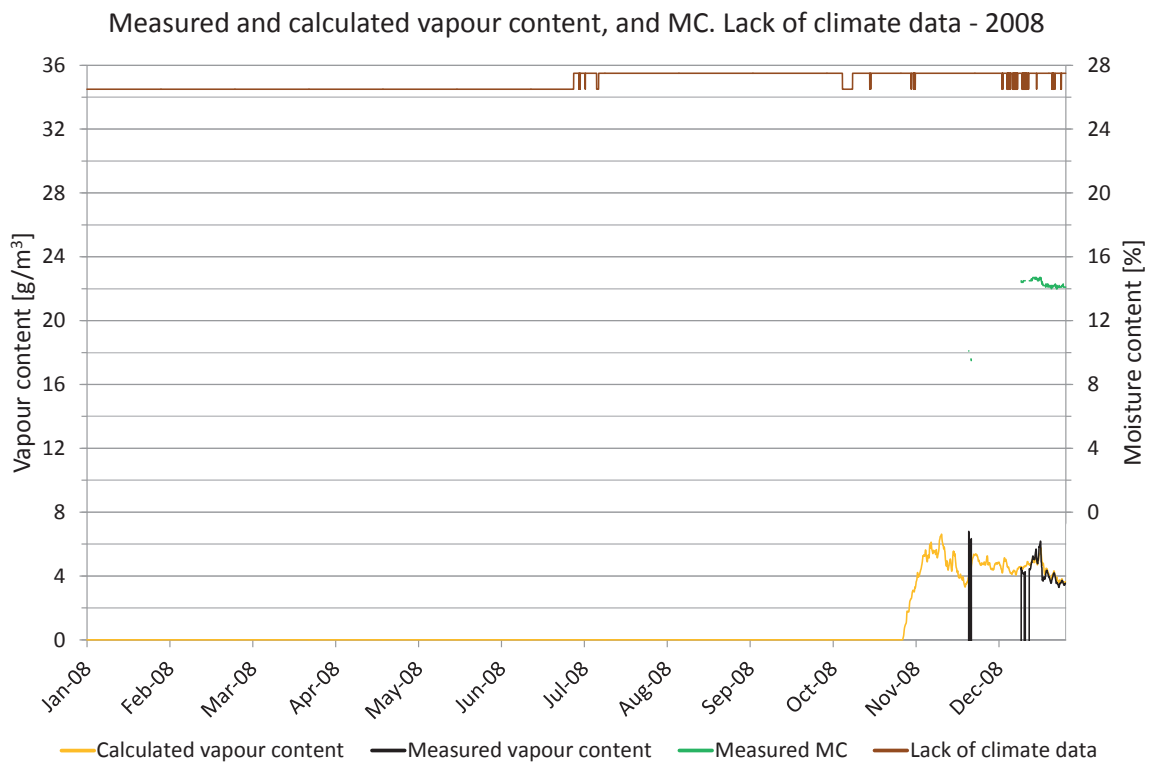


Figure 8.31.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

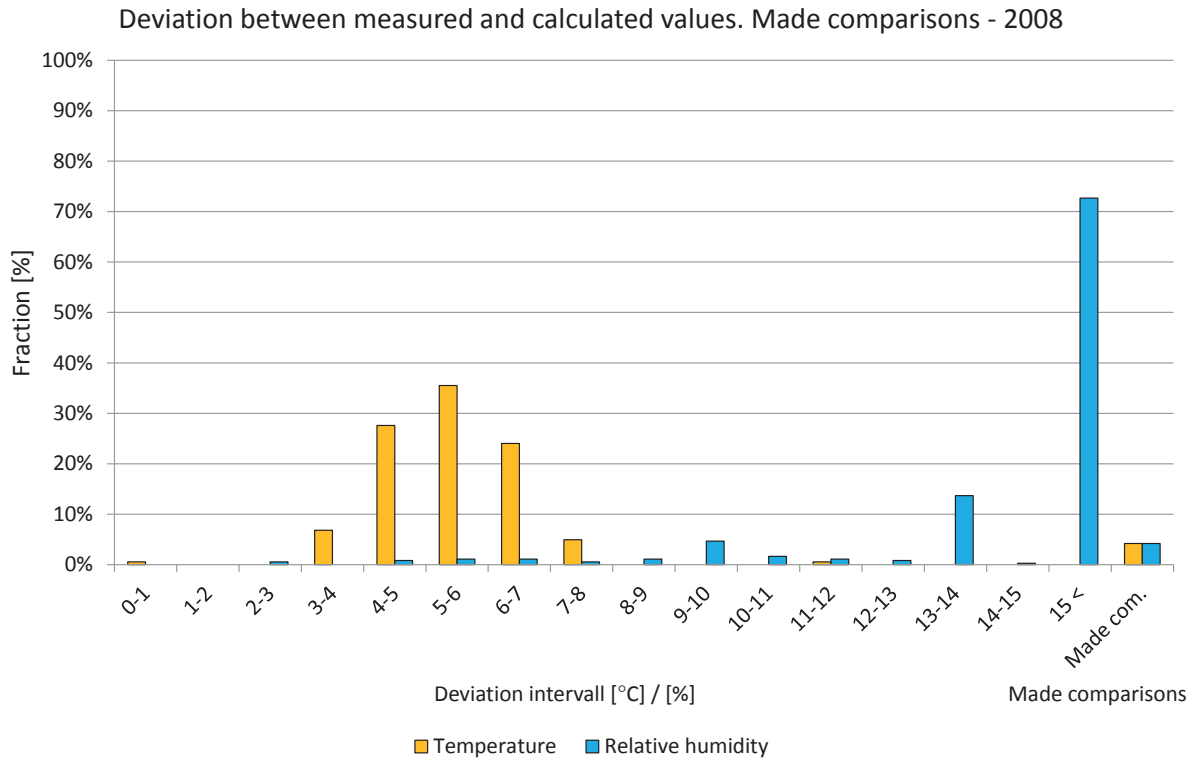


Figure 8.31.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

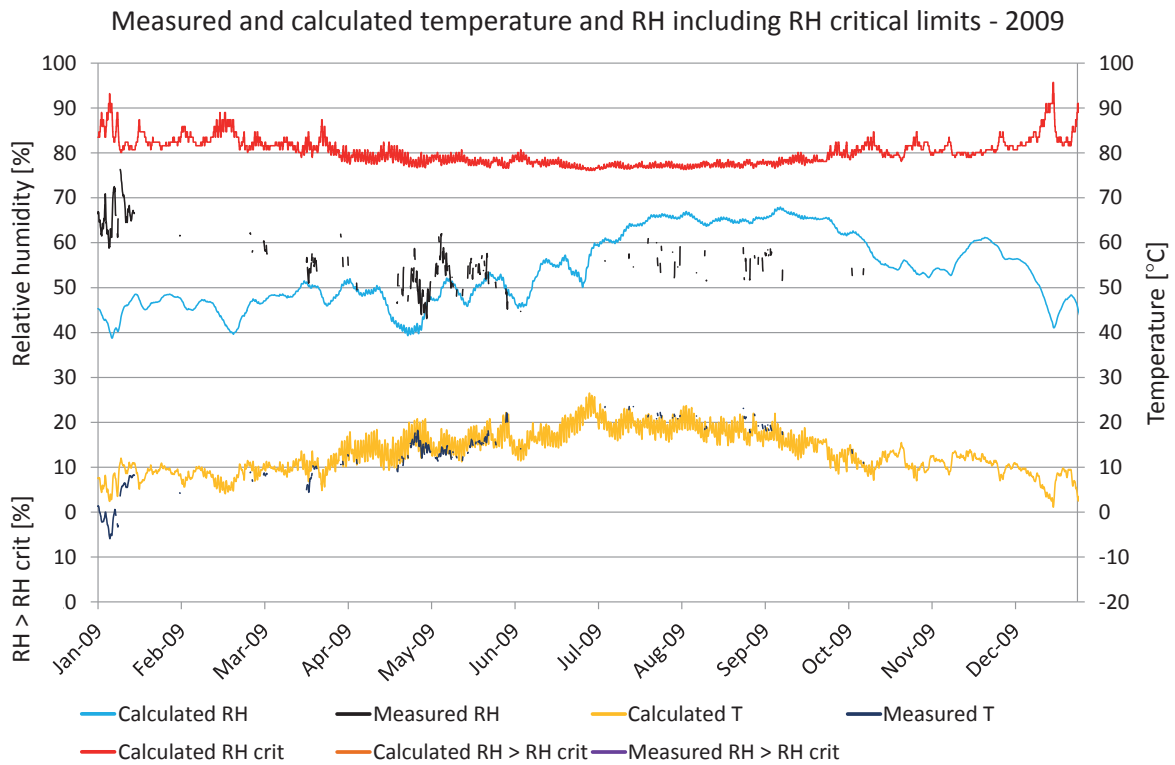


Figure 8.31.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

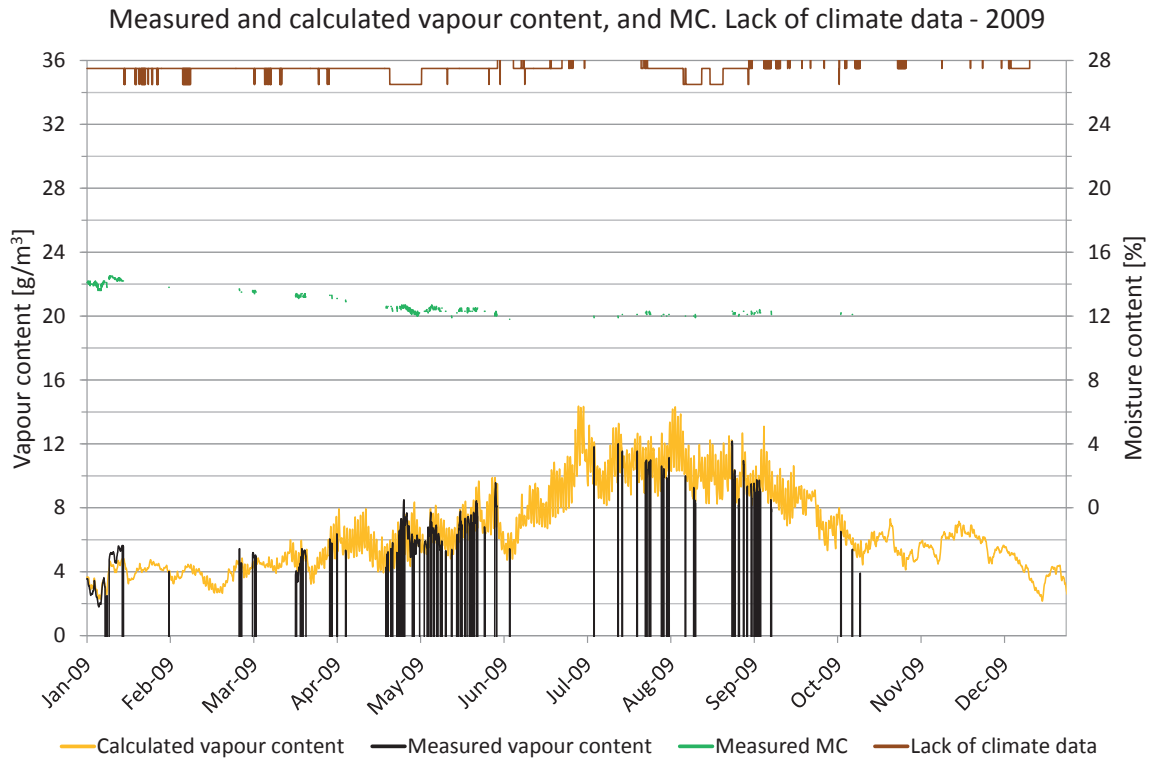


Figure 8.31.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

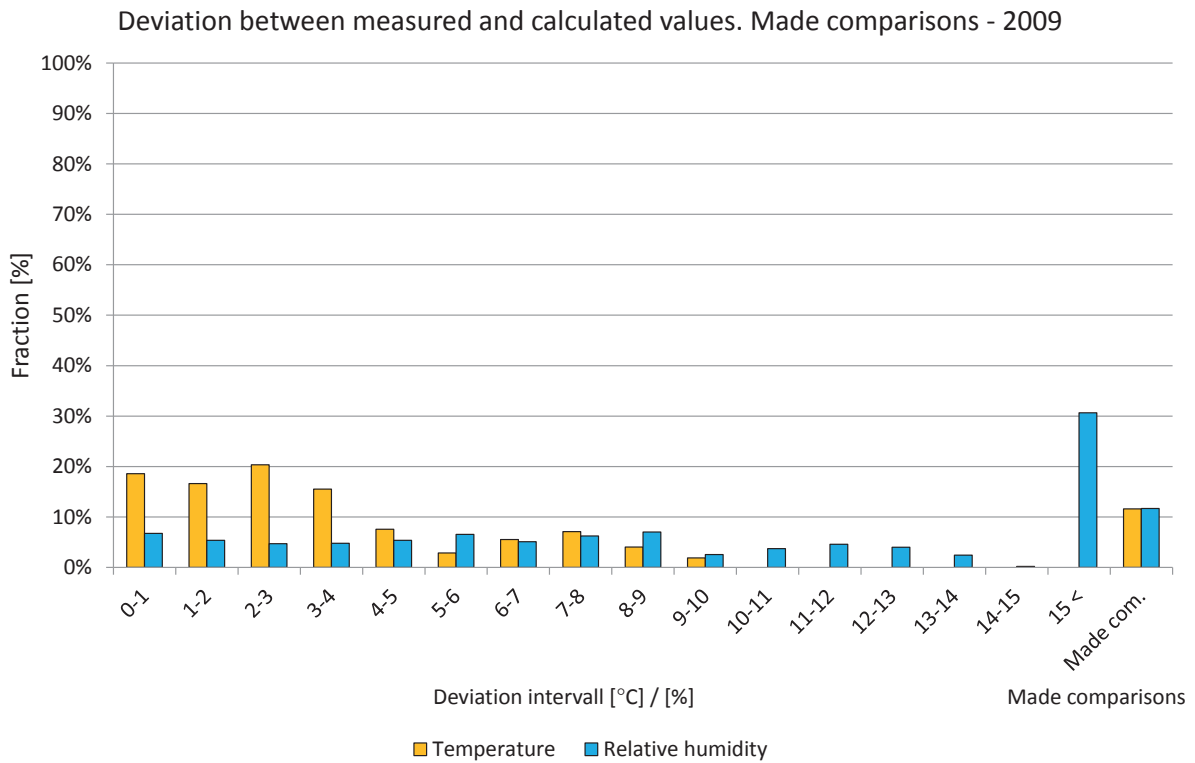


Figure 8.31.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

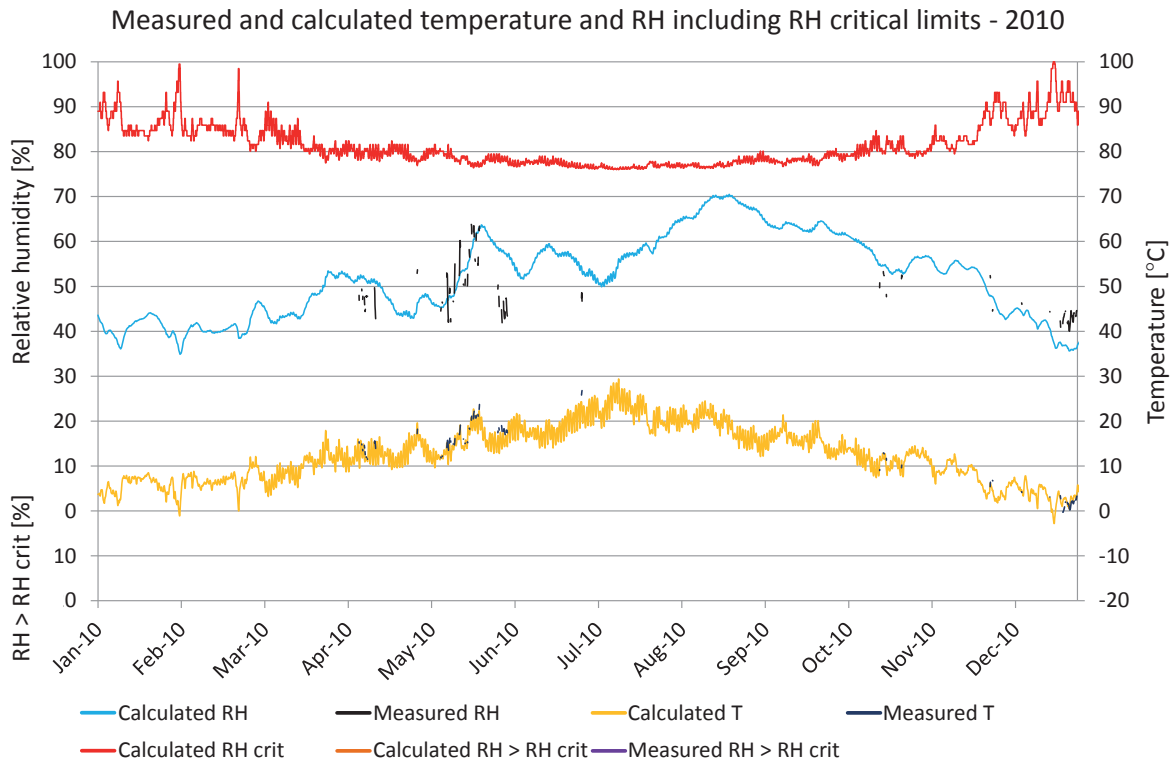


Figure 8.31.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

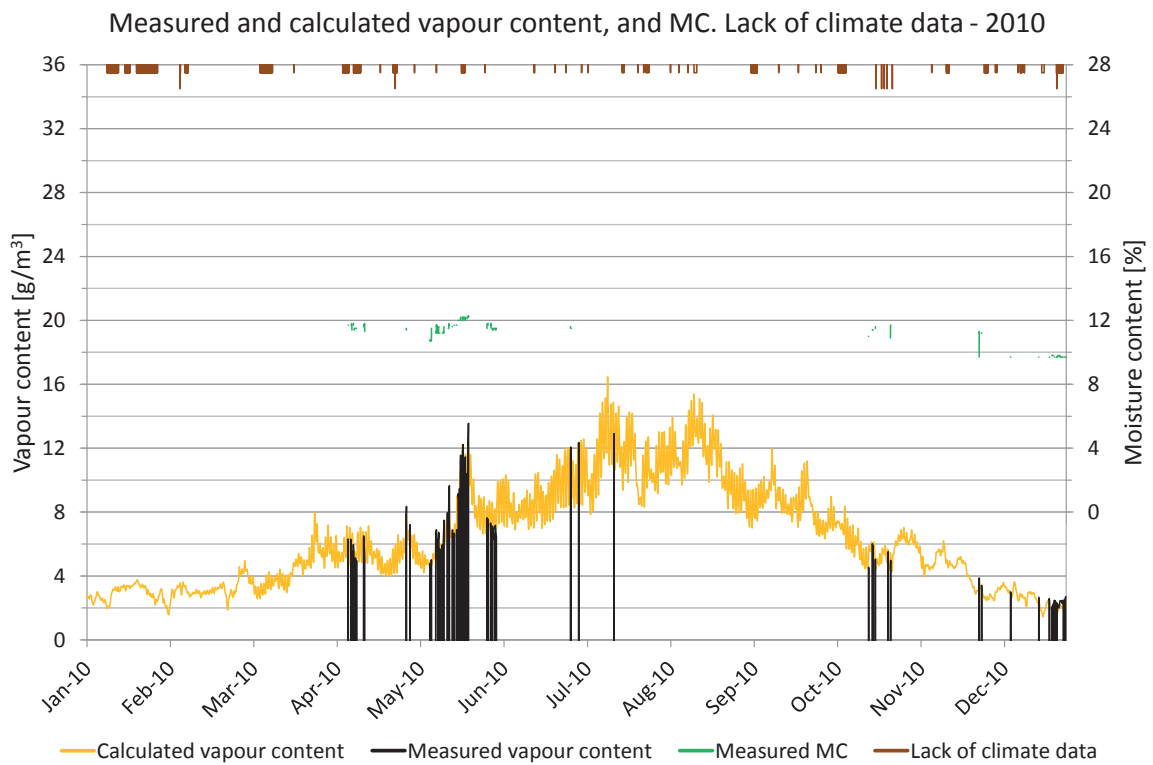


Figure 8.31.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

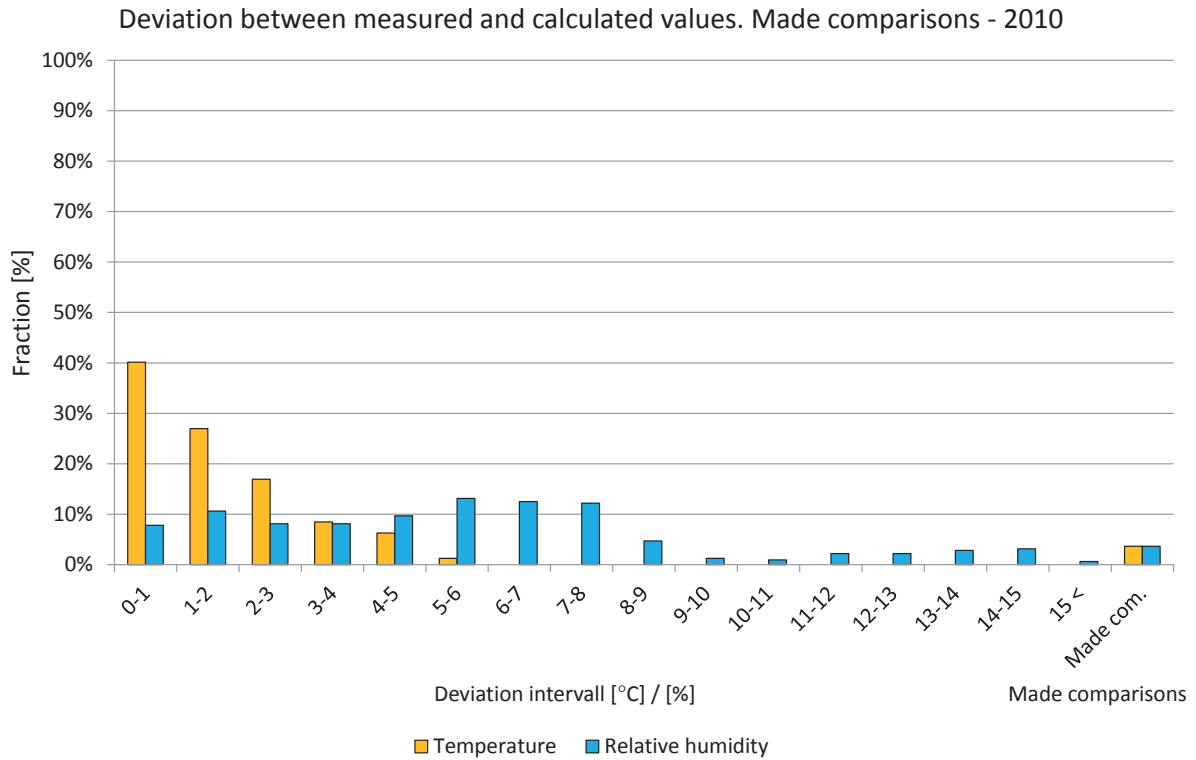


Figure 8.31.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

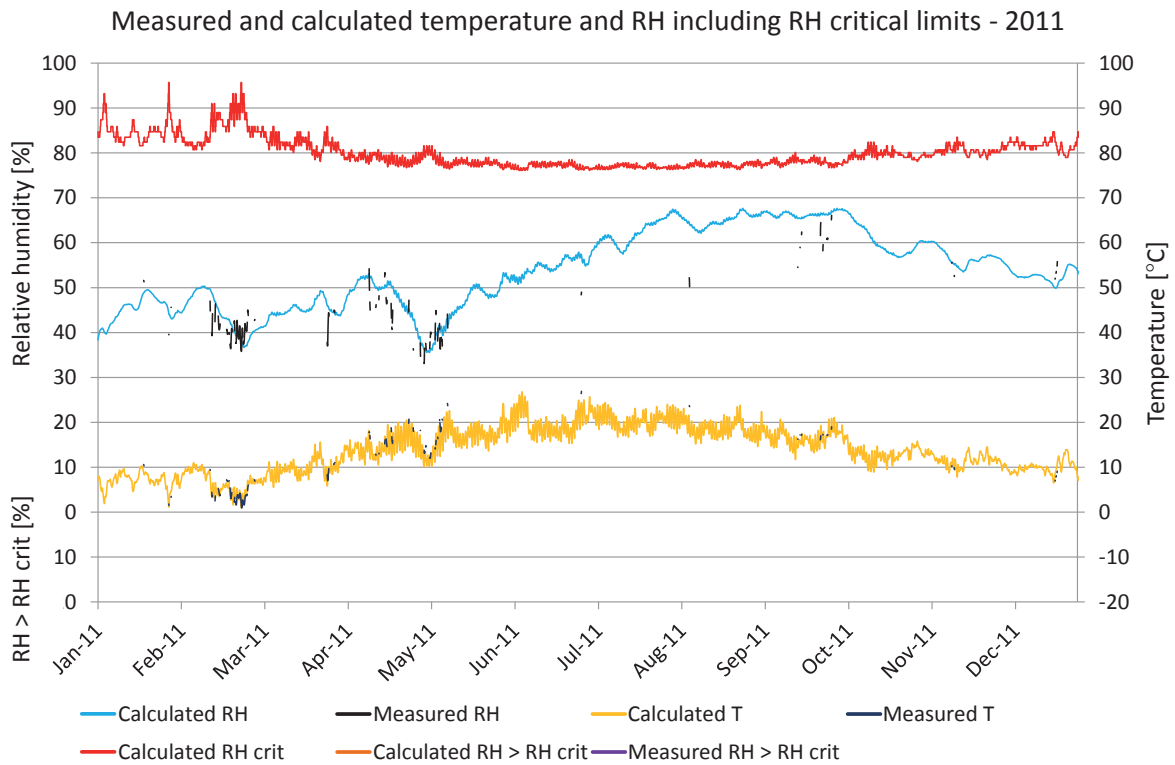


Figure 8.31.14. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

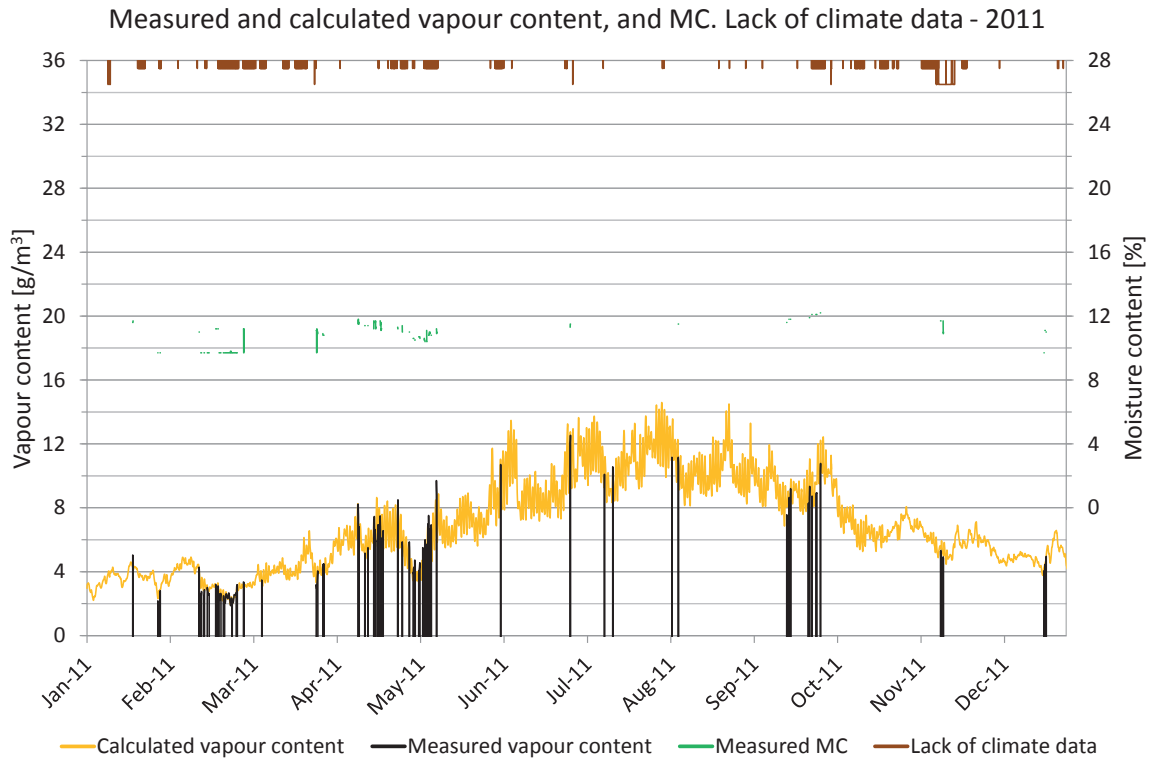


Figure 8.31.15. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

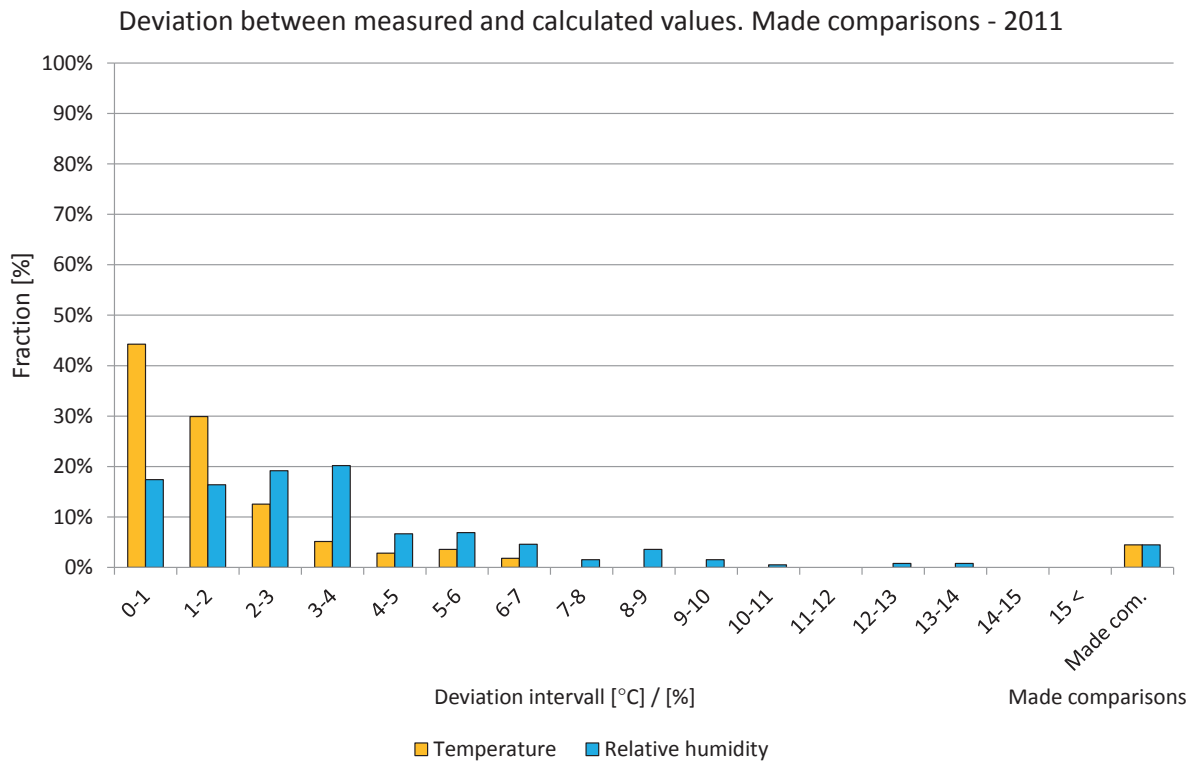


Figure 8.31.16. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.32 Position 32

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor. The influence of surrounding glass around the balcony was not included in the calculations.

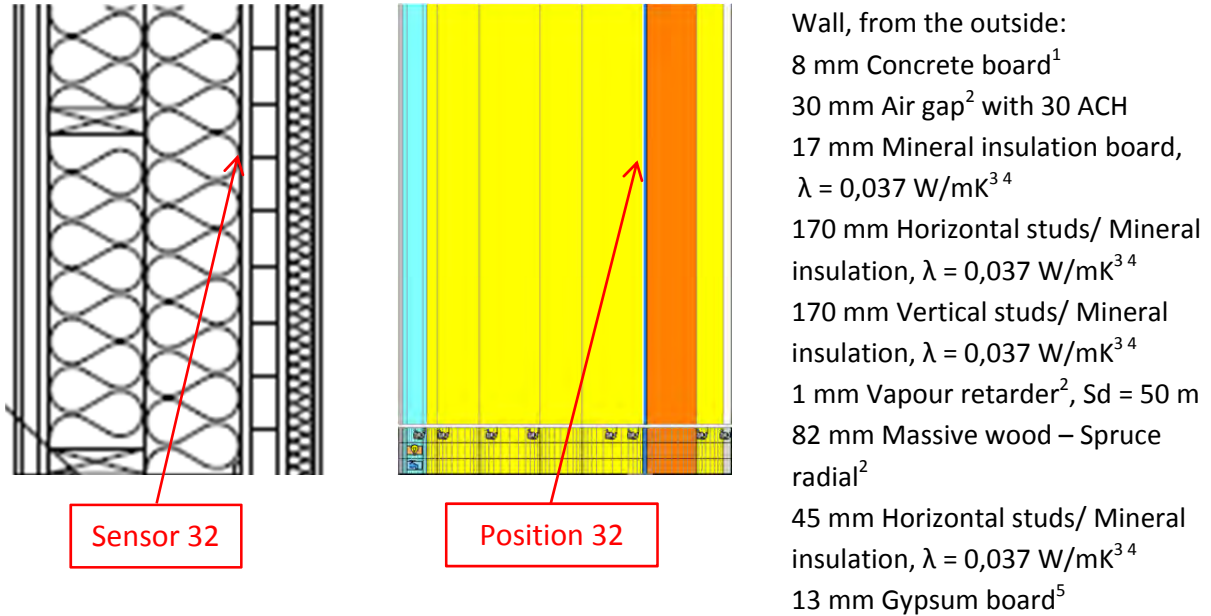


Figure 8.32.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

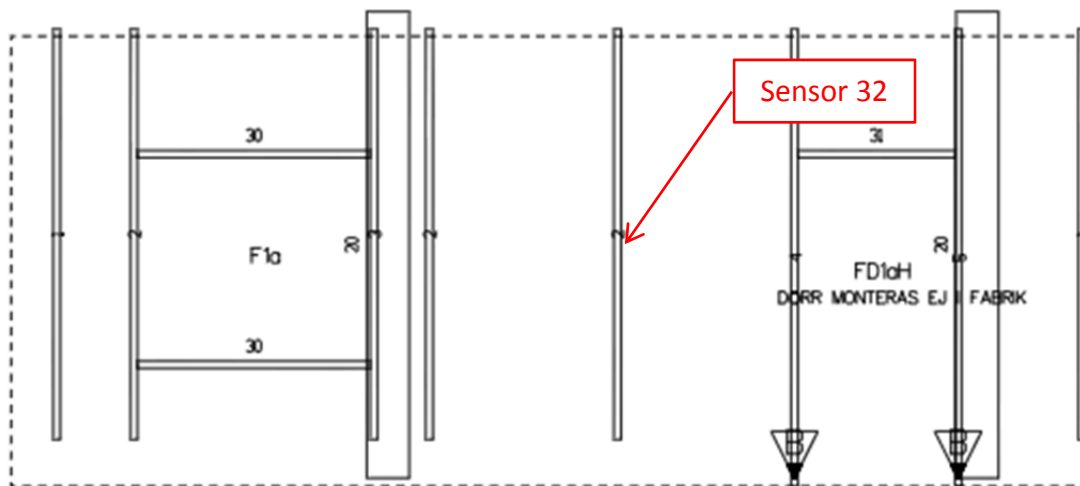


Figure 8.32.2. Location of the studied position.



Figure 8.32.3. Location of the studied position.



Figure 8.32.4. Location of the studied position. The balconies were further on surrounded by glass.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2008

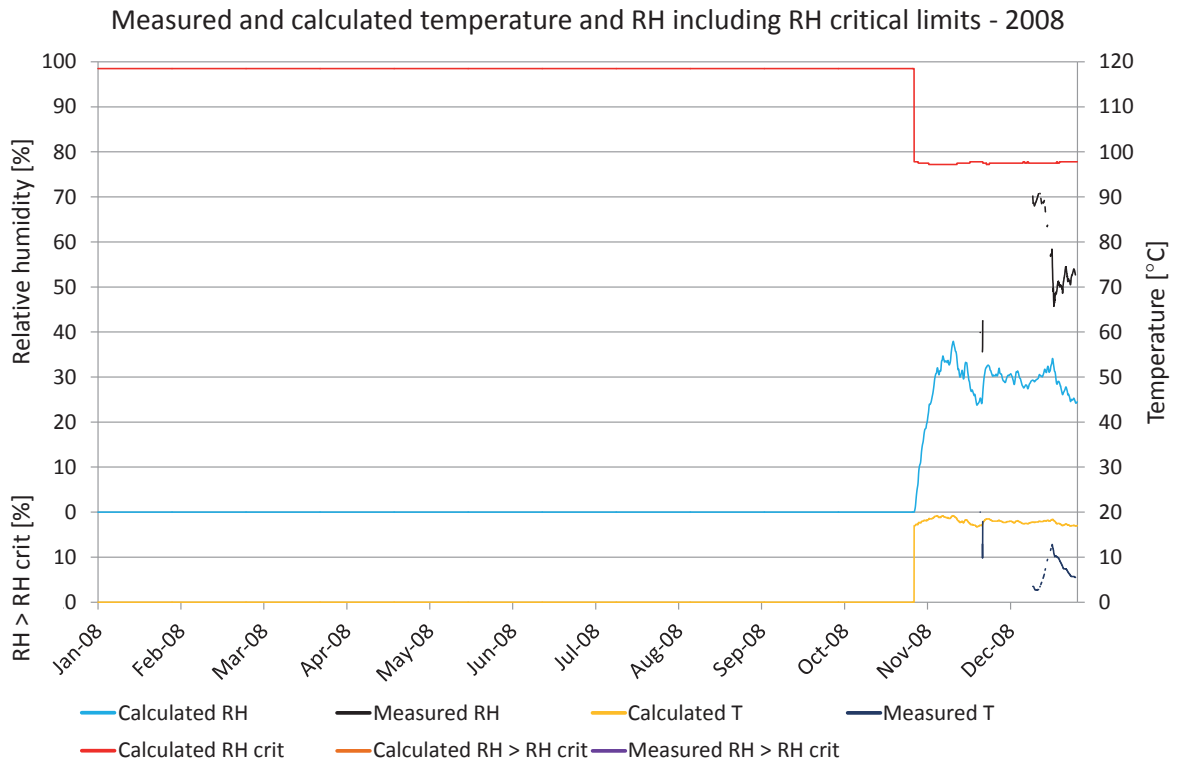


Figure 8.32.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

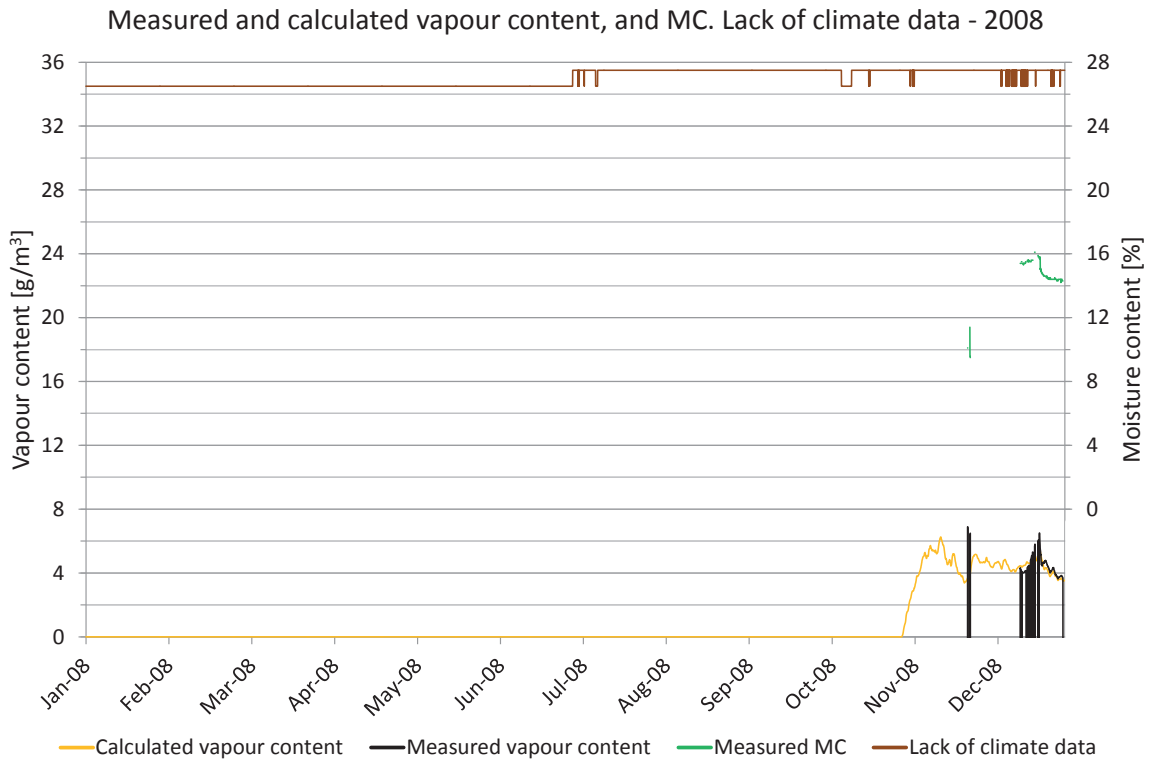


Figure 8.32.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

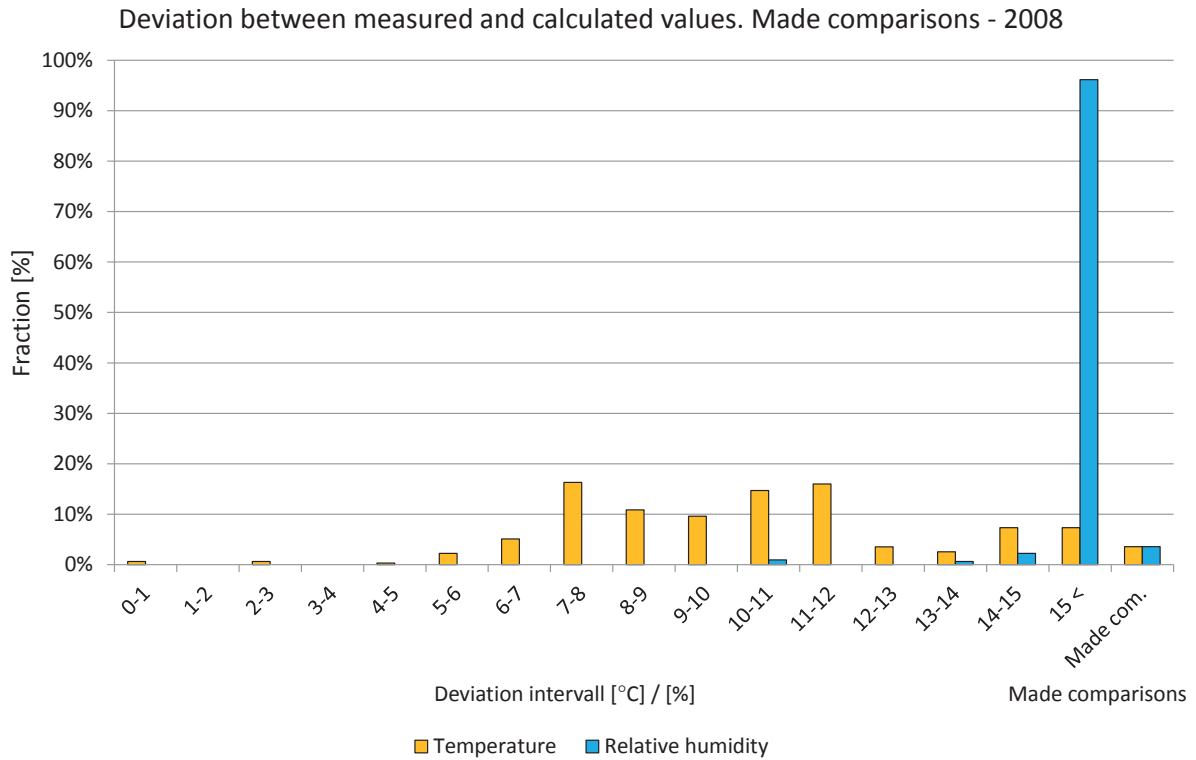


Figure 8.32.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

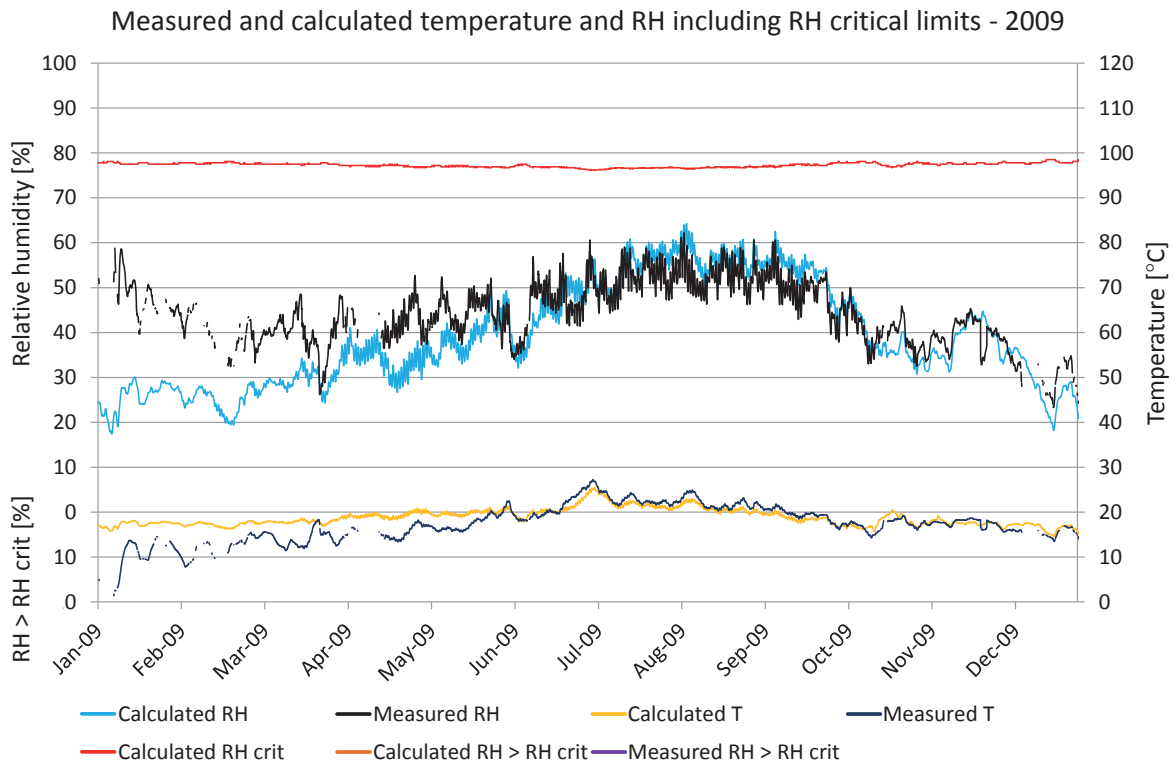


Figure 8.32.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

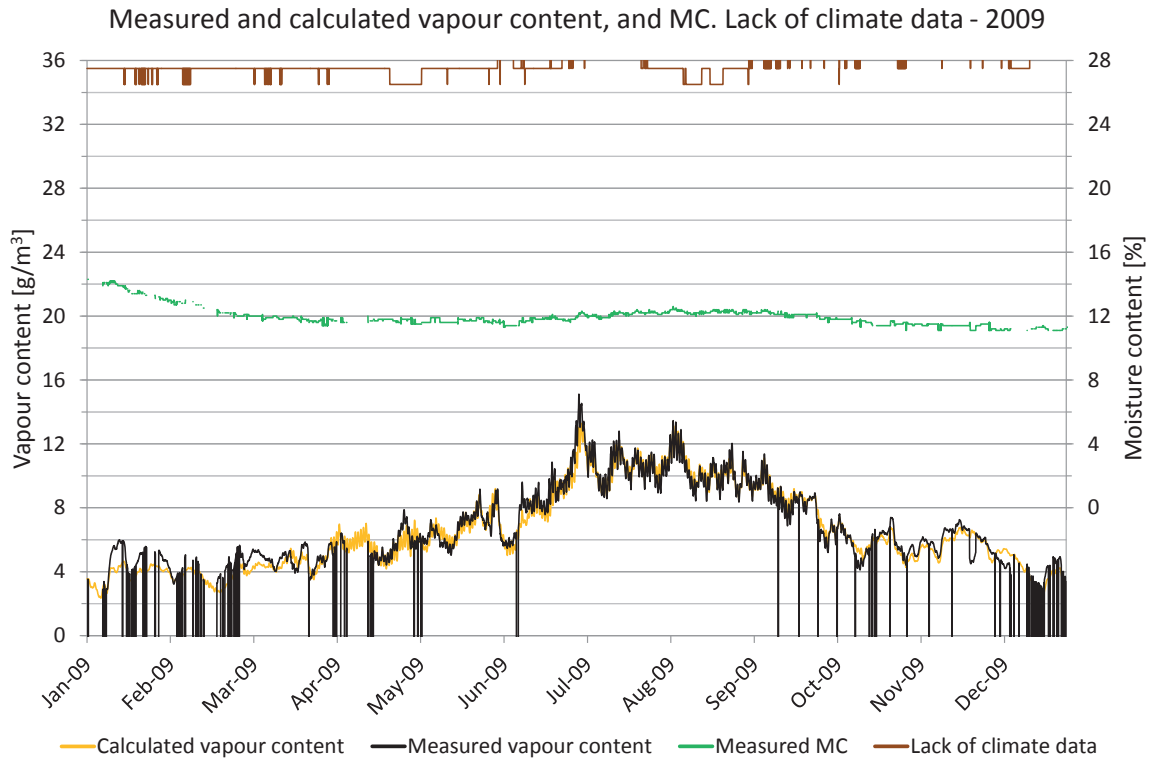


Figure 8.32.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

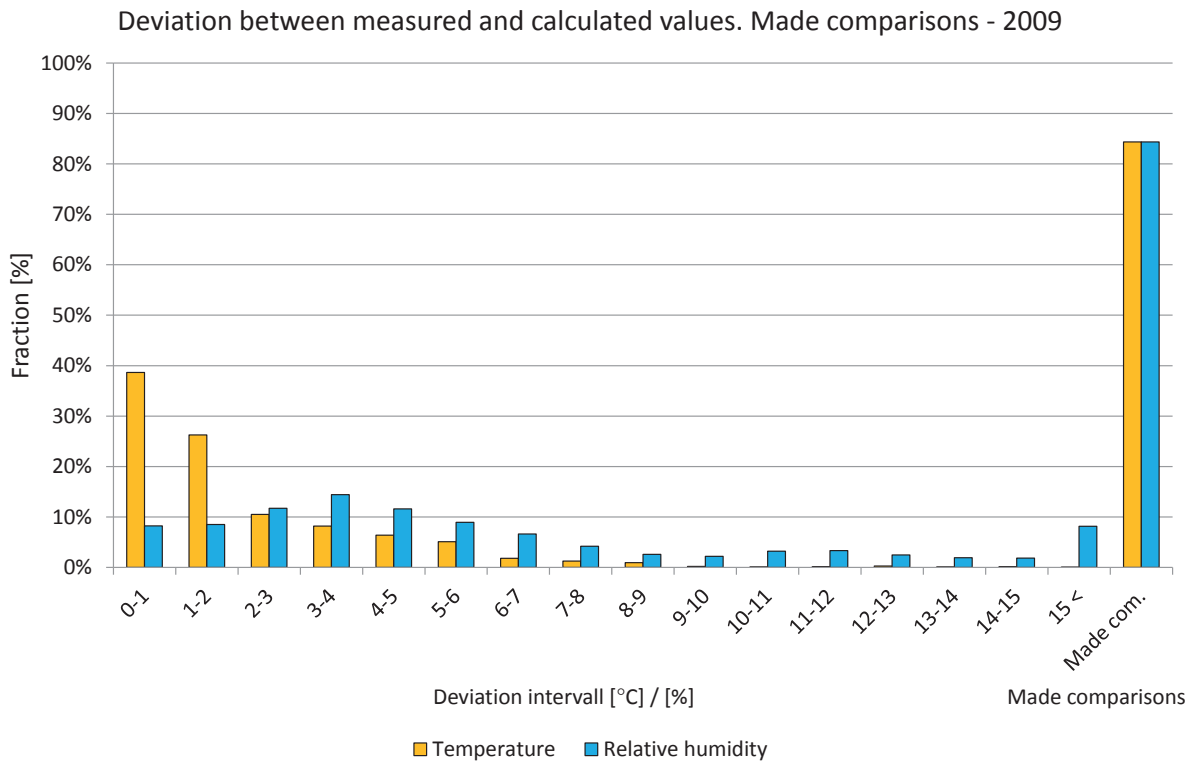


Figure 8.32.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

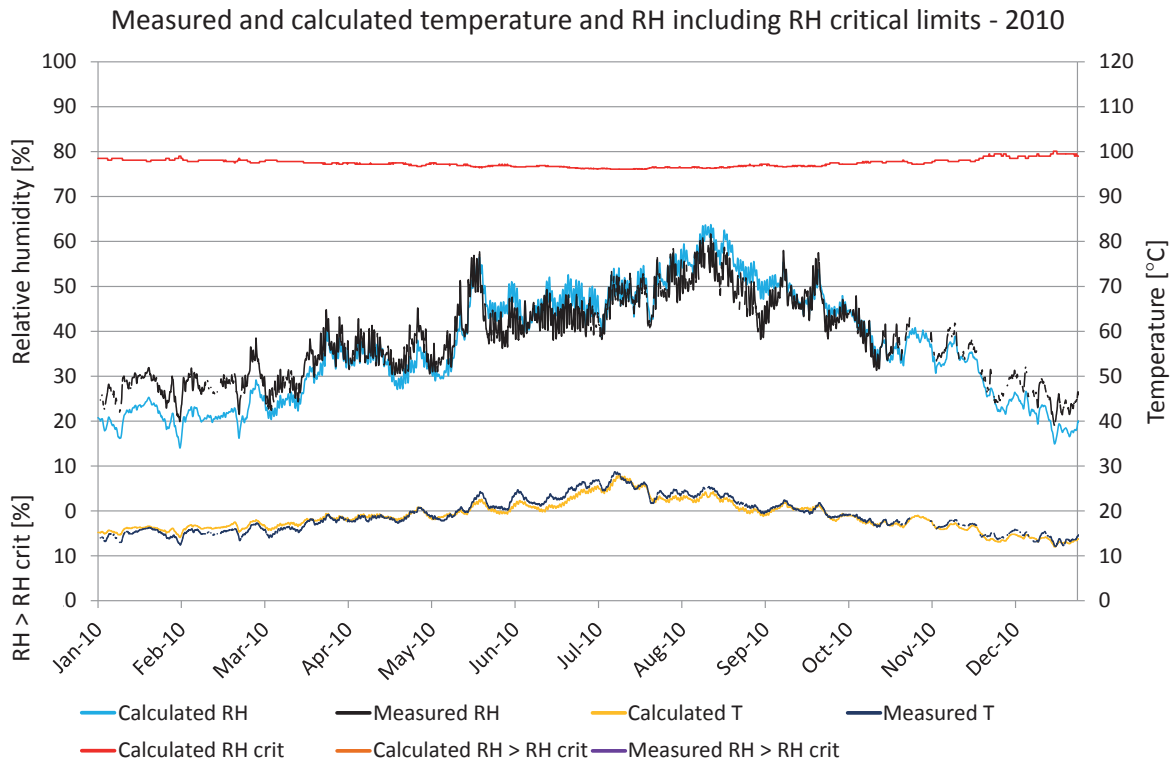


Figure 8.32.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

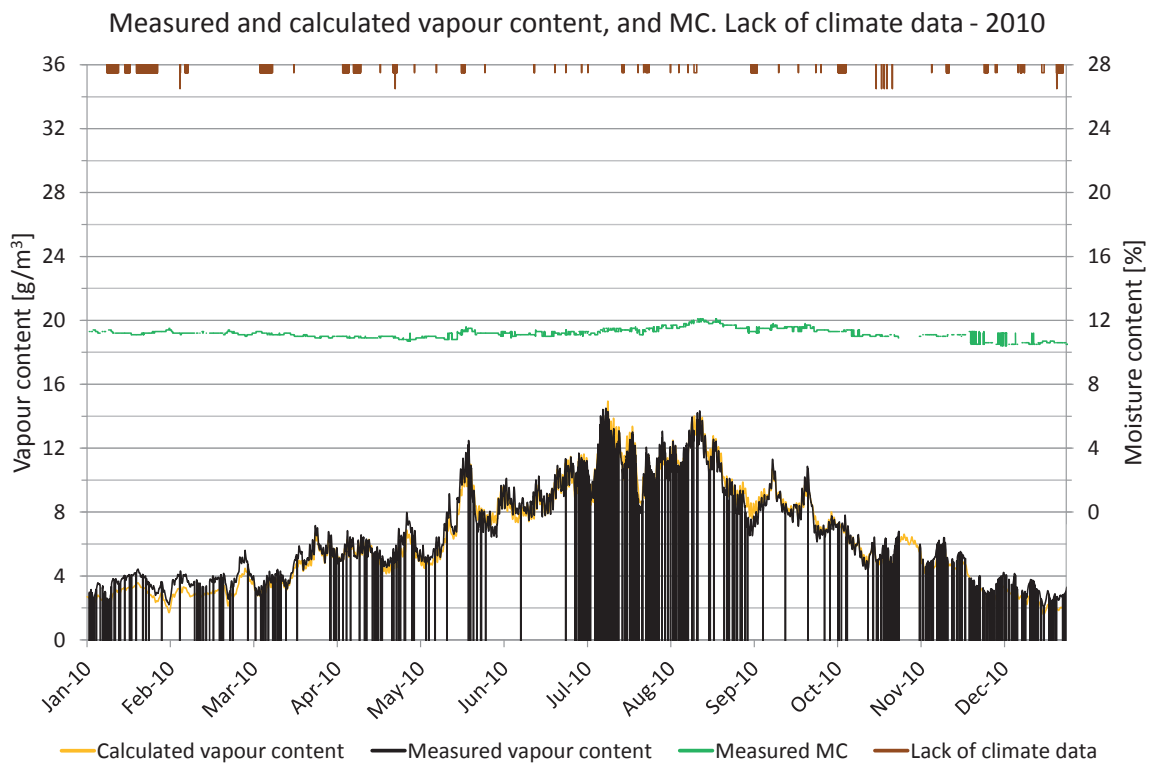


Figure 8.32.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

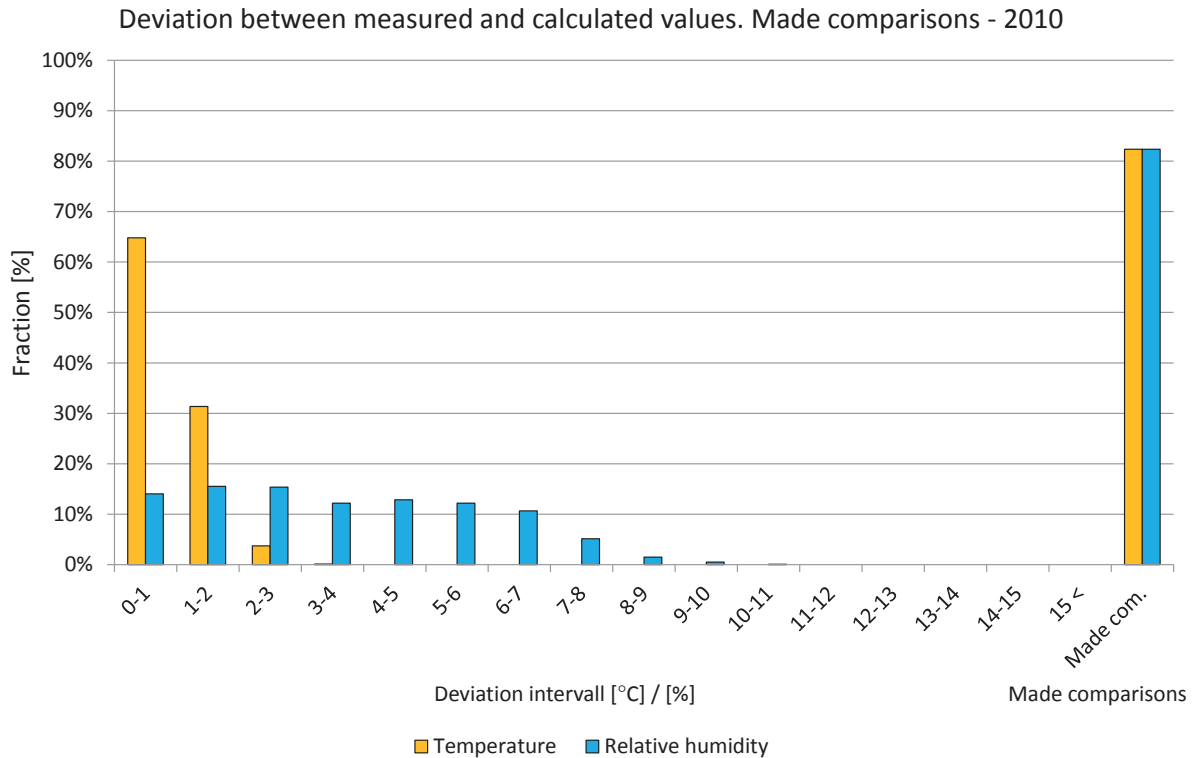


Figure 8.32.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

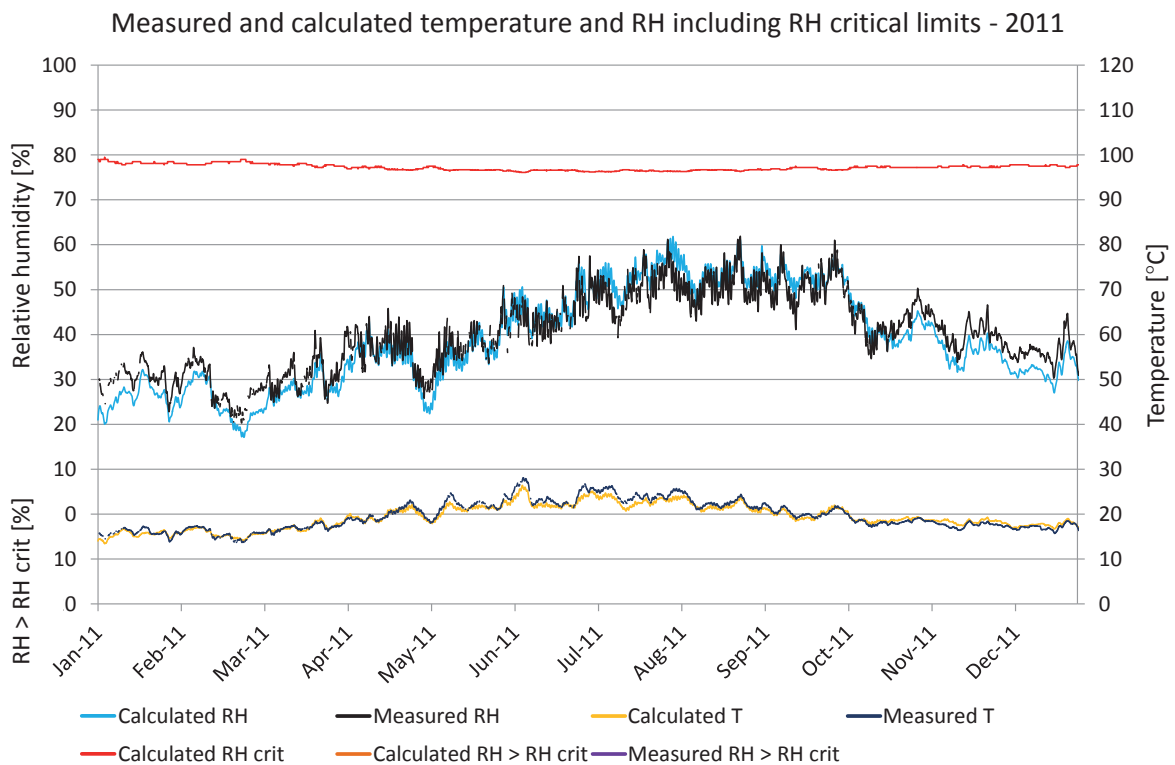


Figure 8.32.14. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

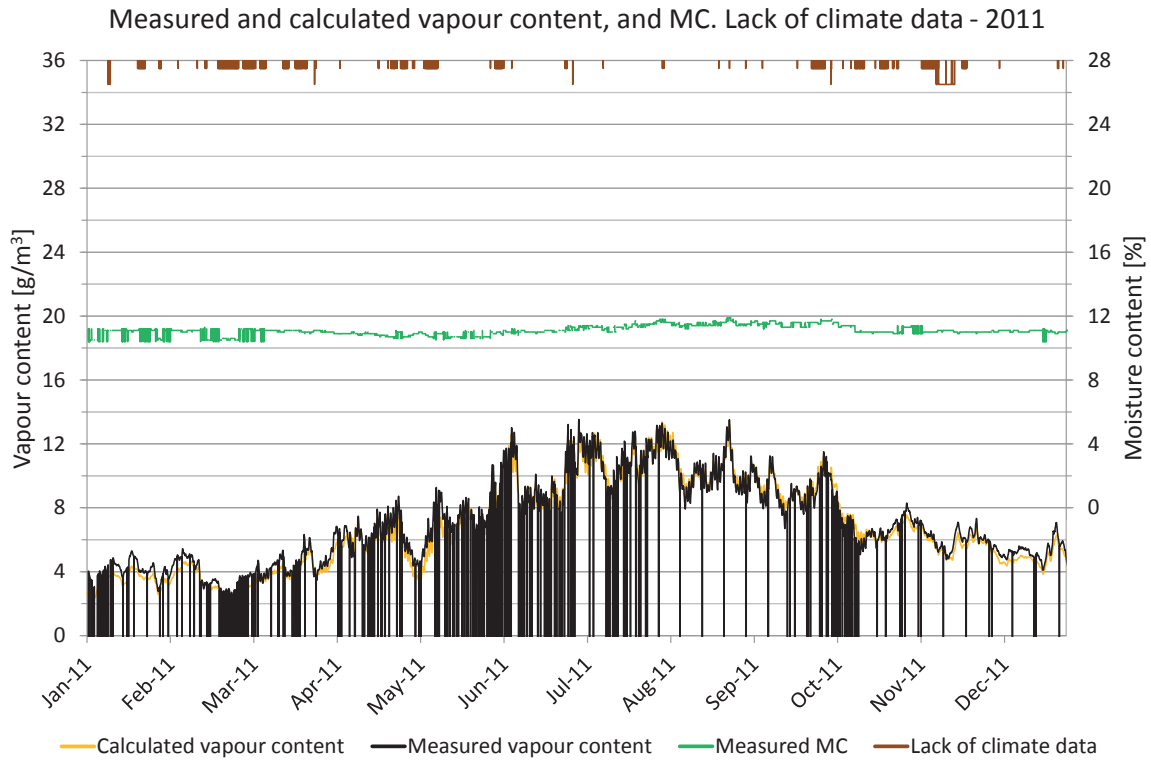


Figure 8.32.15. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

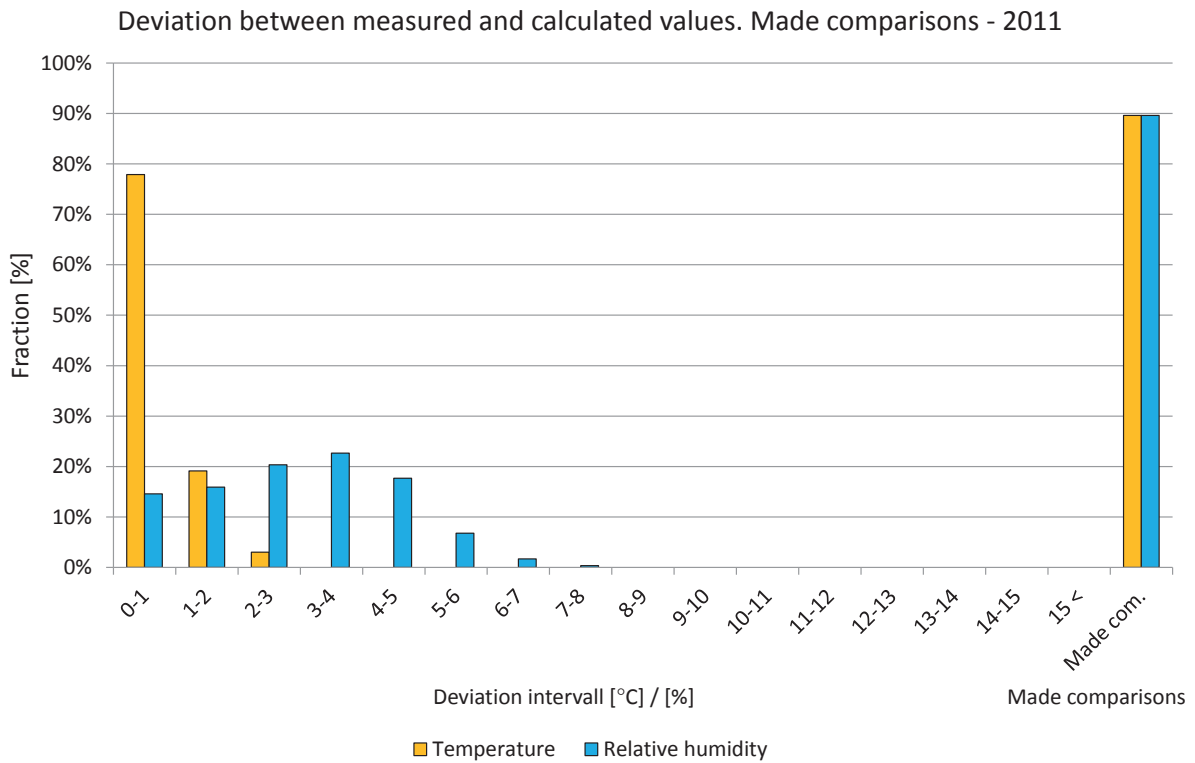


Figure 8.32.16. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.33 Position 33

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor.

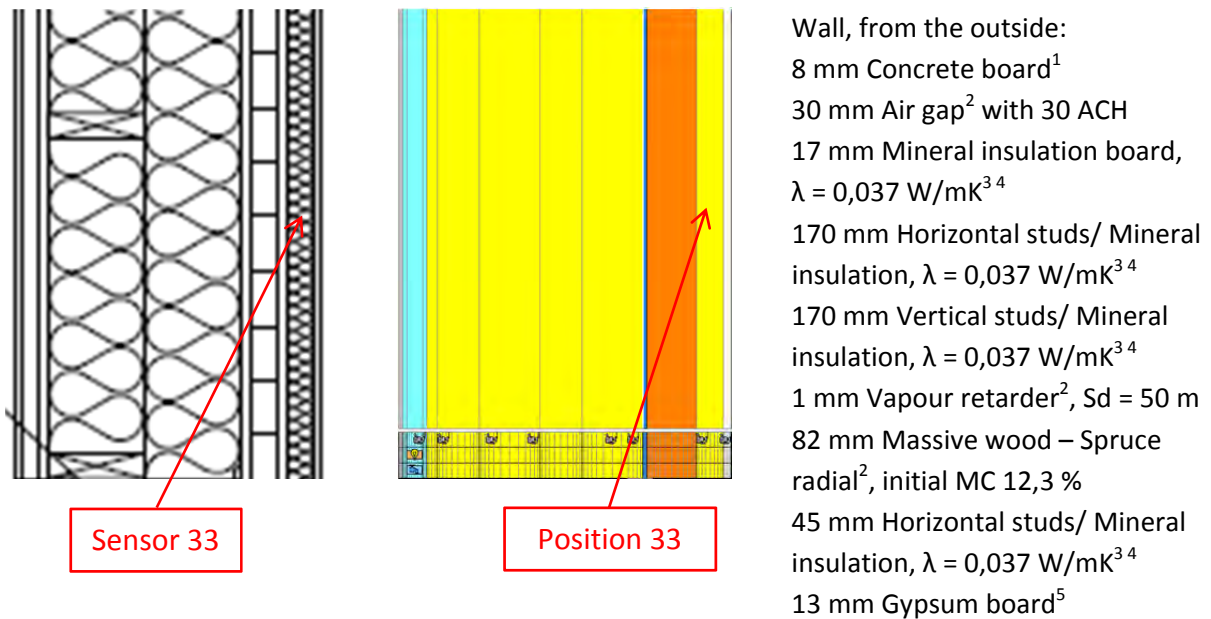


Figure 8.33.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

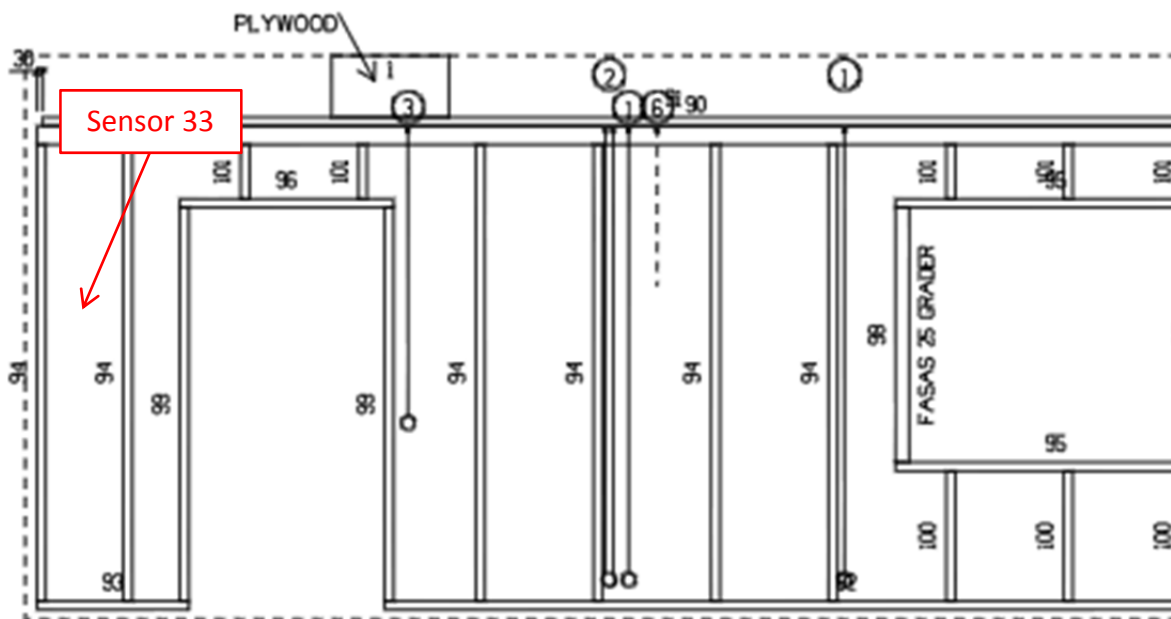


Figure 8.33.2. Location of the studied position.

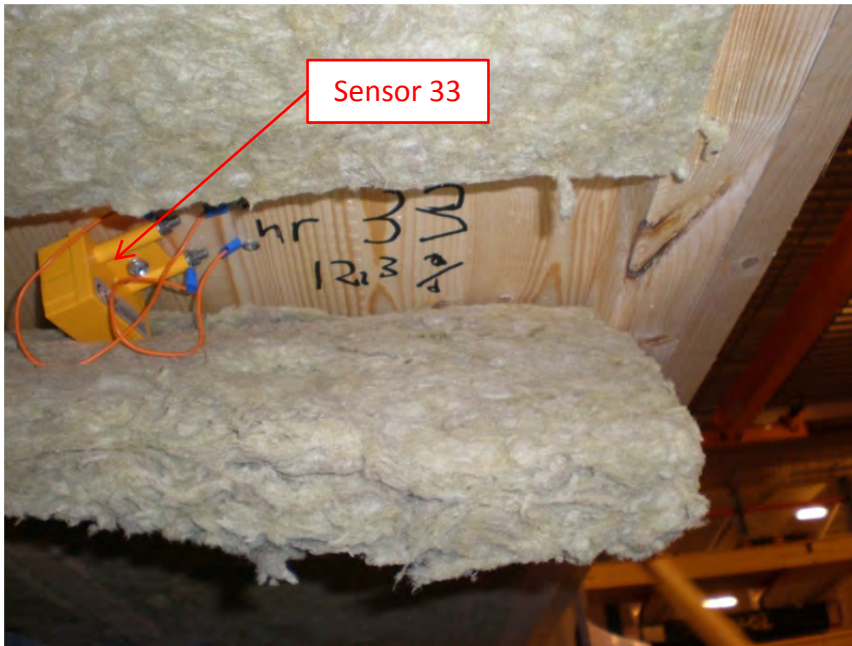


Figure 8.33.3. Location of the studied position.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors. However, this position was less affected of those factors compare to other studied positions.

Year 2008

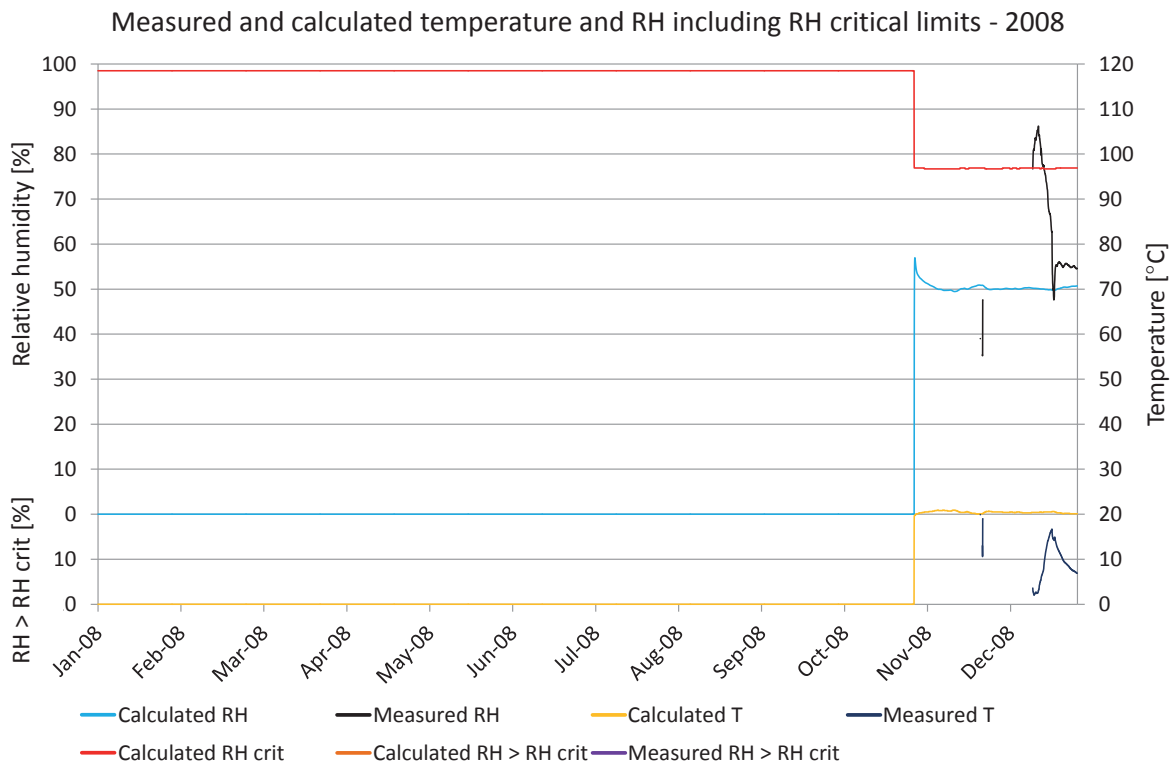


Figure 8.33.4. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

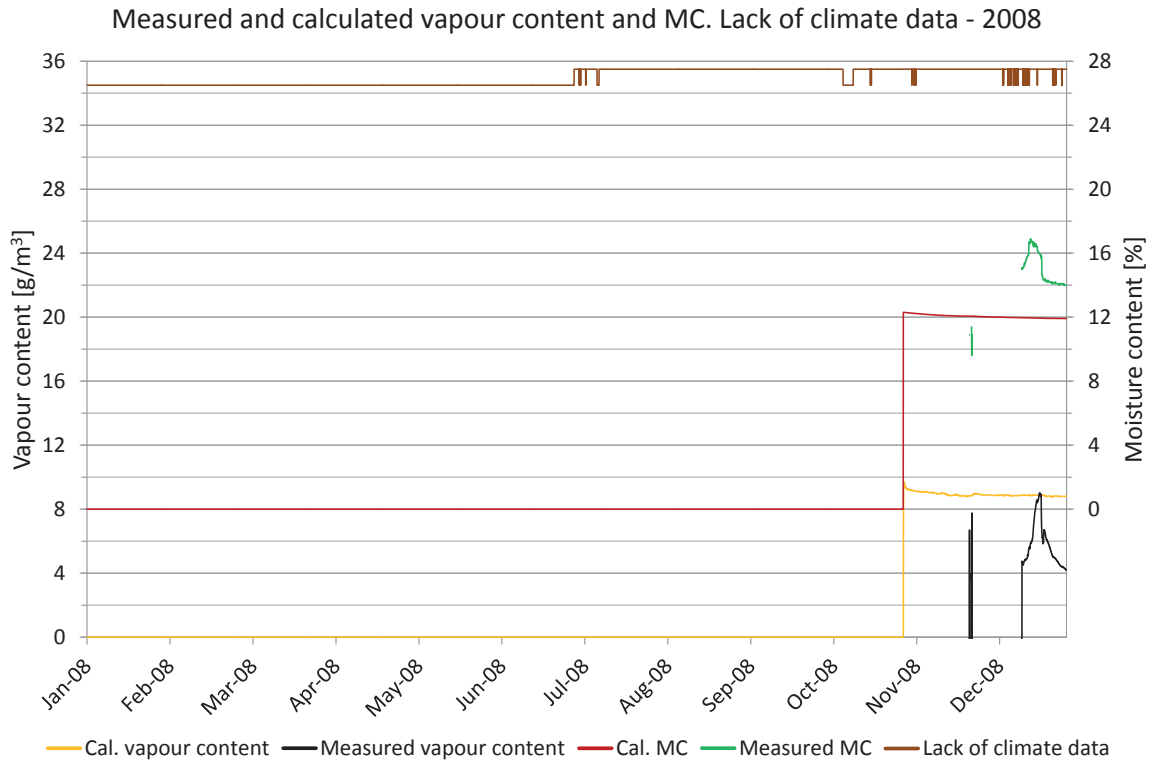


Figure 8.33.5. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

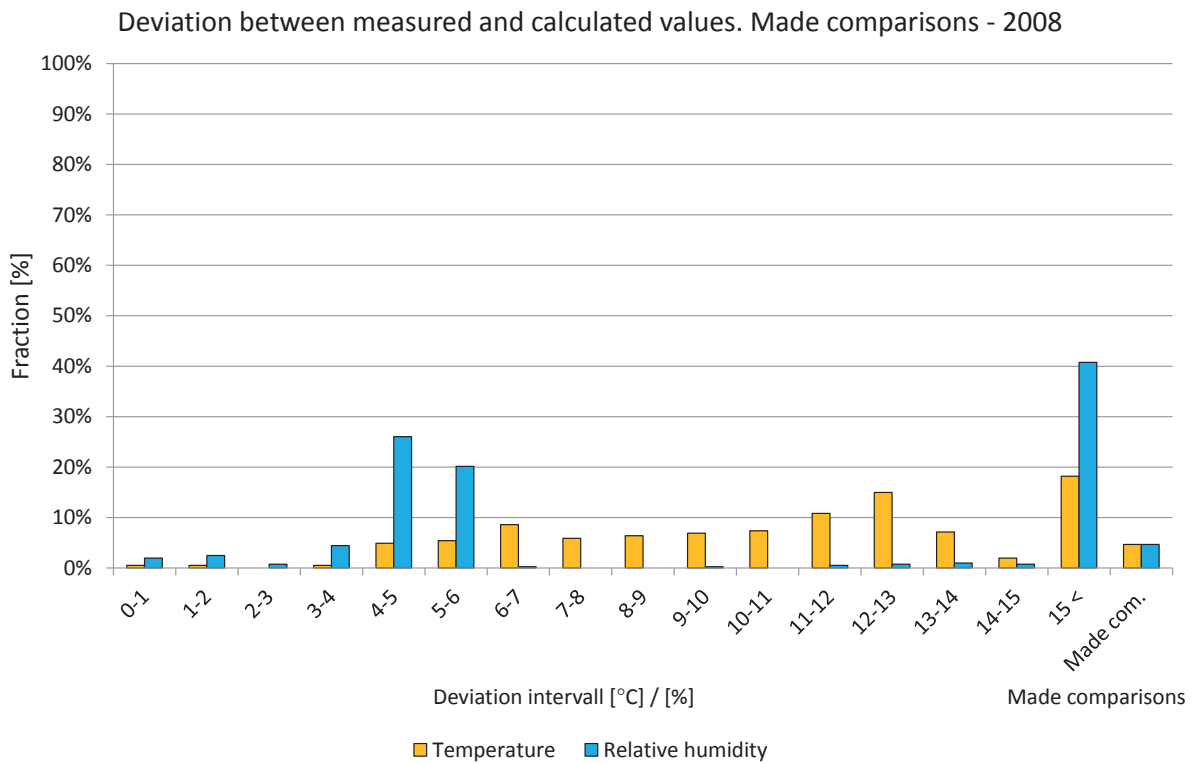


Figure 8.33.6. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

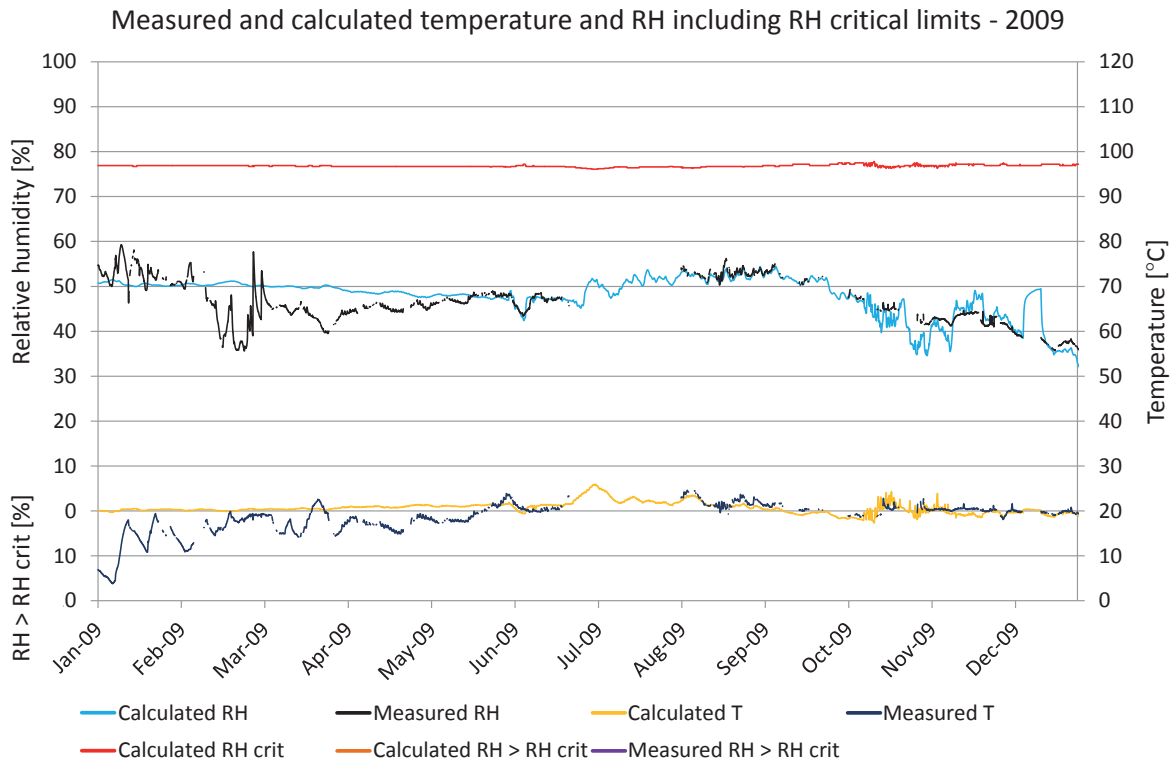


Figure 8.33.7. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

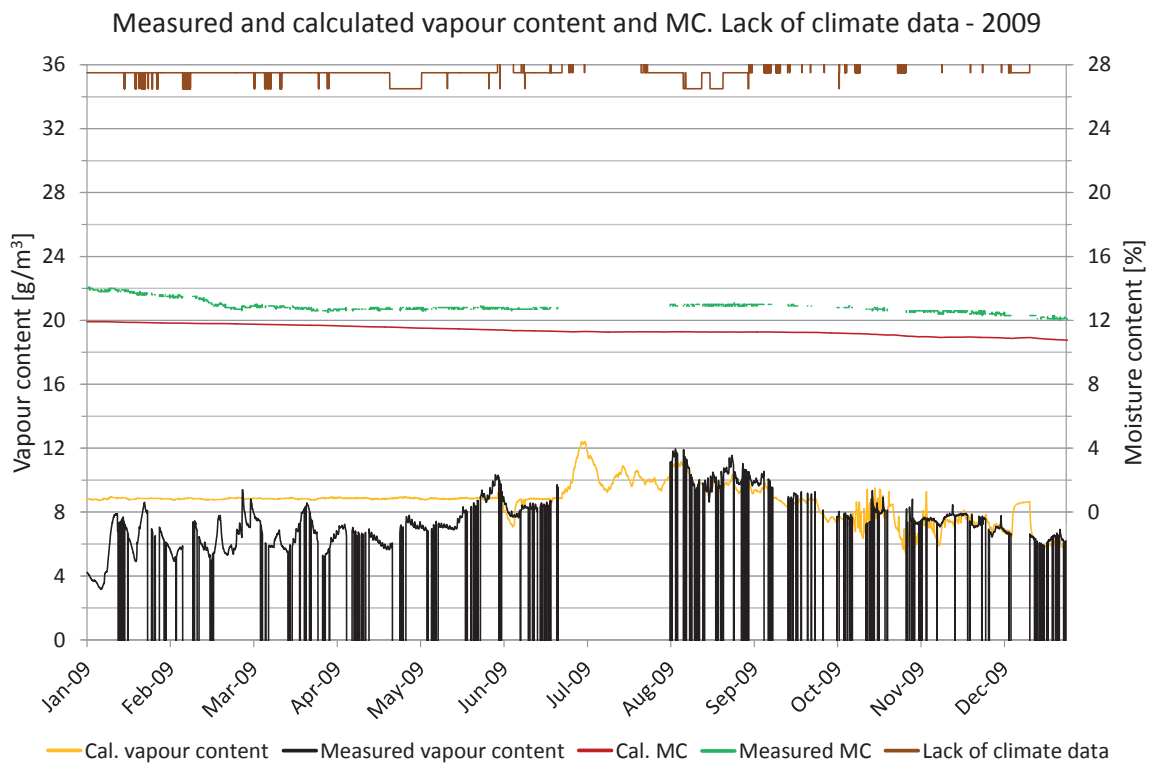


Figure 8.33.8. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

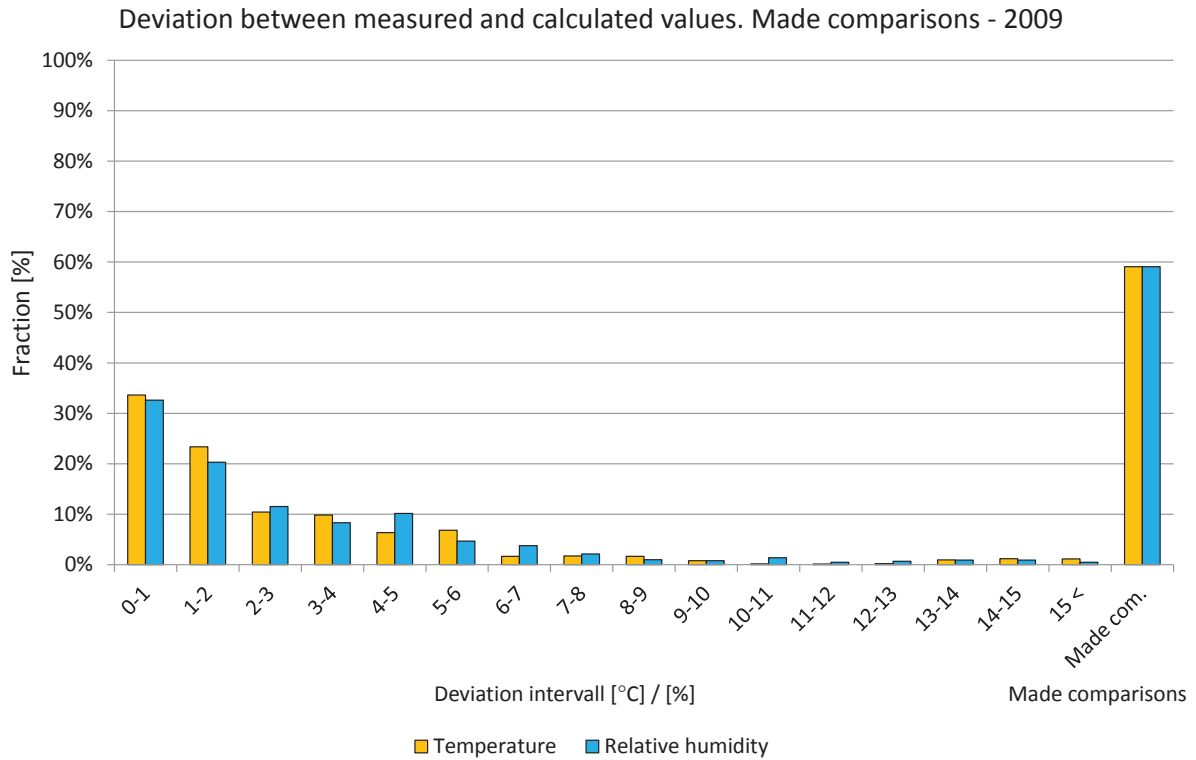


Figure 8.33.9. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

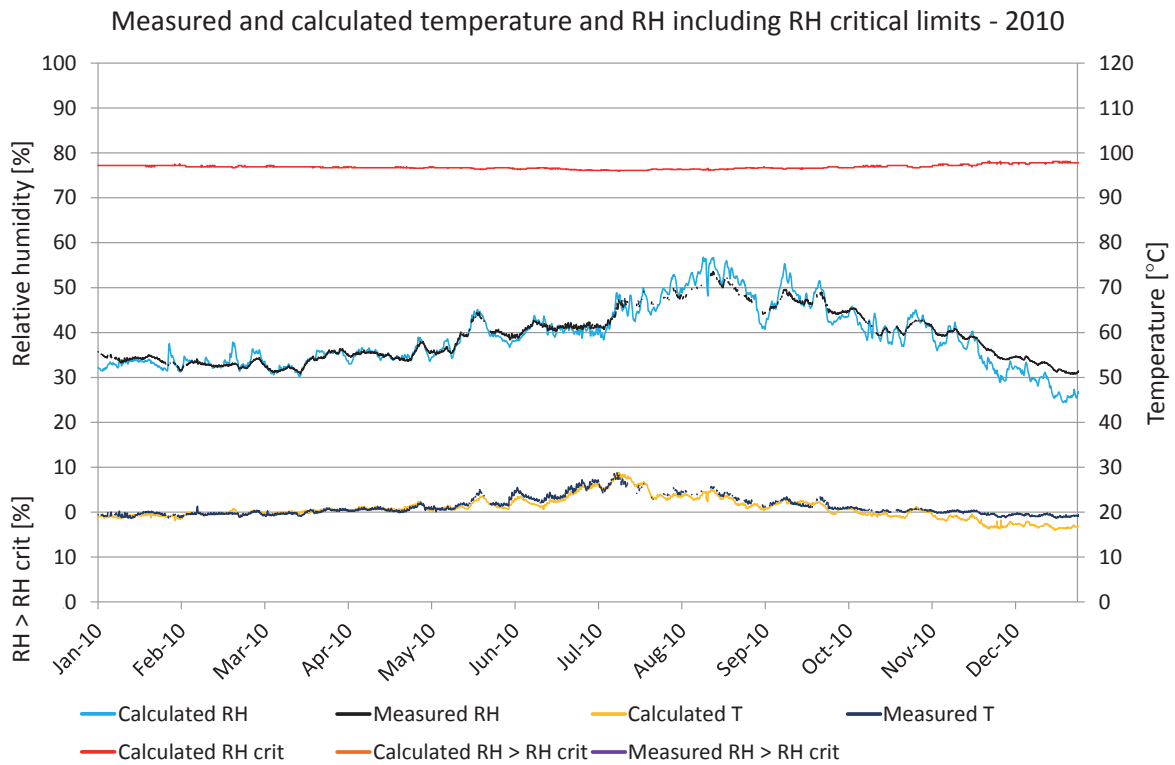


Figure 8.33.10. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

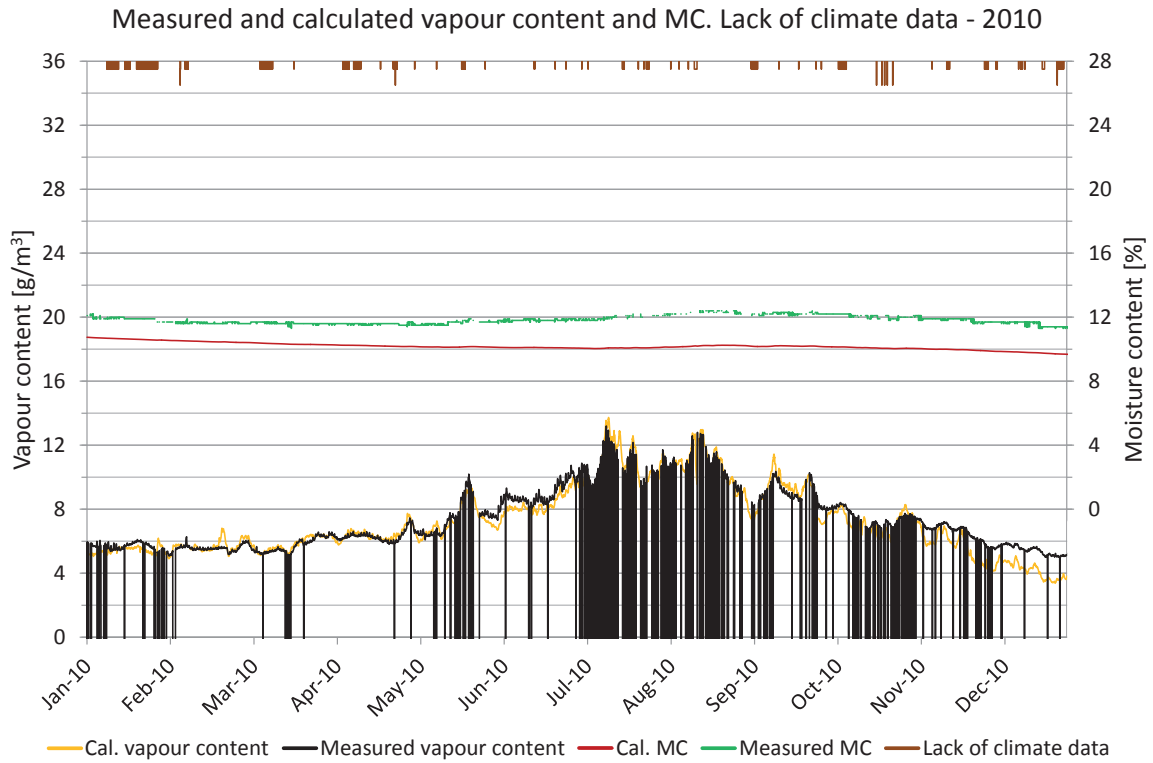


Figure 8.33.11. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

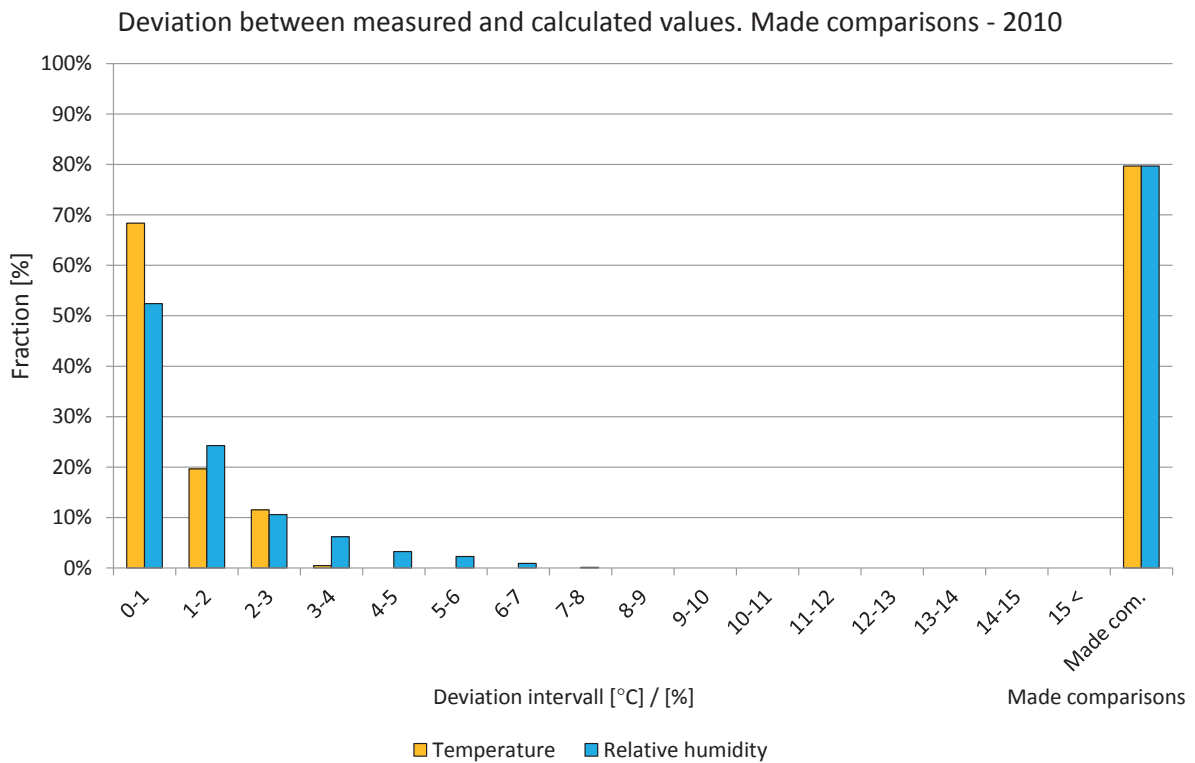


Figure 8.33.12. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

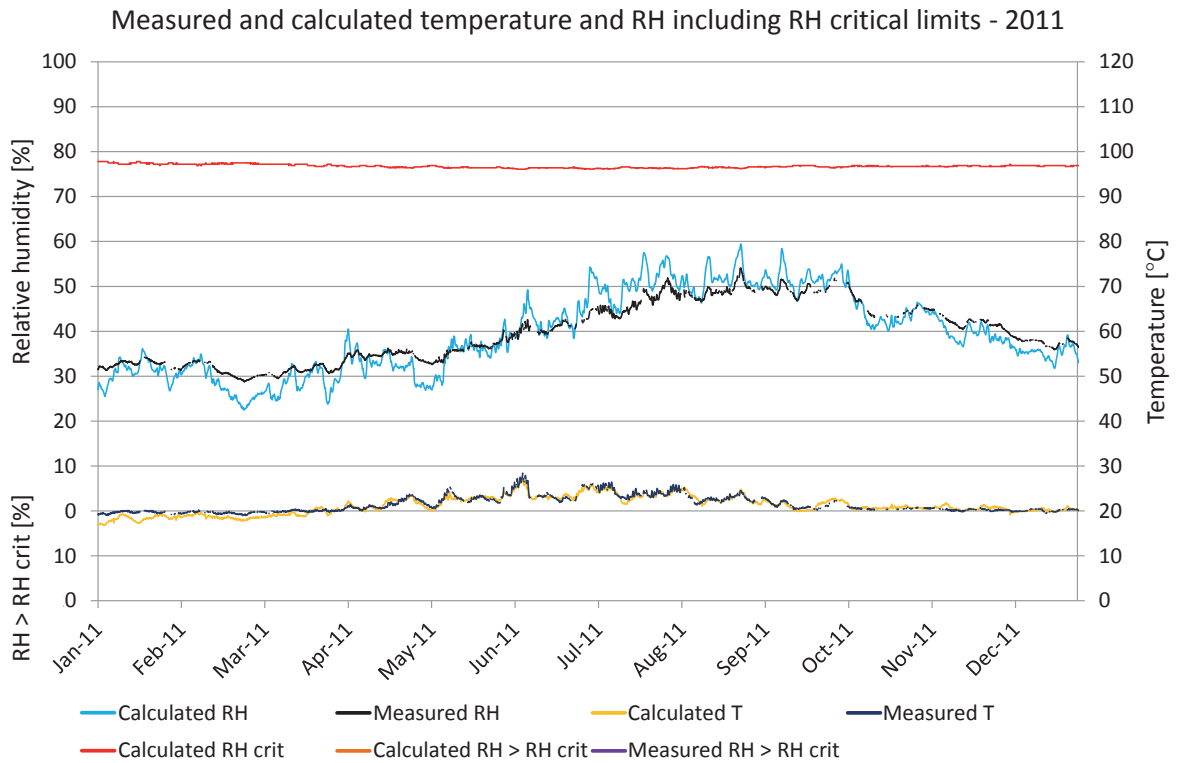


Figure 8.33.13. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

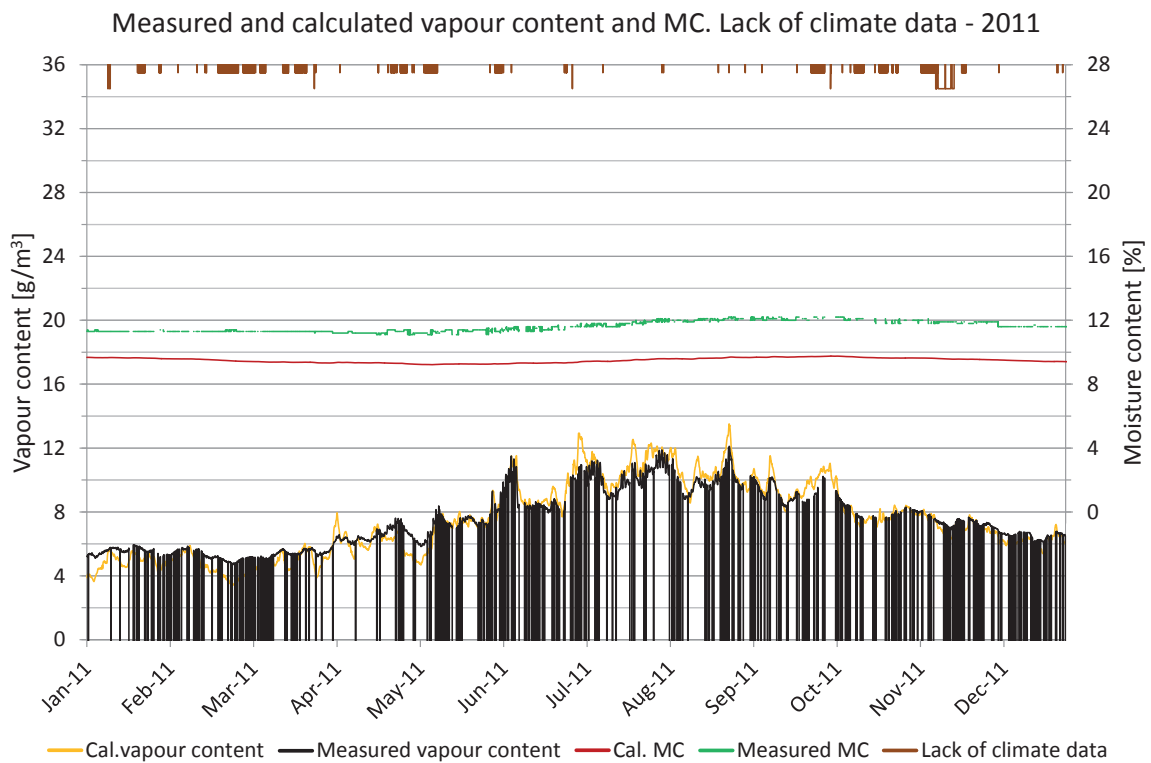


Figure 8.33.14. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

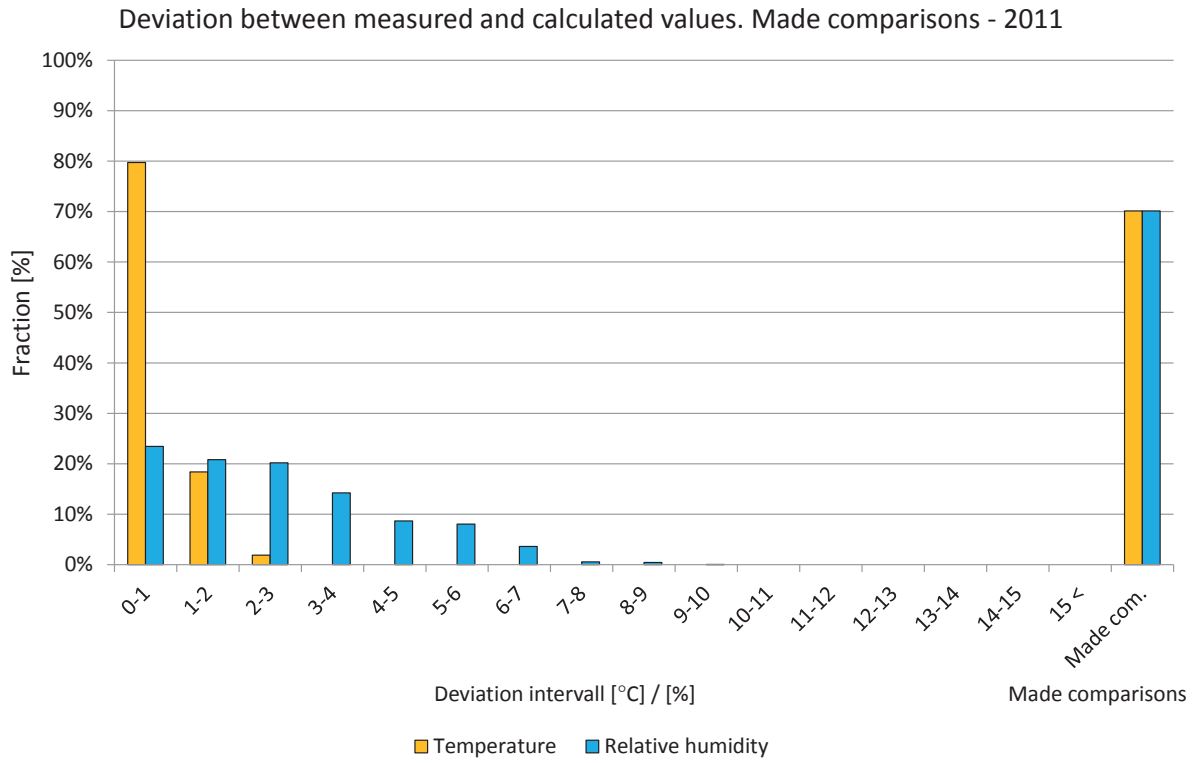


Figure 8.33.15. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.34 Position 34

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor.

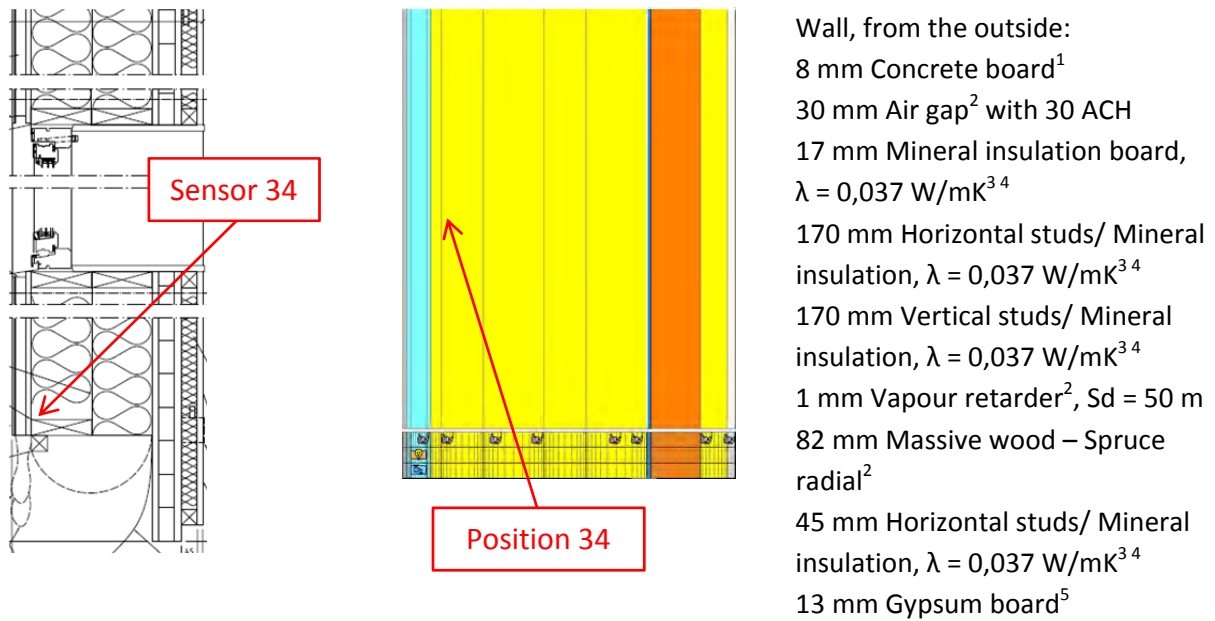


Figure 8.34.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

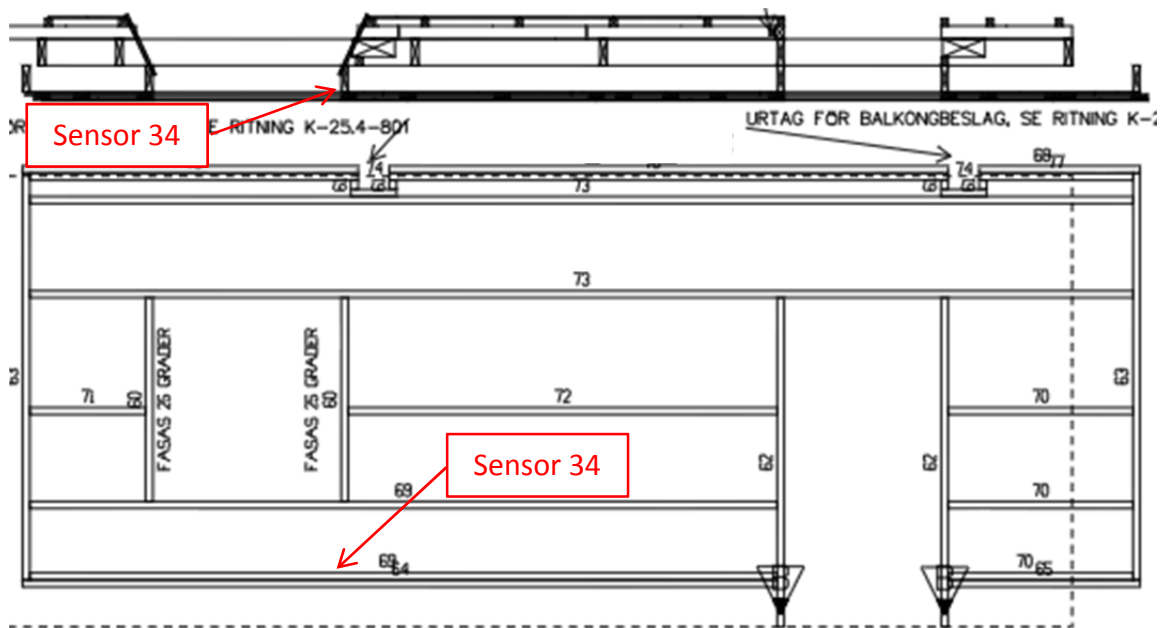


Figure 8.34.2. Location of the studied position.



Figure 8.34.3. Location of the studied position.



Figure 8.34.4. Location of the studied position.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2009

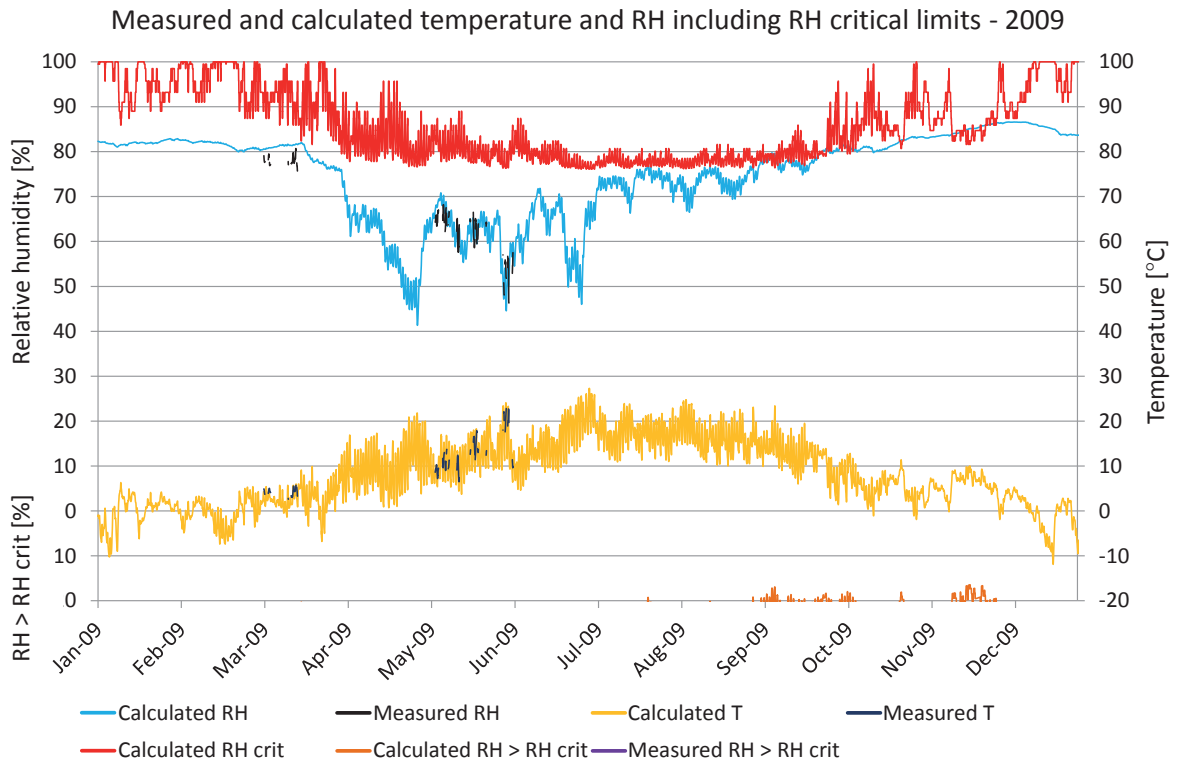


Figure 8.34.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

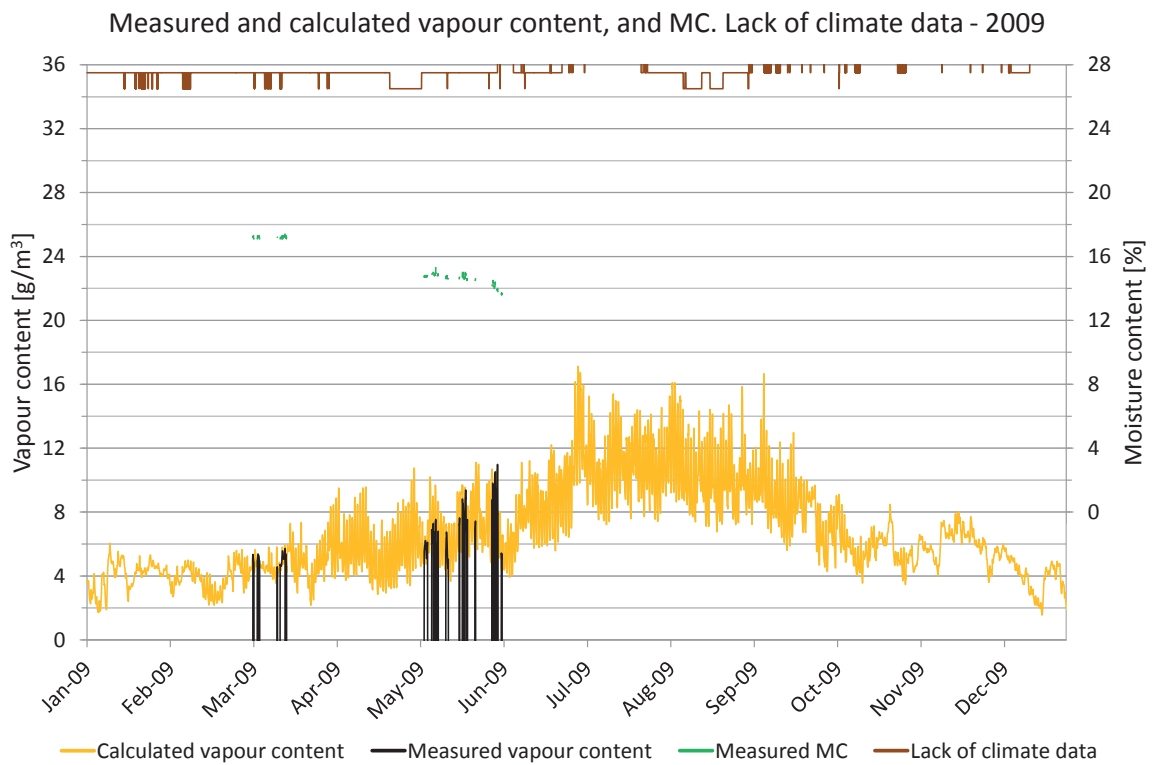


Figure 8.34.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

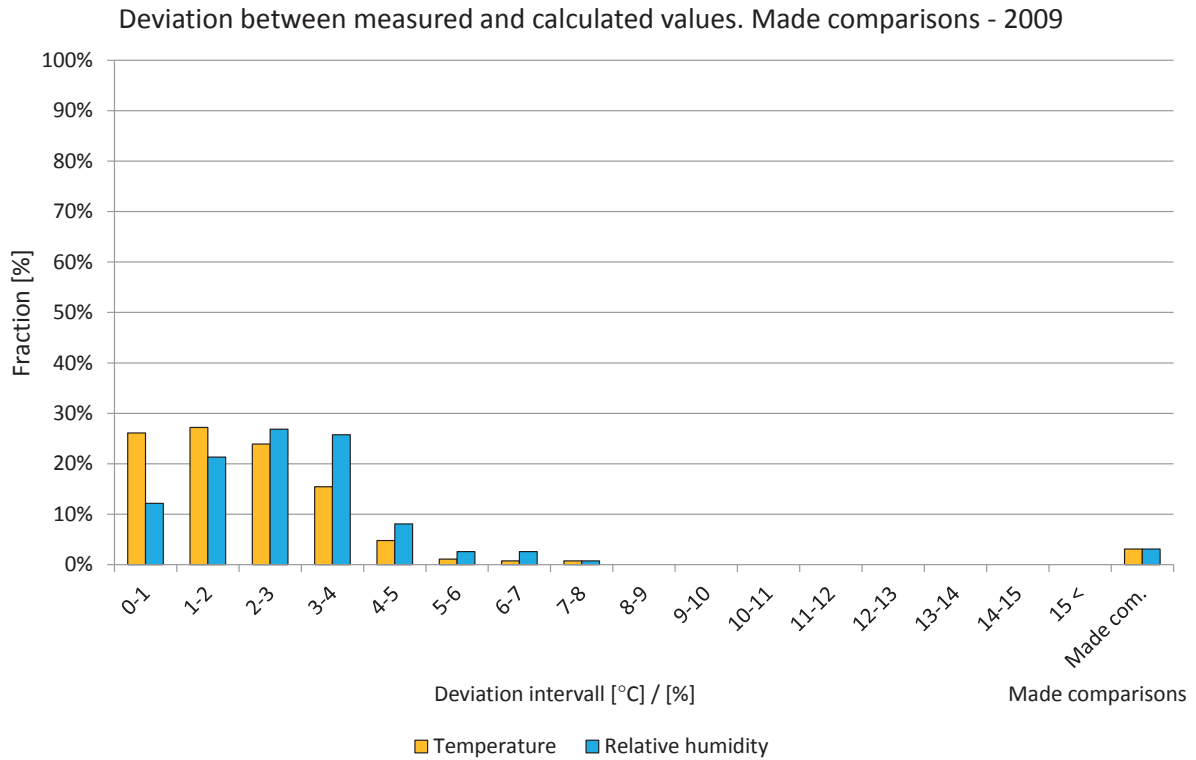


Figure 8.34.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

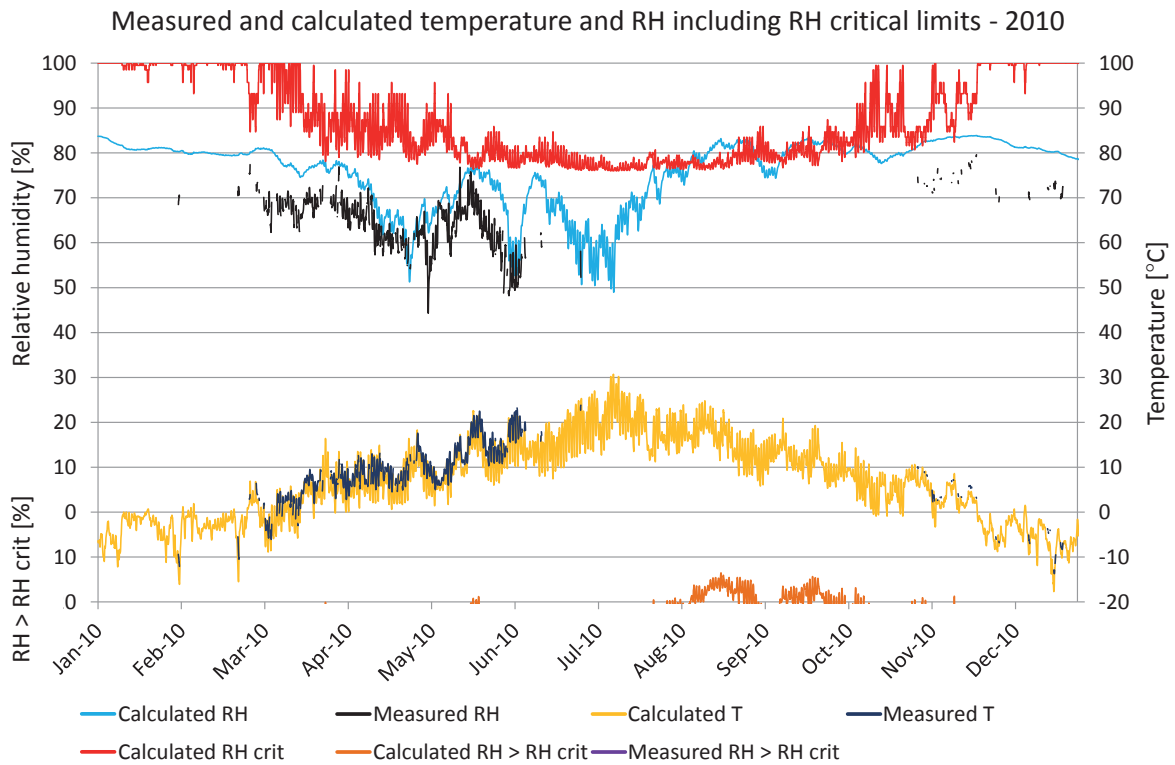


Figure 8.34.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

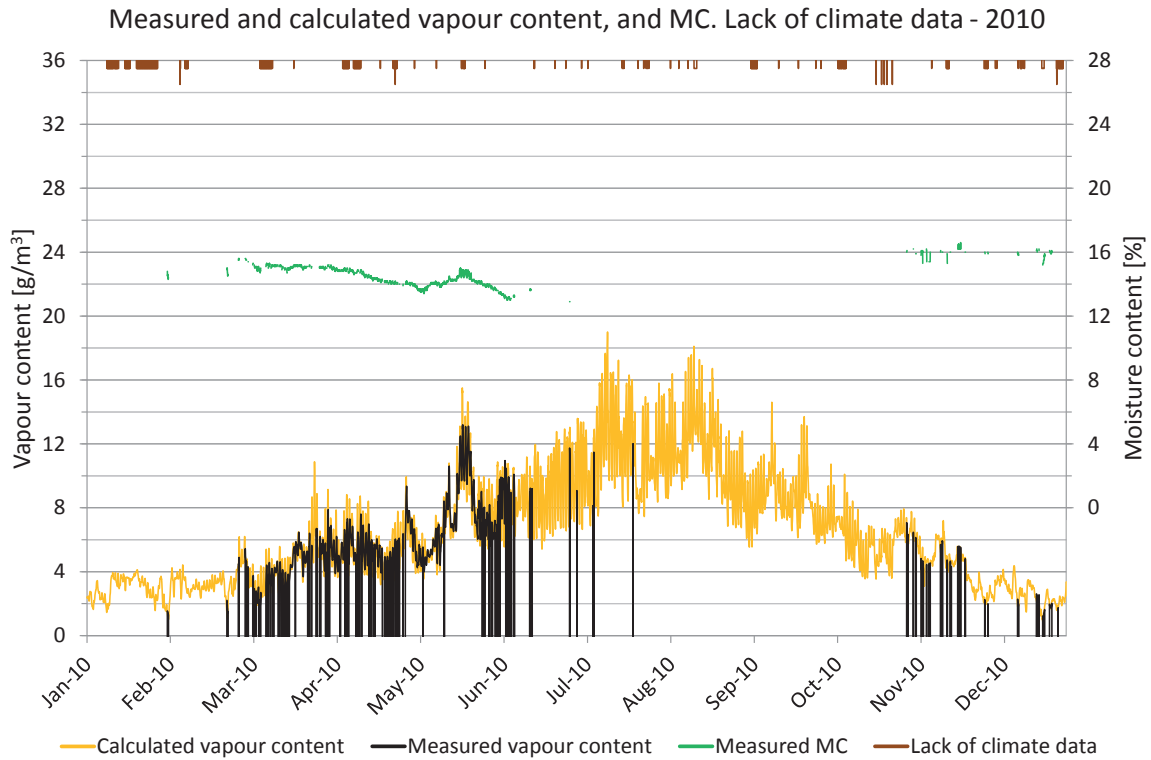


Figure 8.34.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

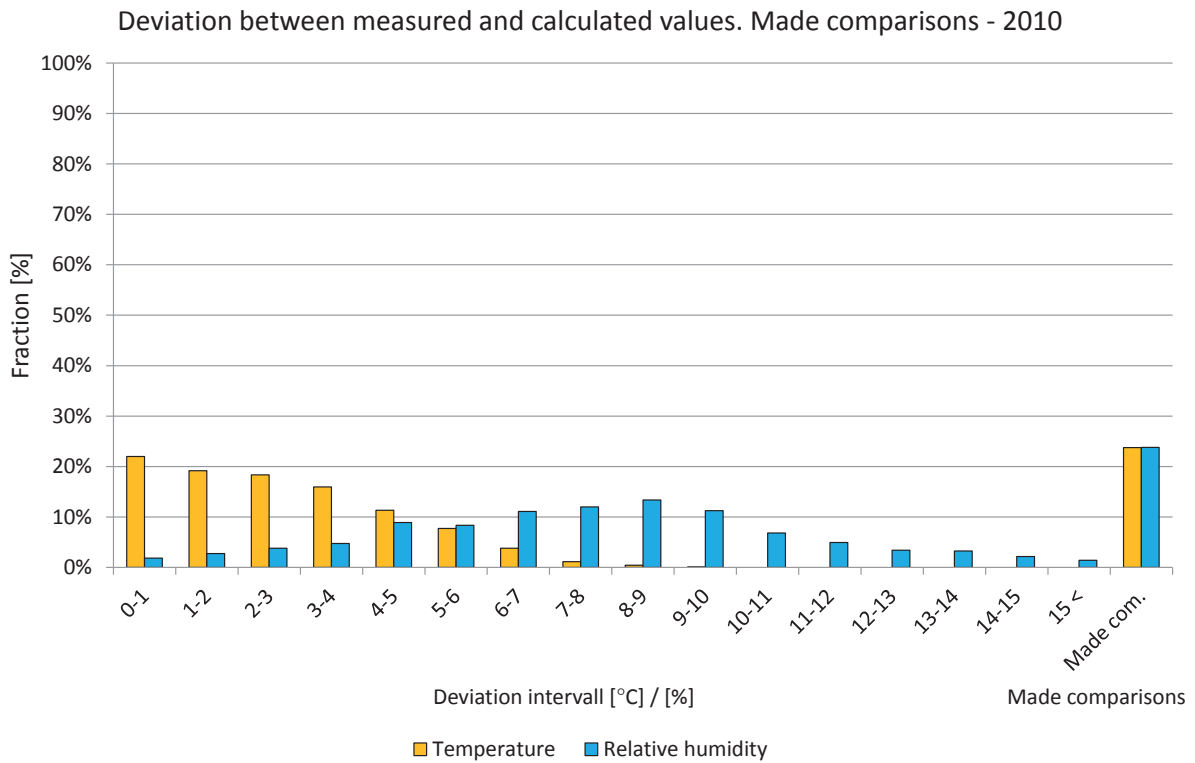


Figure 8.34.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

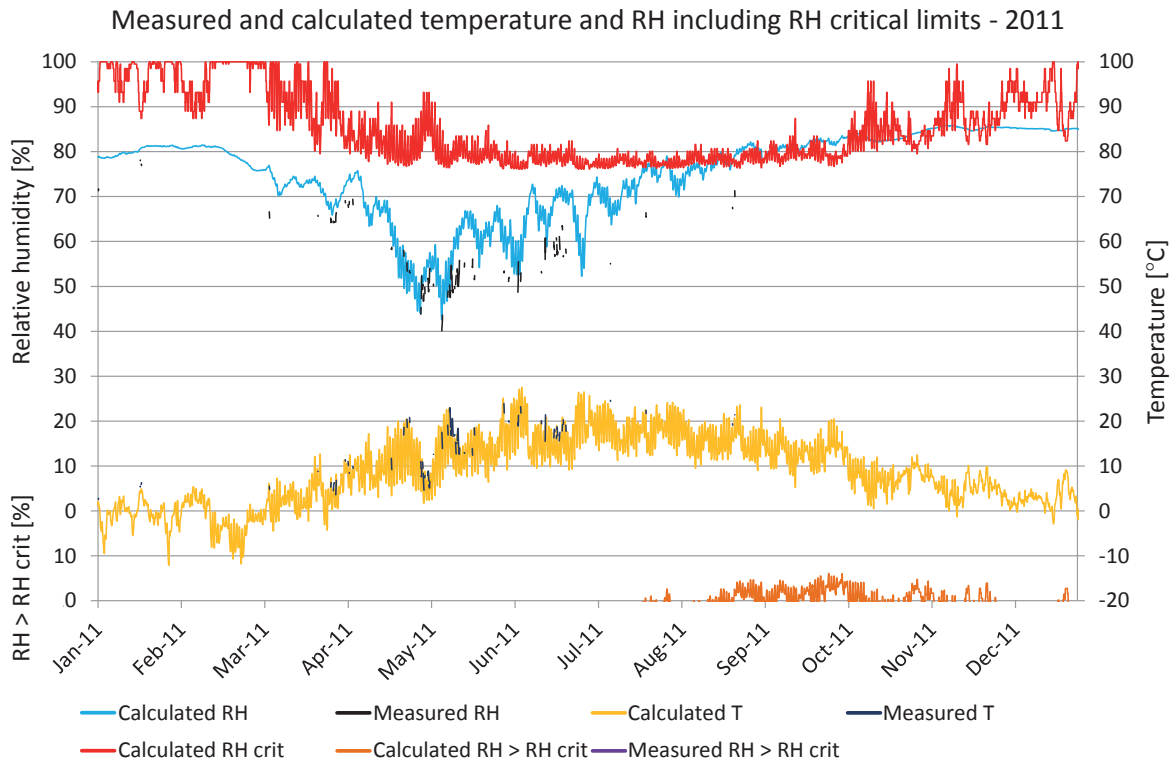


Figure 8.34.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

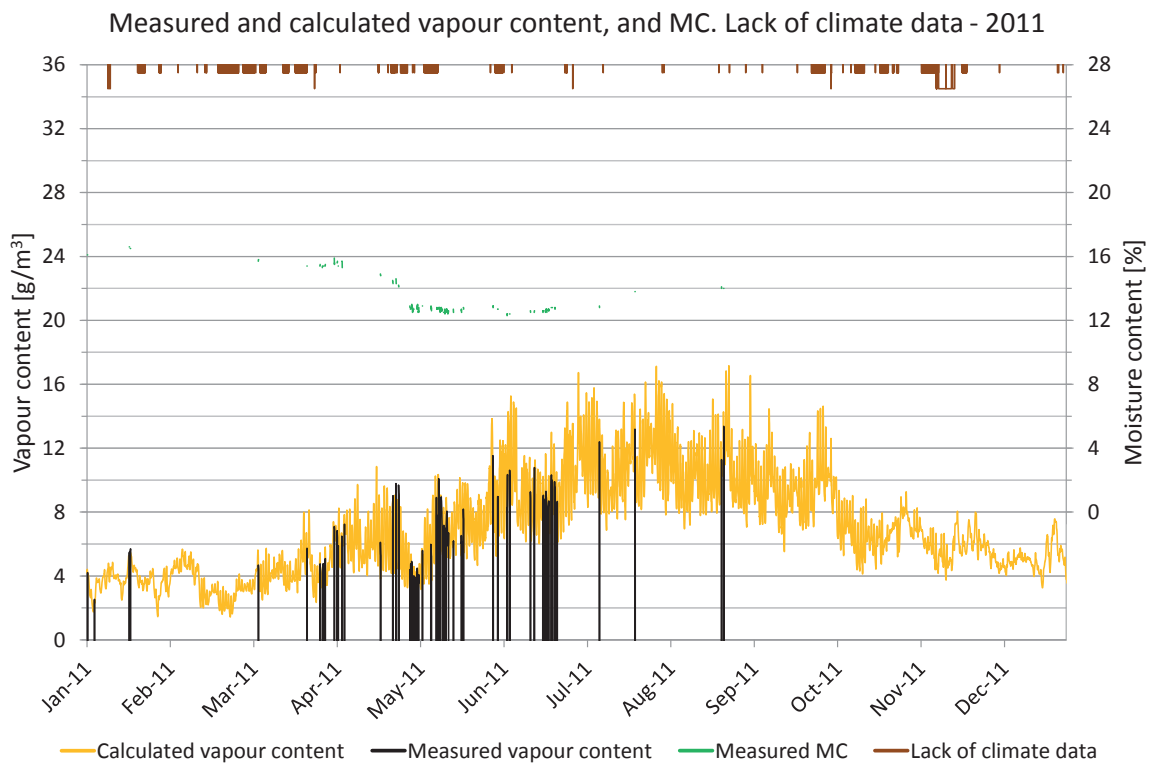


Figure 8.34.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

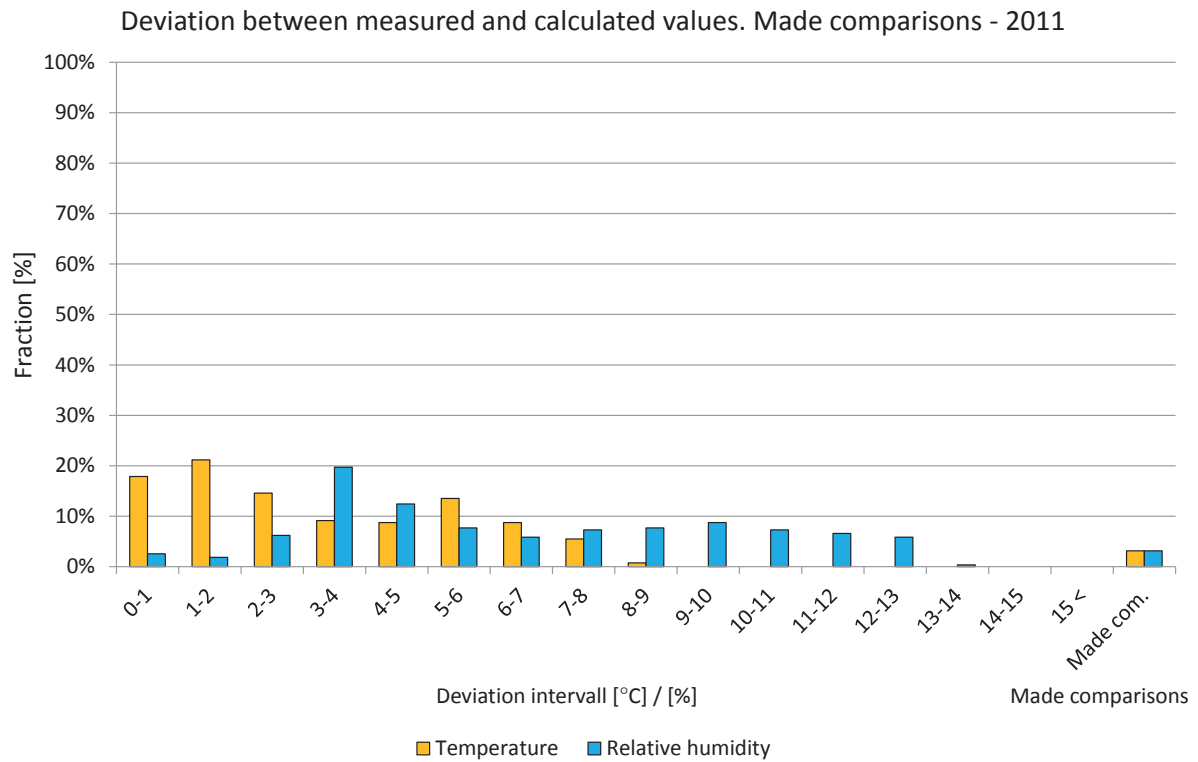


Figure 8.34.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.35 Position 35

No measurements and calculations in the position are shown since the measurement sensor was out of order from measurements start.

8.36 Position 36

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor.

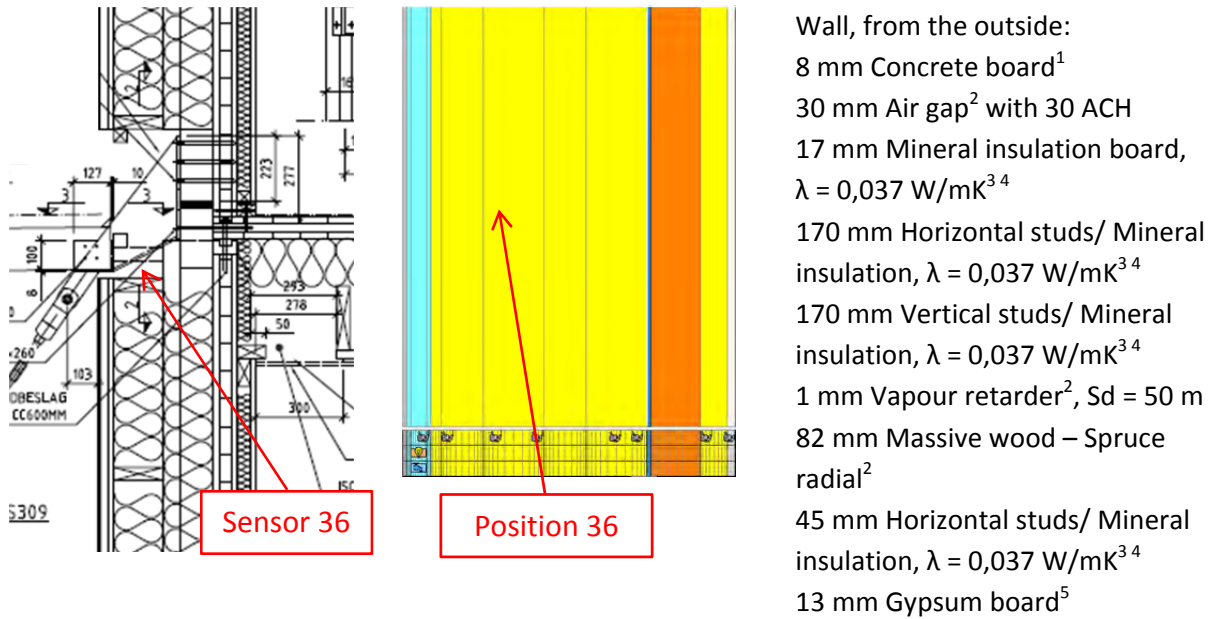


Figure 8.36.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

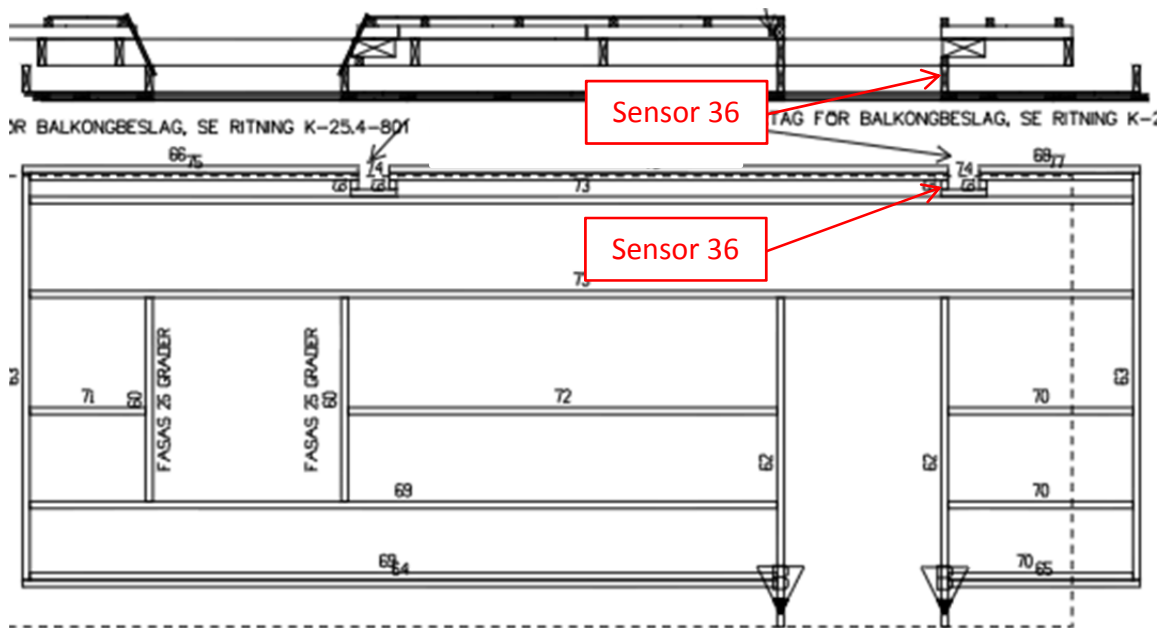


Figure 8.36.2. Location of the studied position.



Figure 8.36.3. Location of the studied position.



Figure 8.36.4. Location of the studied position.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2008

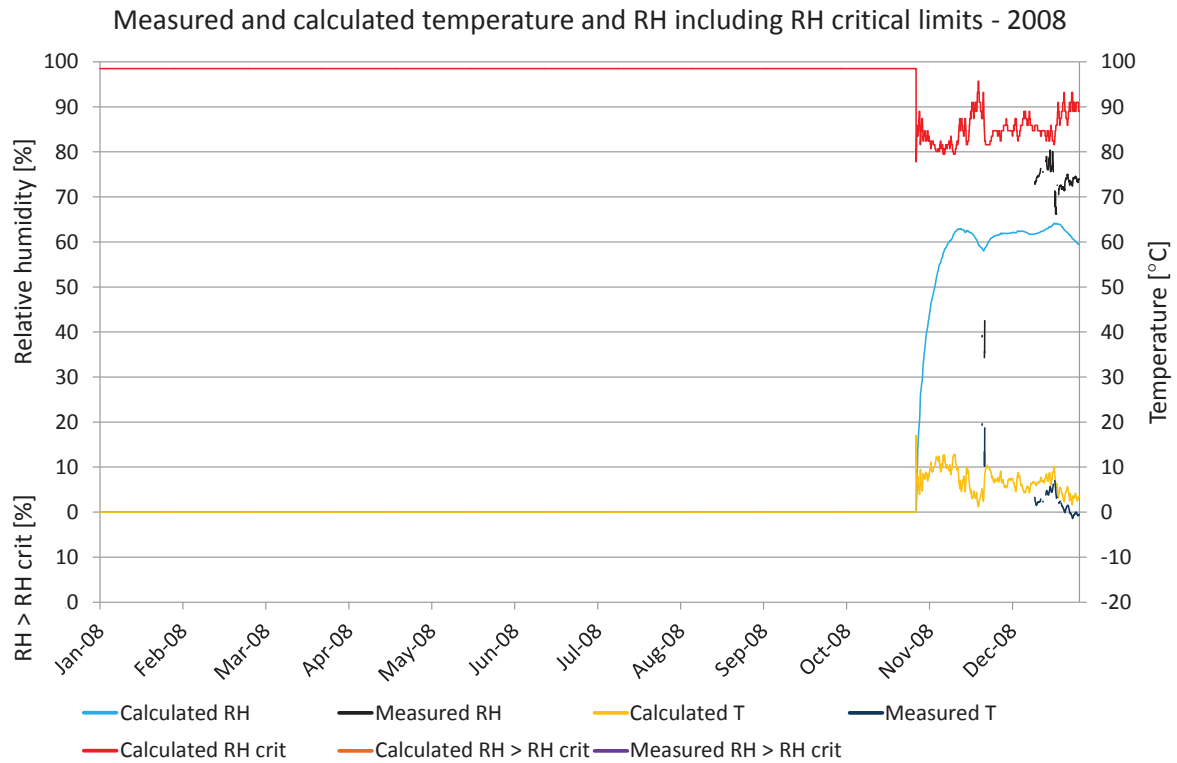


Figure 8.36.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

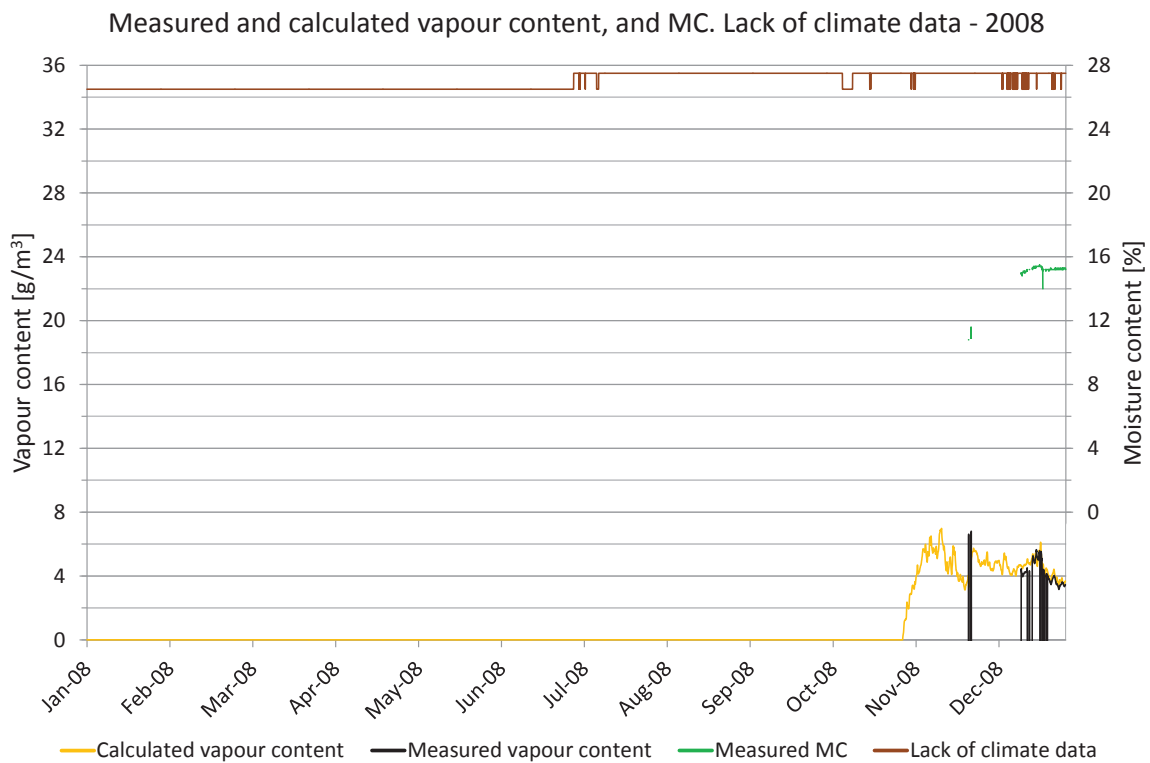


Figure 8.36.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

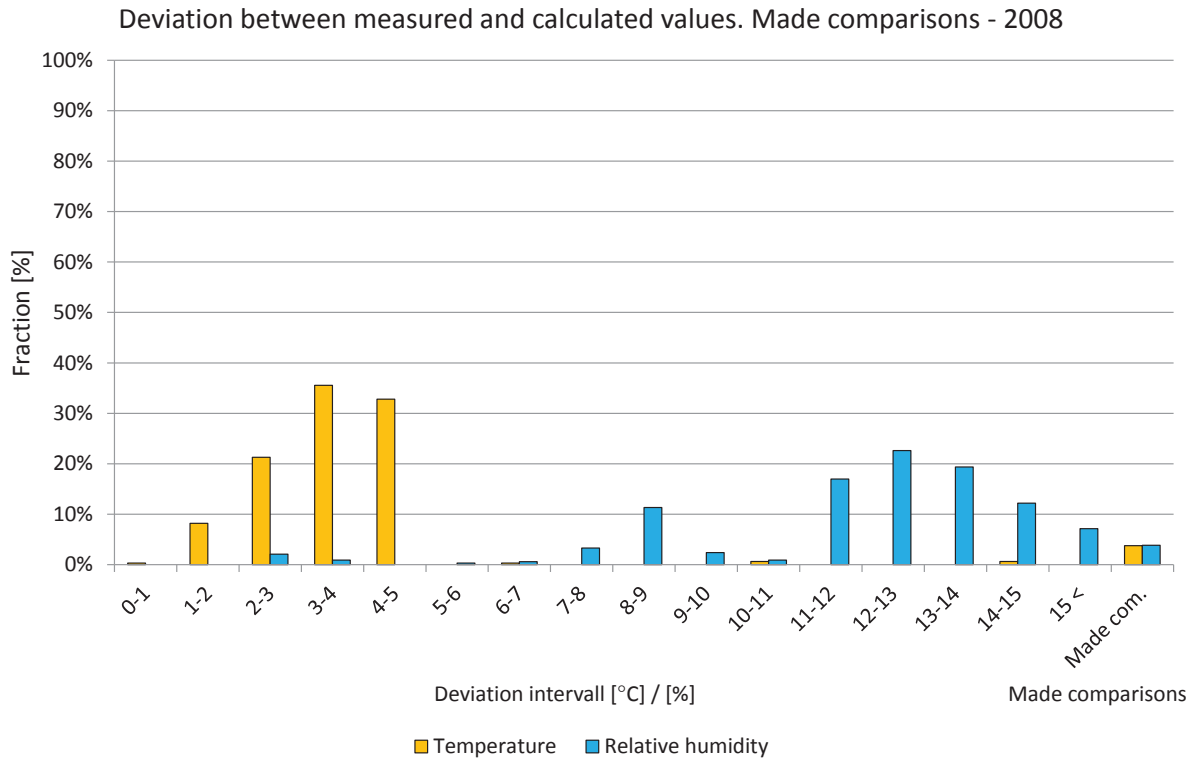


Figure 8.36.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

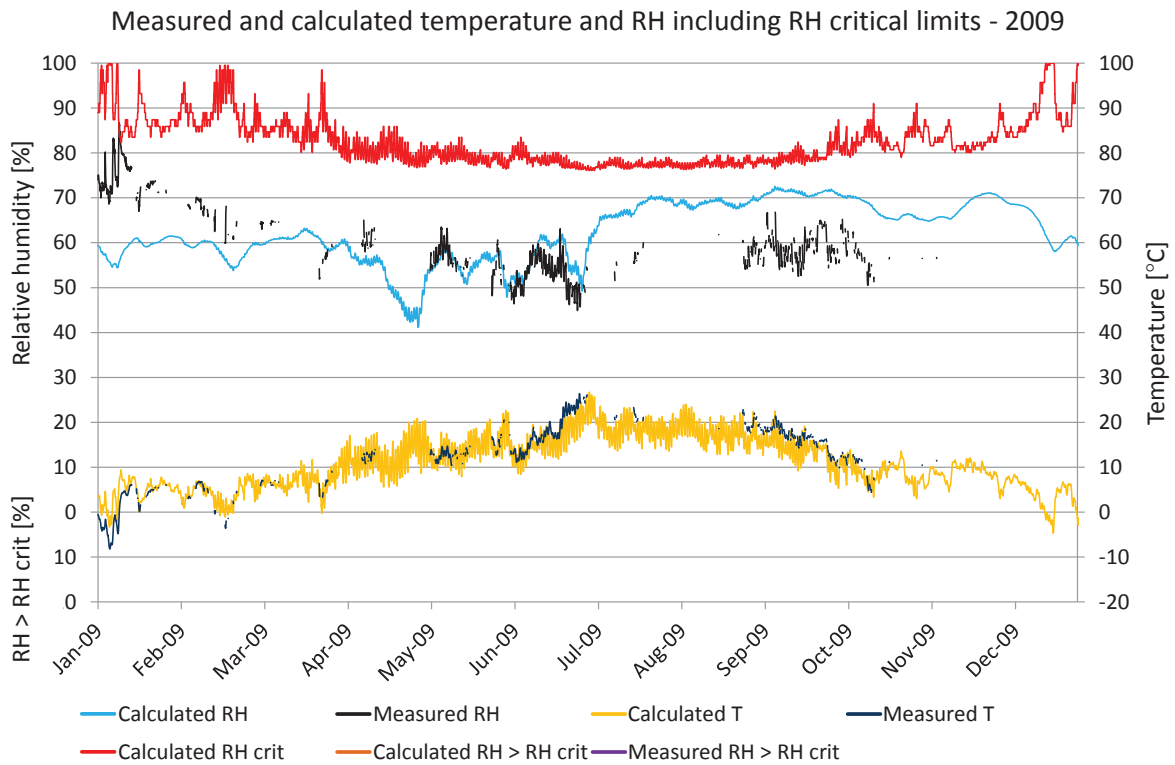


Figure 8.36.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

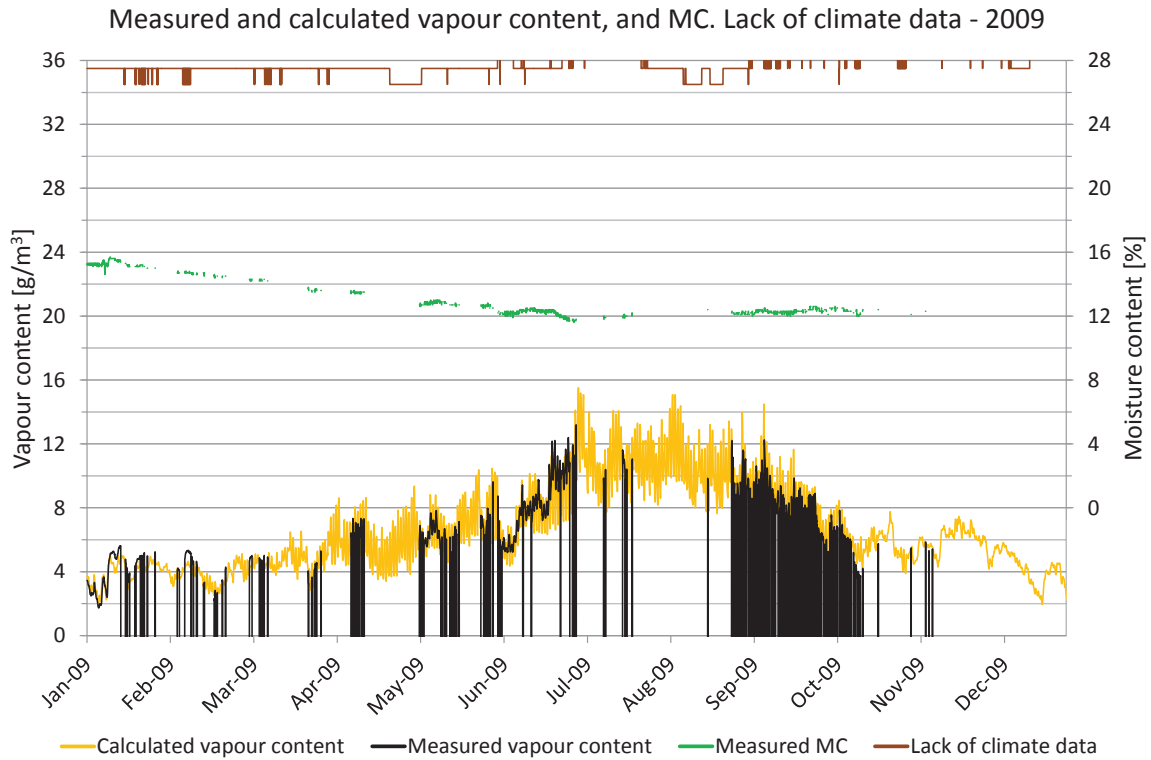


Figure 8.36.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

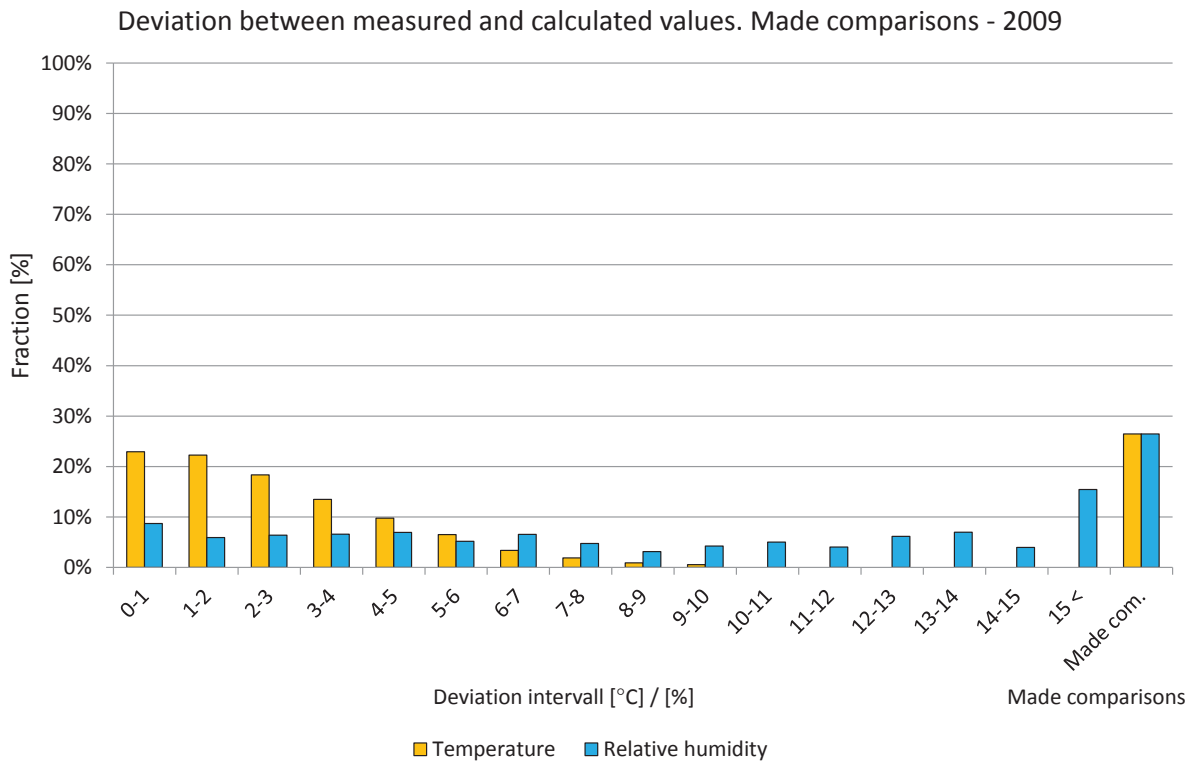


Figure 8.36.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

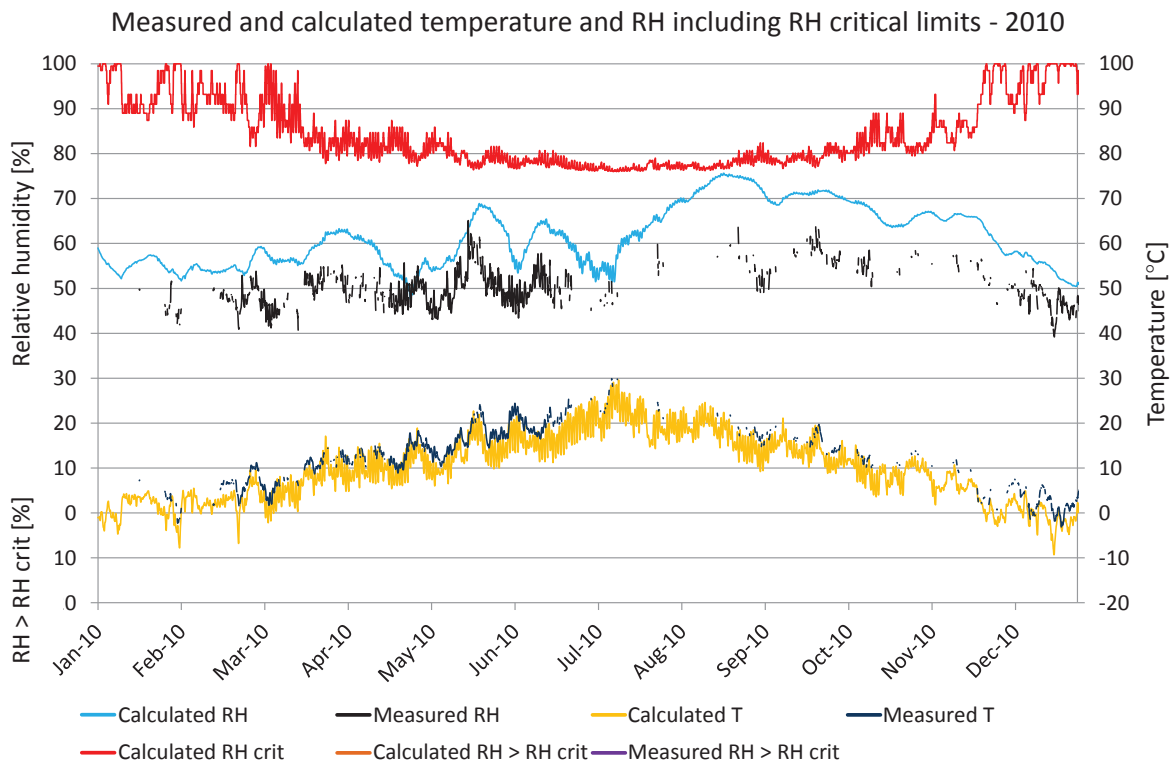


Figure 8.36.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

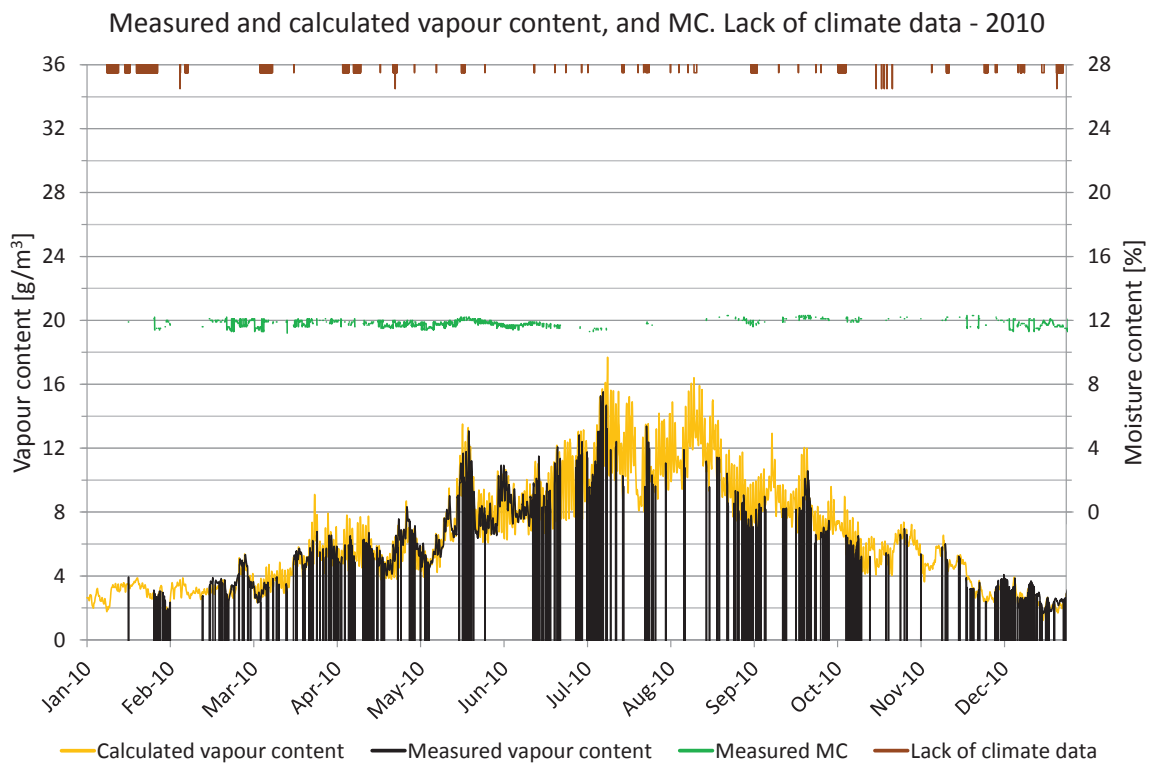


Figure 8.36.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

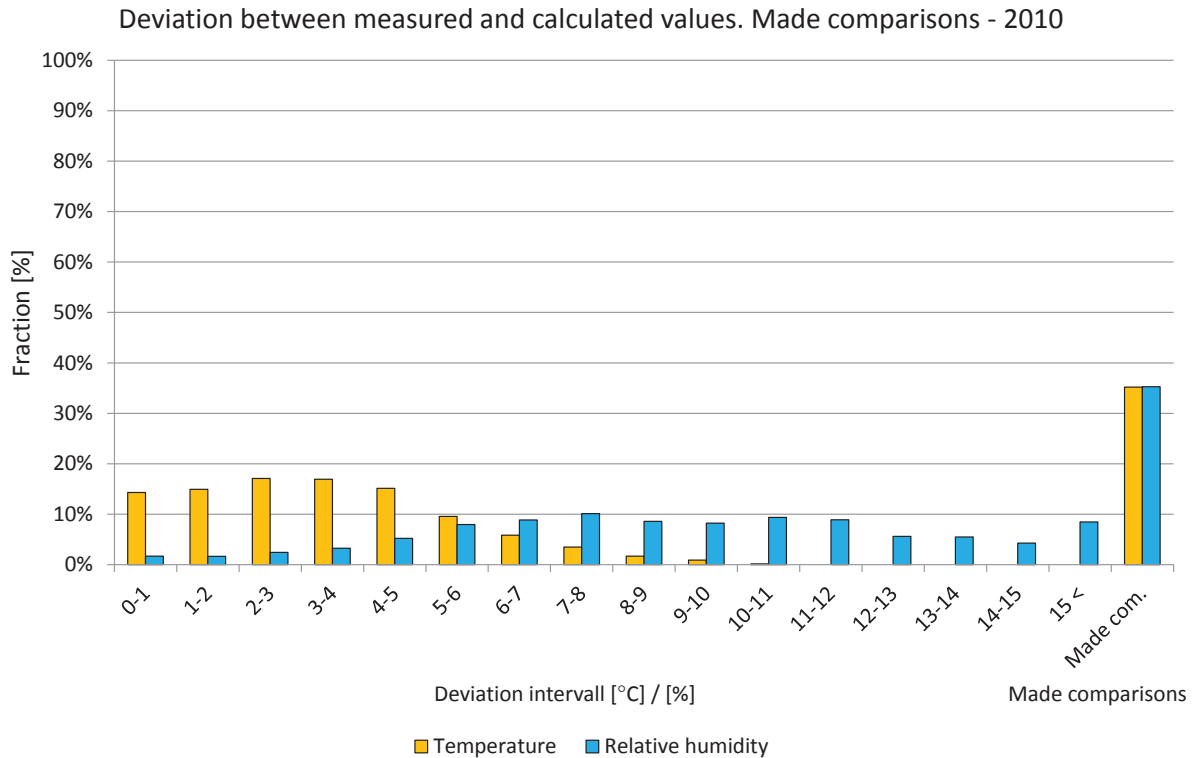


Figure 8.36.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

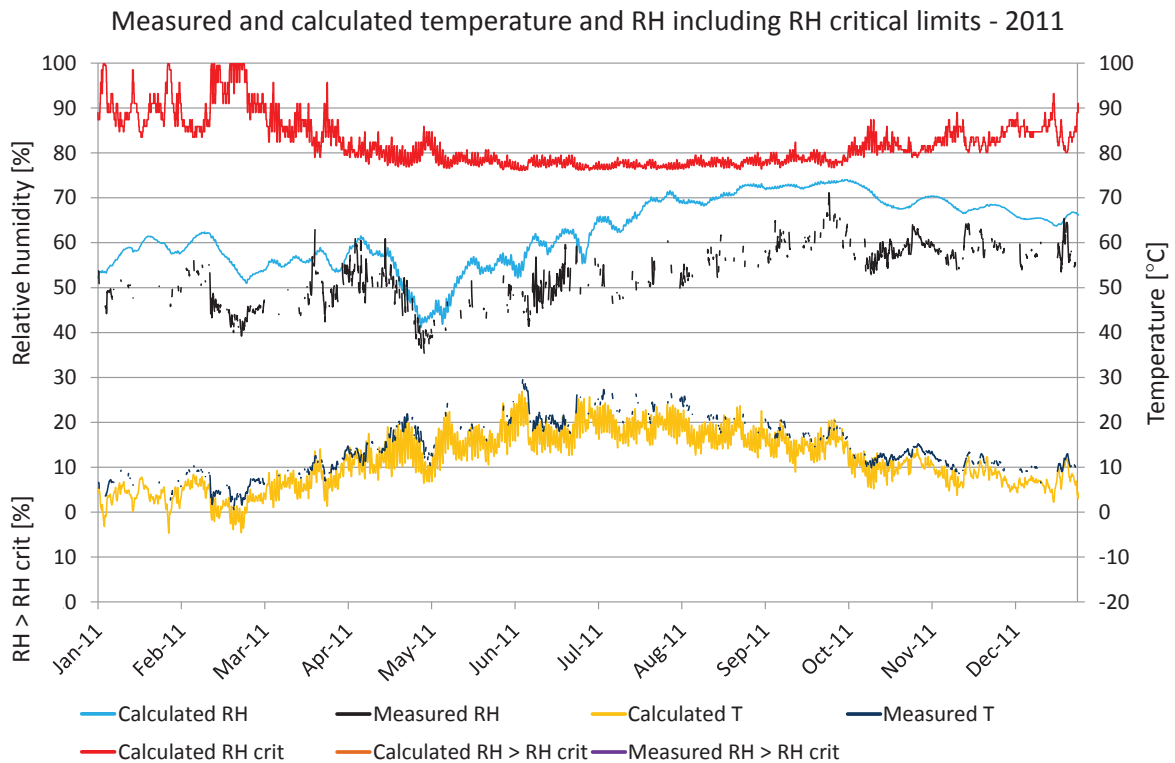


Figure 8.36.14. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

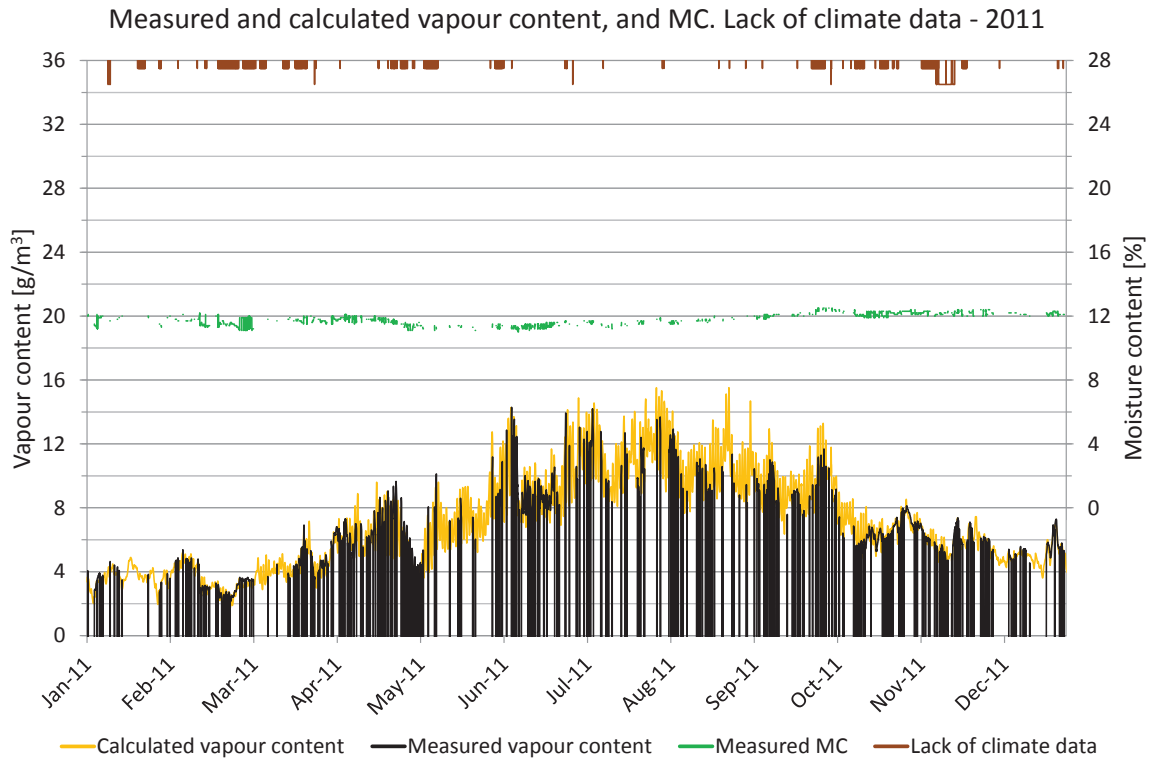


Figure 8.36.15. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

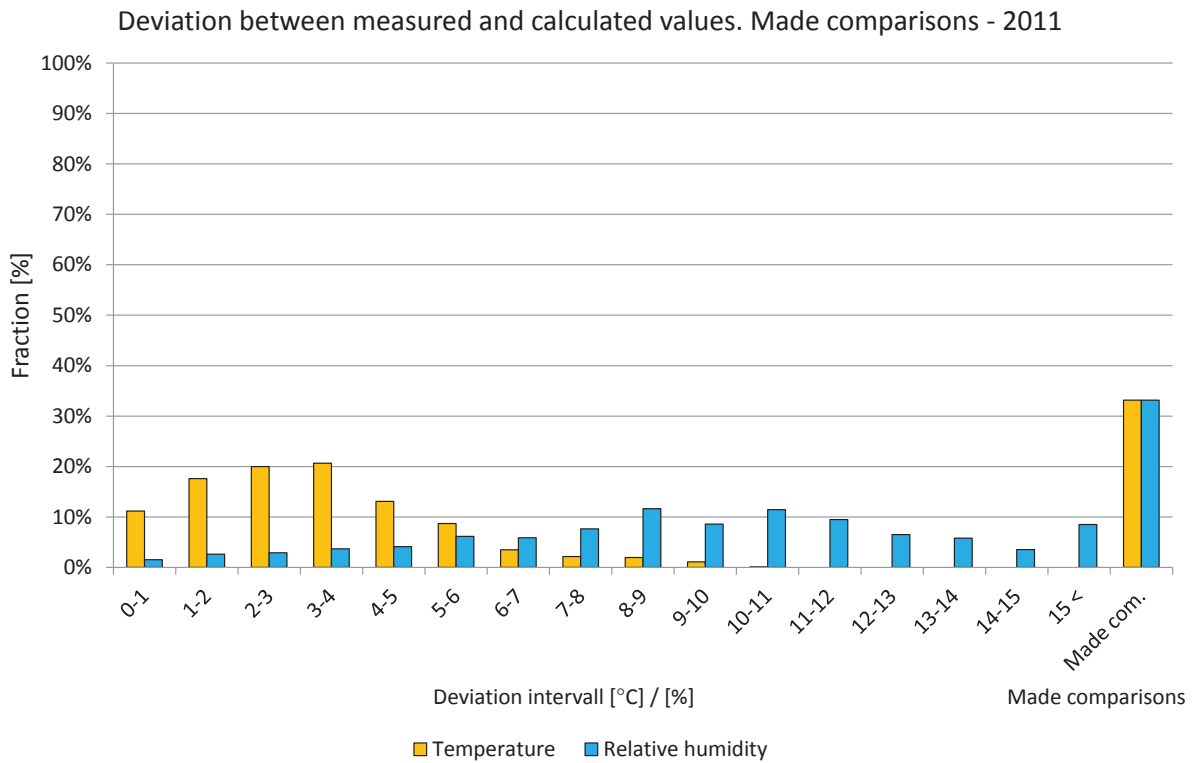


Figure 8.36.16. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

8.37 Position 37

No measurements and calculations in the position are shown since the measurement sensor was out of order from measurements start.

8.38 Position 38

No measurements and calculations in the position are shown since the measurement sensor was out of order from measurements start.

8.39 Position 39

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in a wall facing north on the seventh floor.

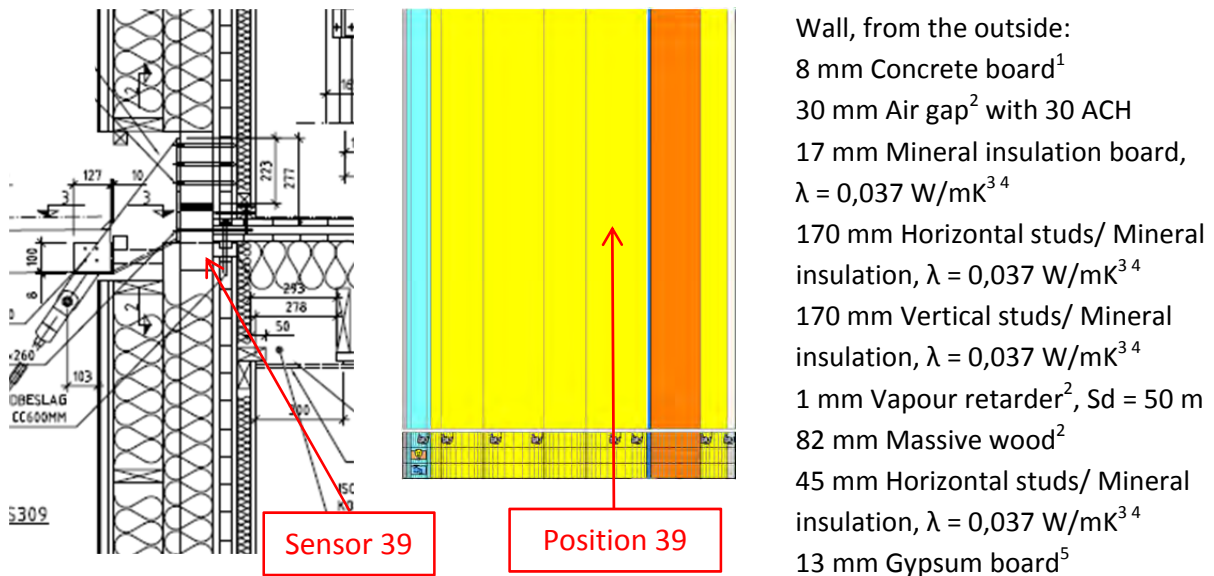


Figure 8.39.1. Vertical cross sectional drawing and WUFI calculation model showing the studied position. 1. Hedenblad, G., 1996, 2. IBP, 2012, 3. IEA Annex 24, 1996, 4. Paroc, 2002, 5. Krus, M., 1996.

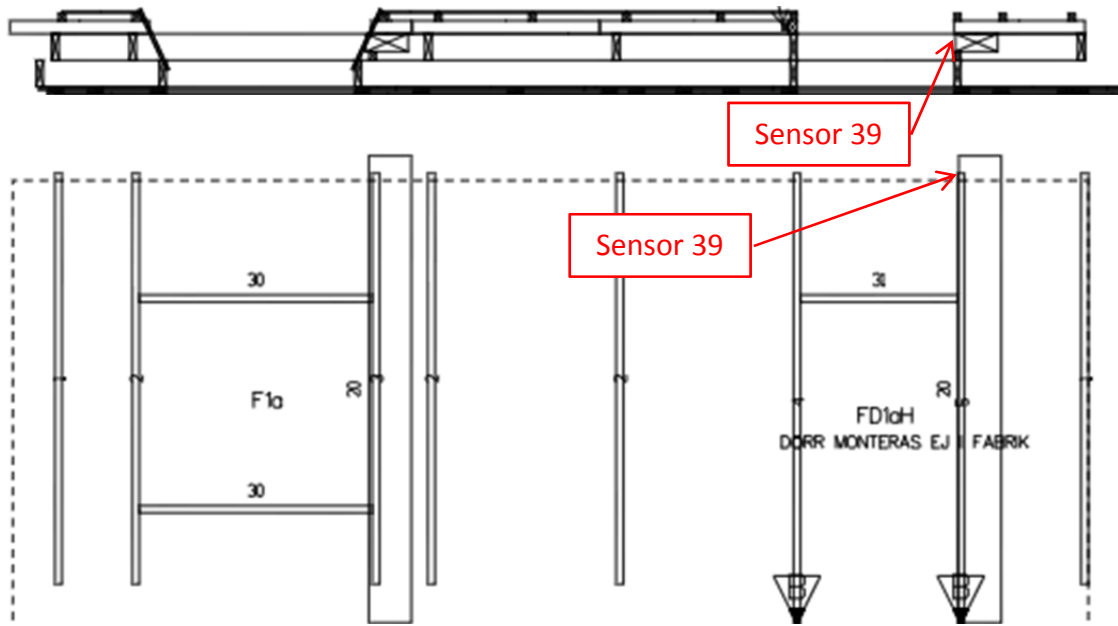


Figure 8.39.2. Location of the studied position.



Figure 8.39.3. Location of the studied position.

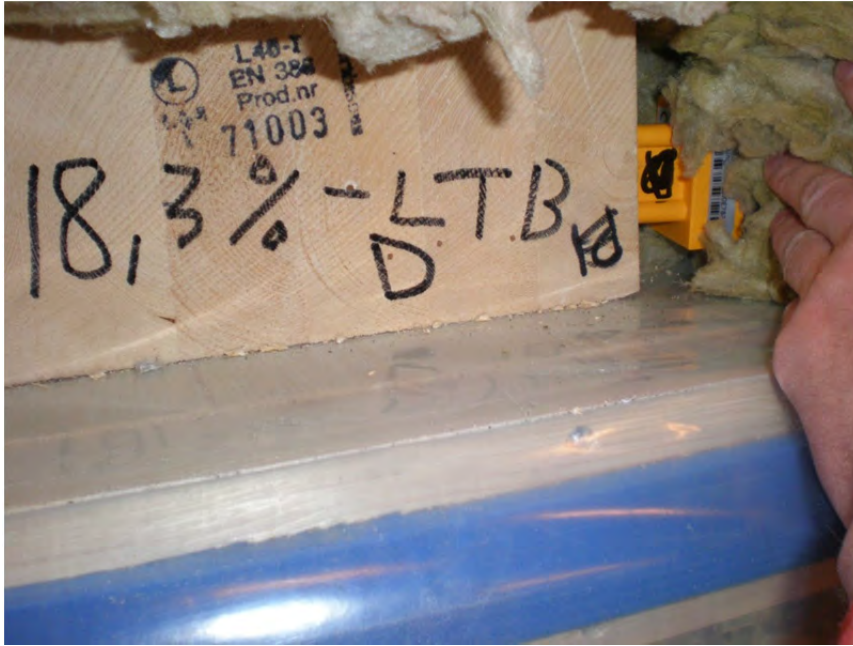


Figure 8.39.4. Location of the studied position.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2008

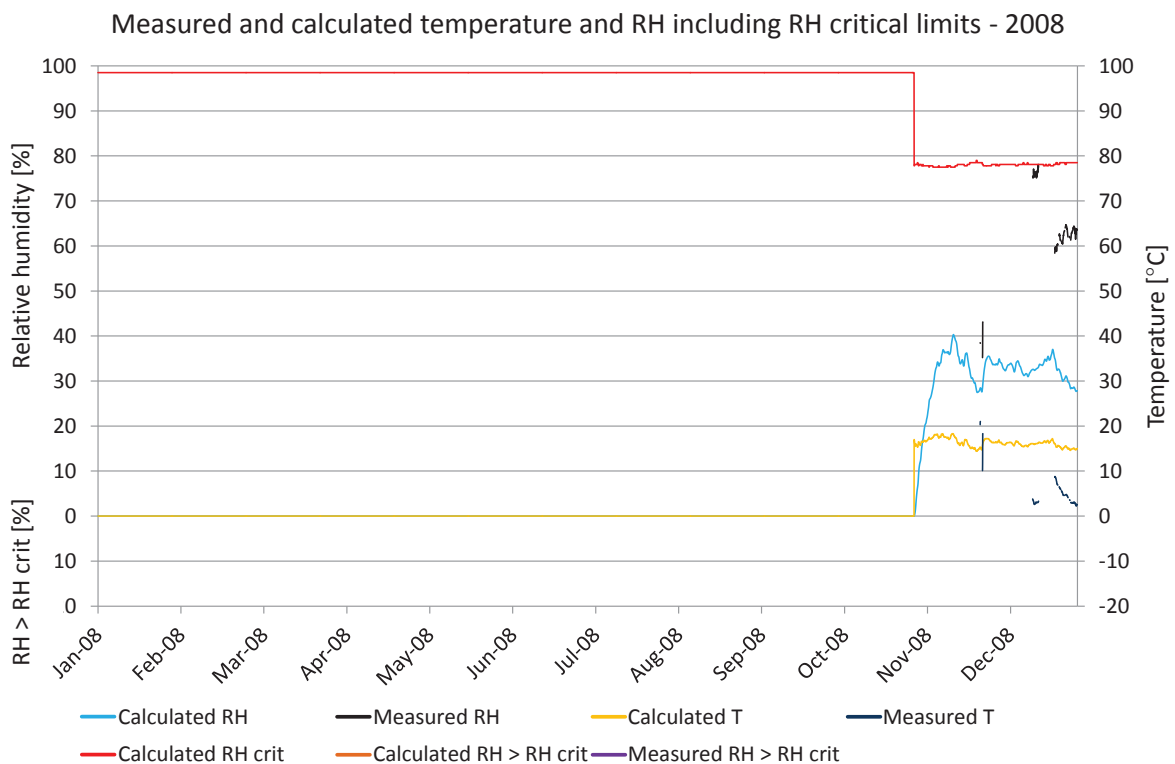


Figure 8.39.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

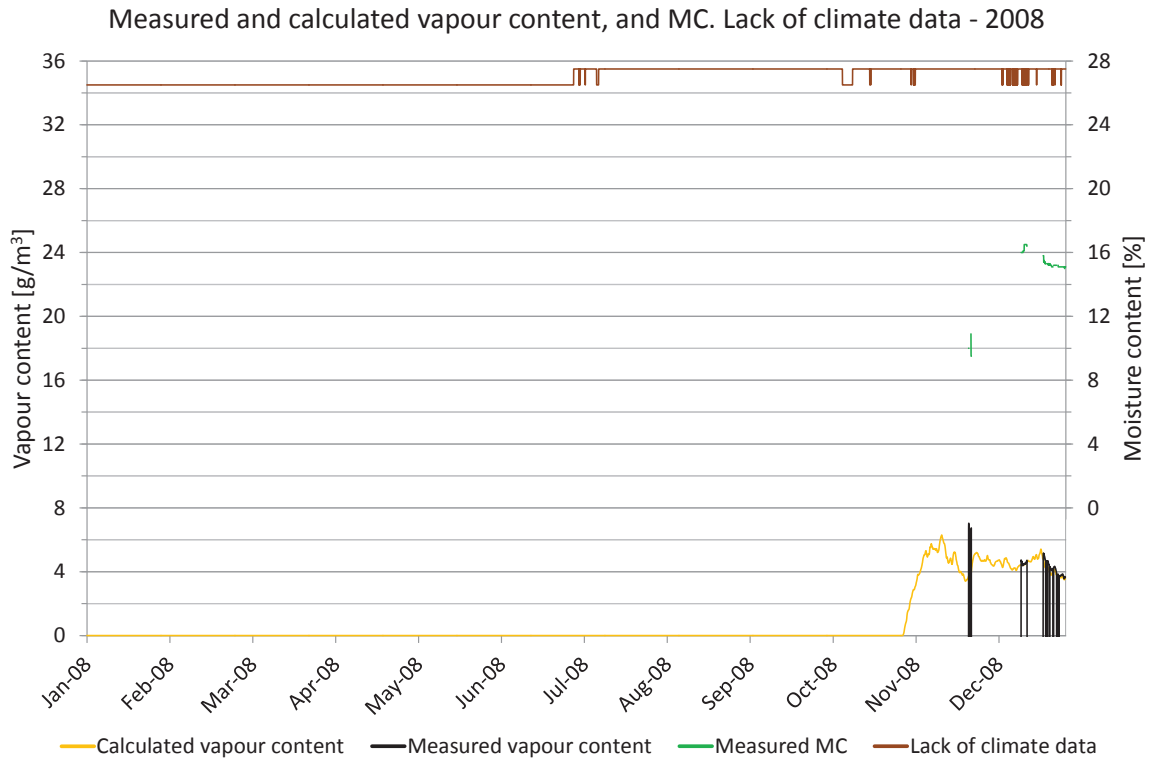


Figure 8.39.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

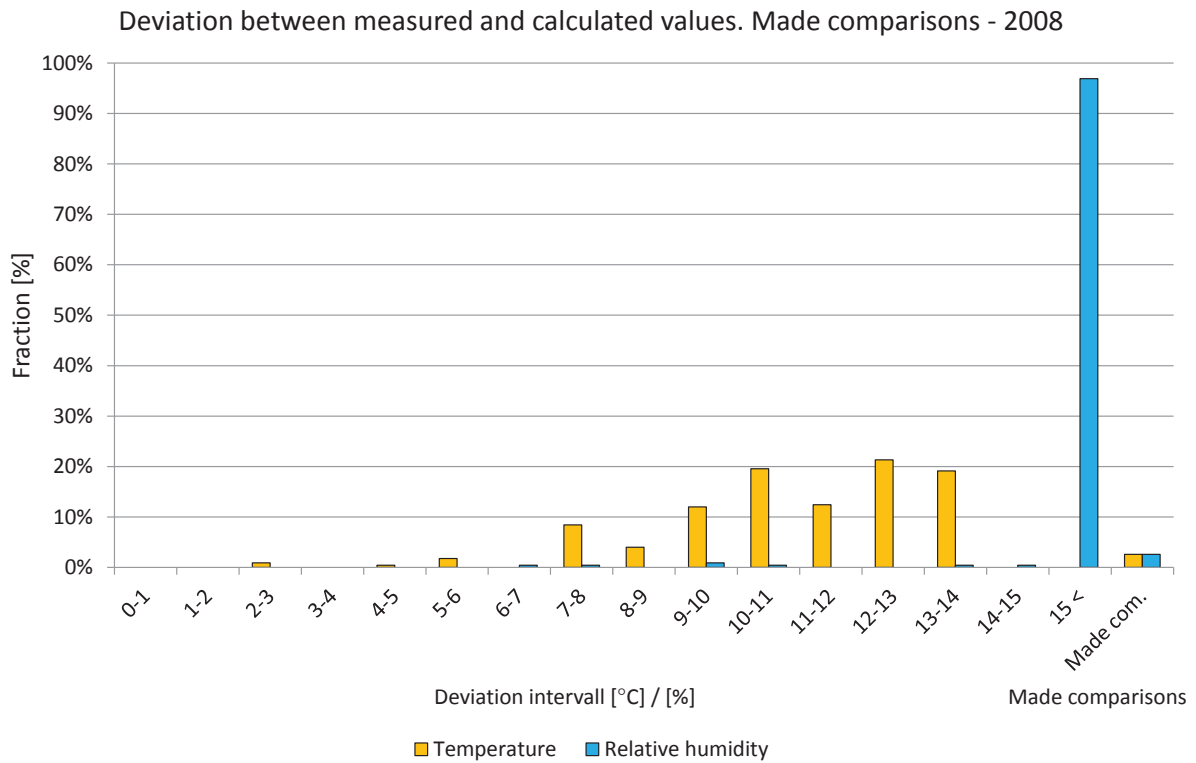


Figure 8.39.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2009

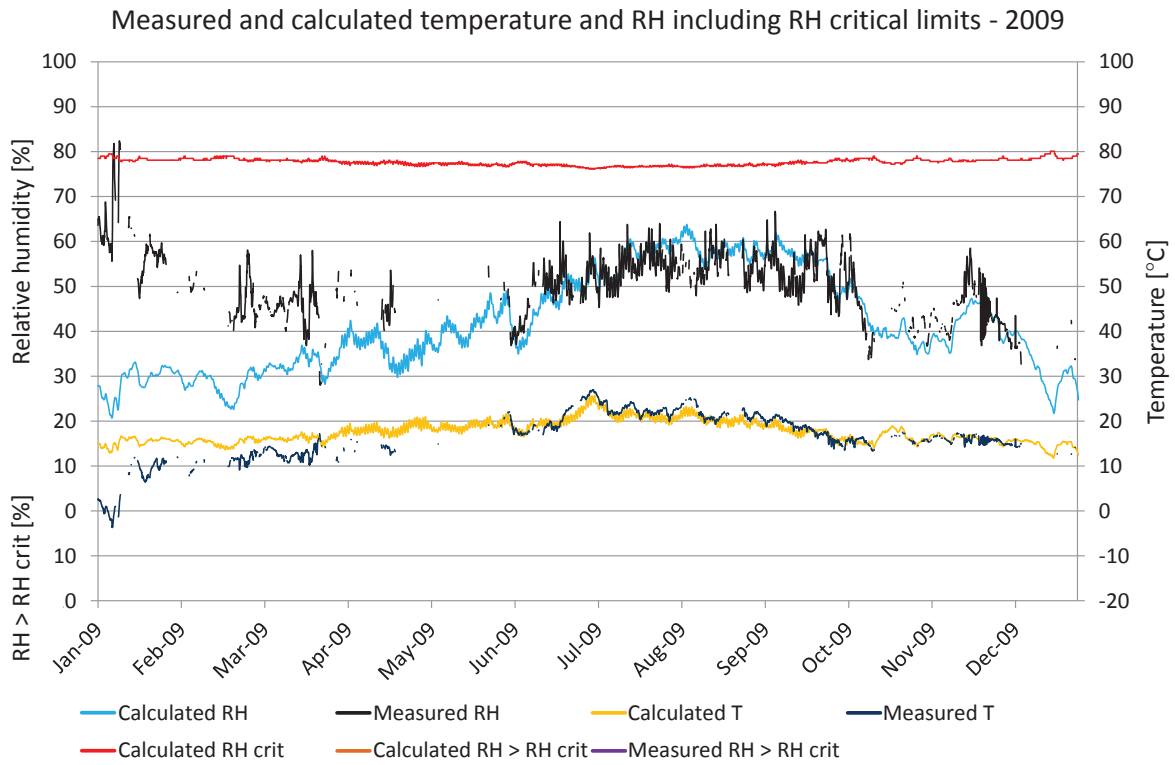


Figure 8.39.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

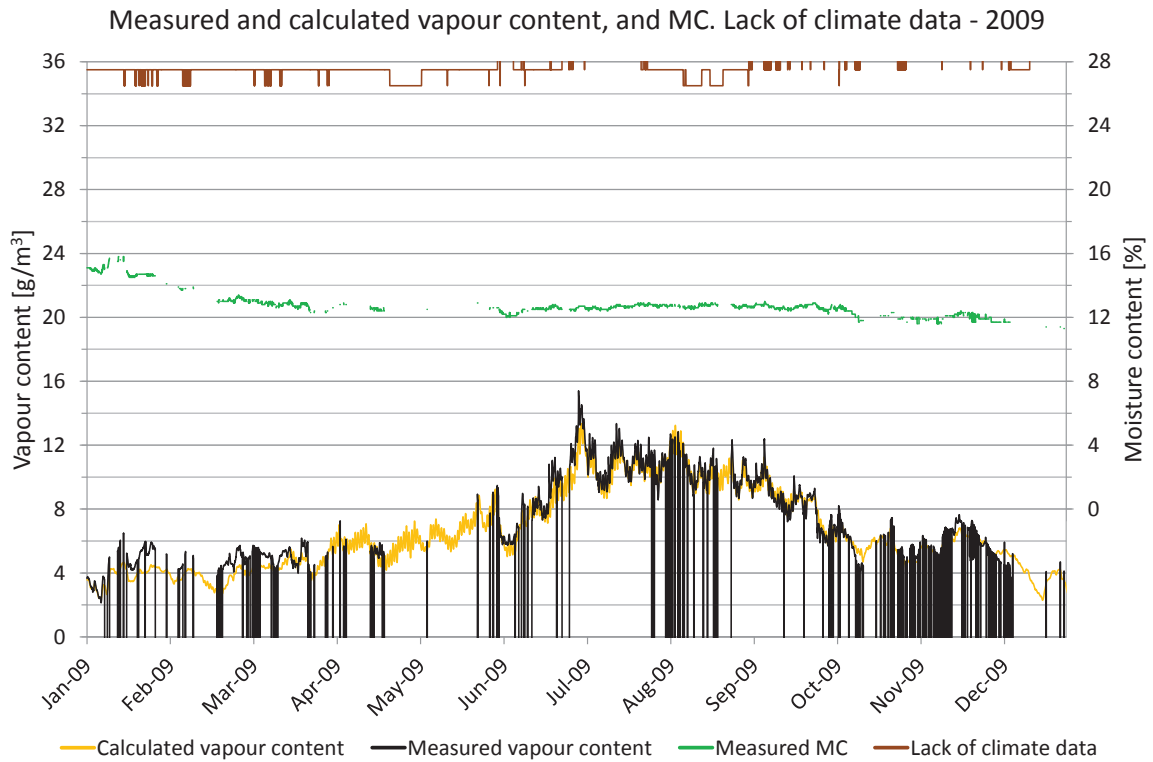


Figure 8.39.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

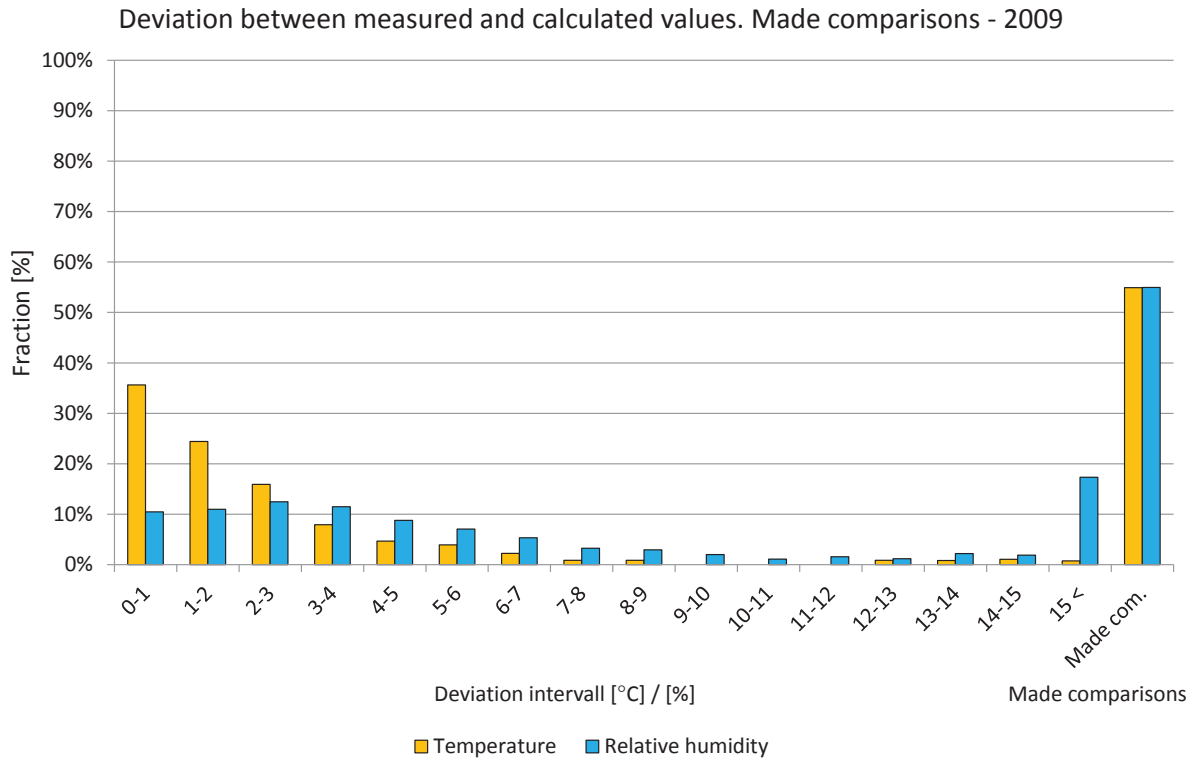


Figure 8.39.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

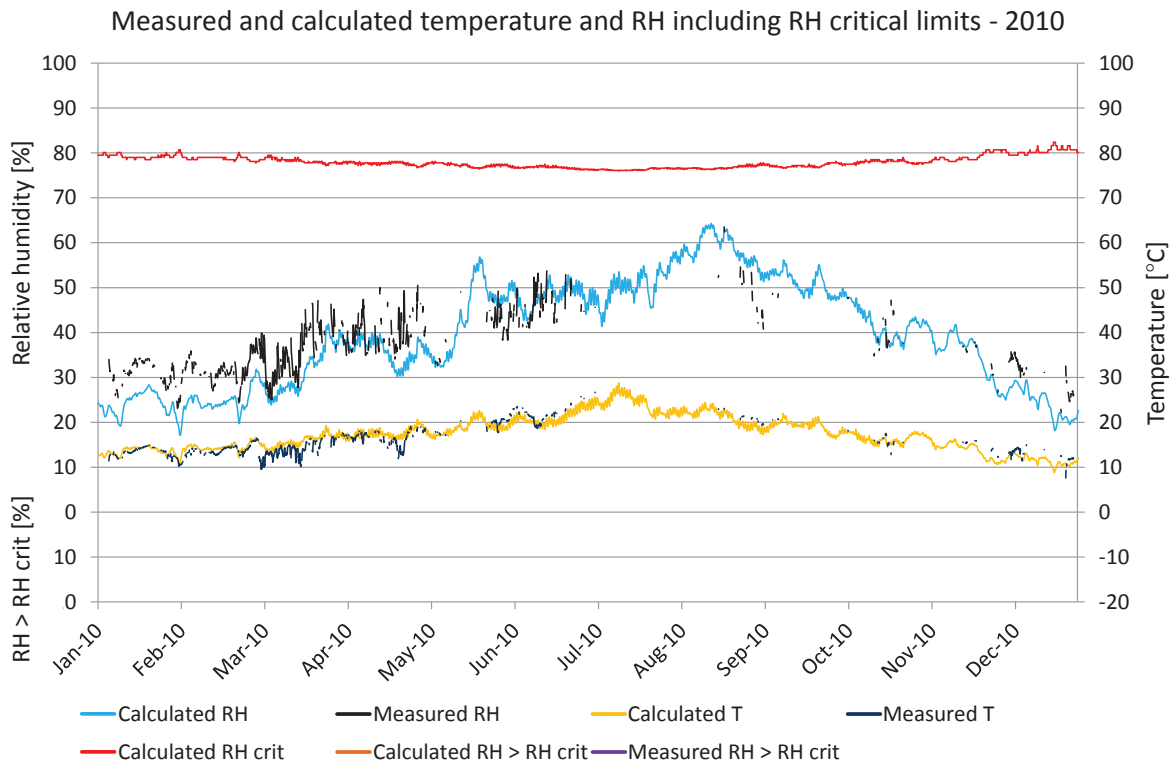


Figure 8.39.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

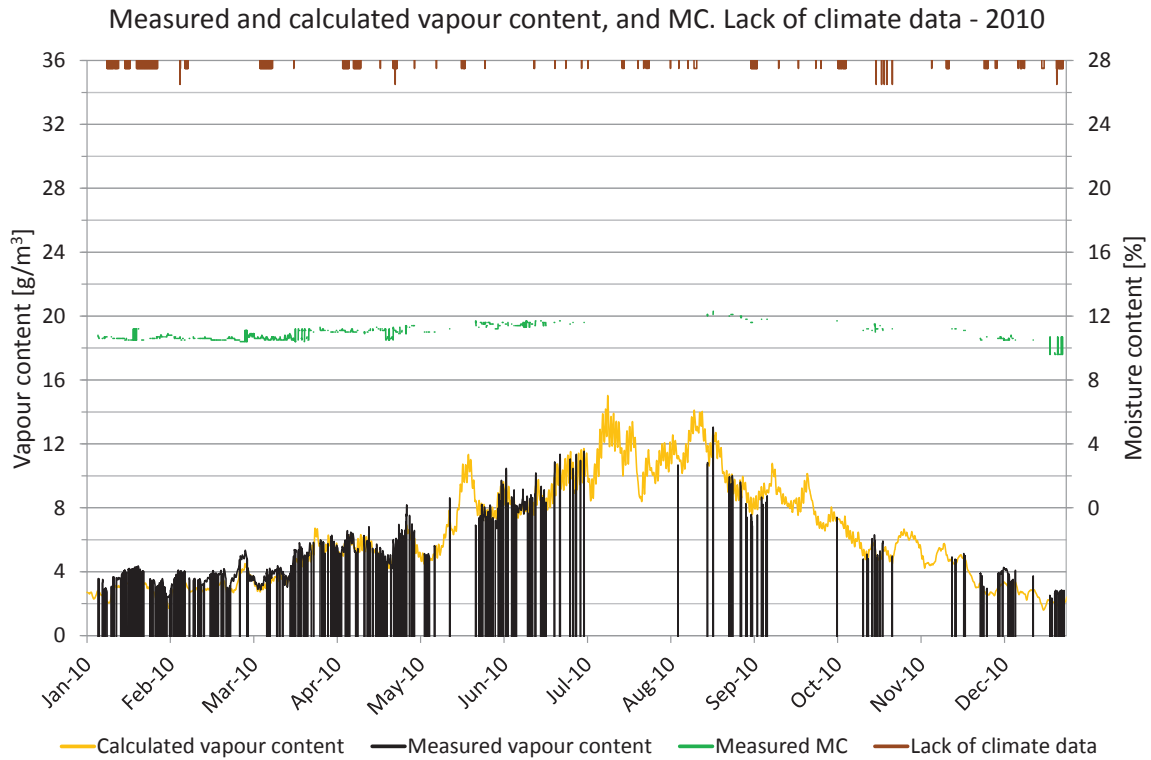


Figure 8.39.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

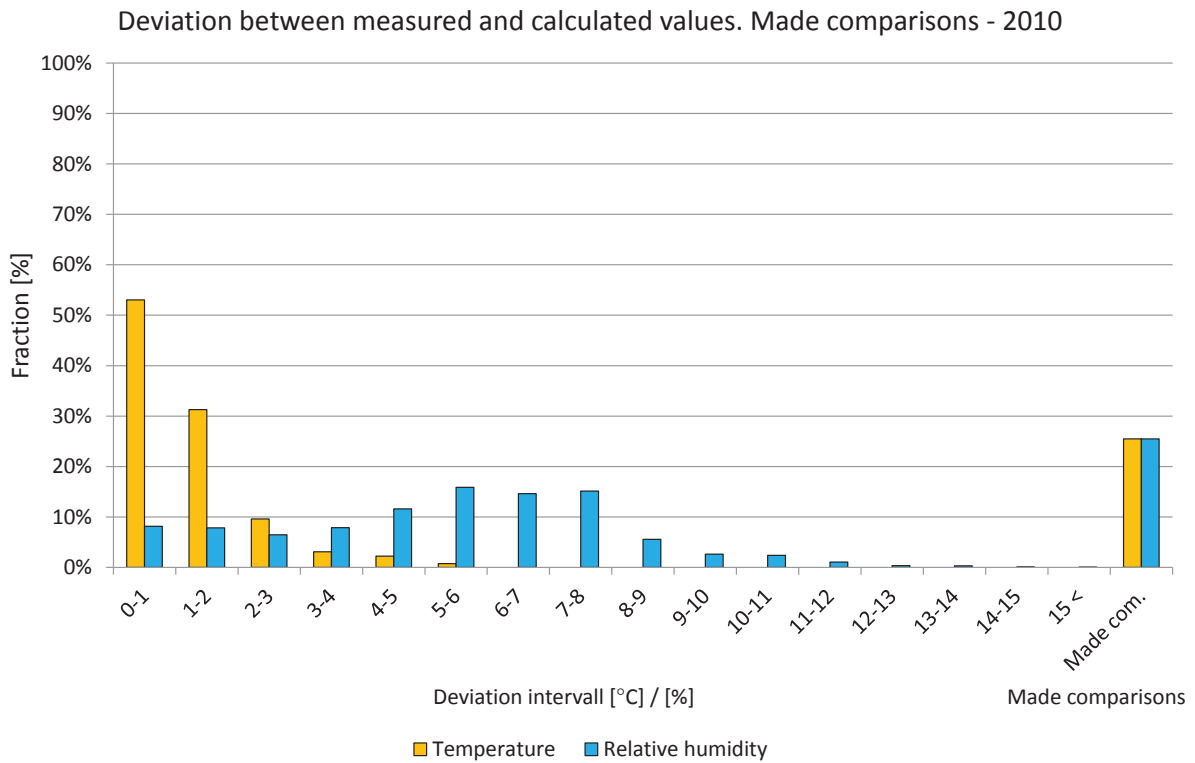


Figure 8.39.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

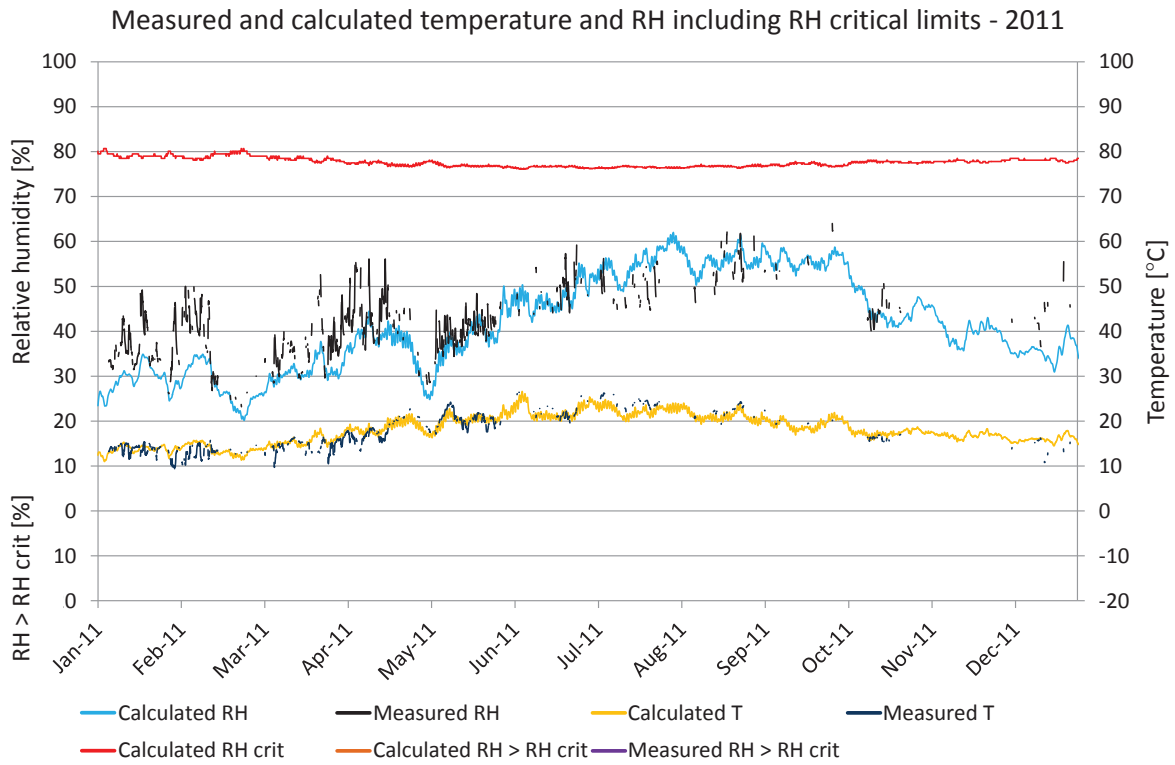


Figure 8.39.14. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated RH > RH_{crit} (light brown), measured RH > RH_{crit} (purple).

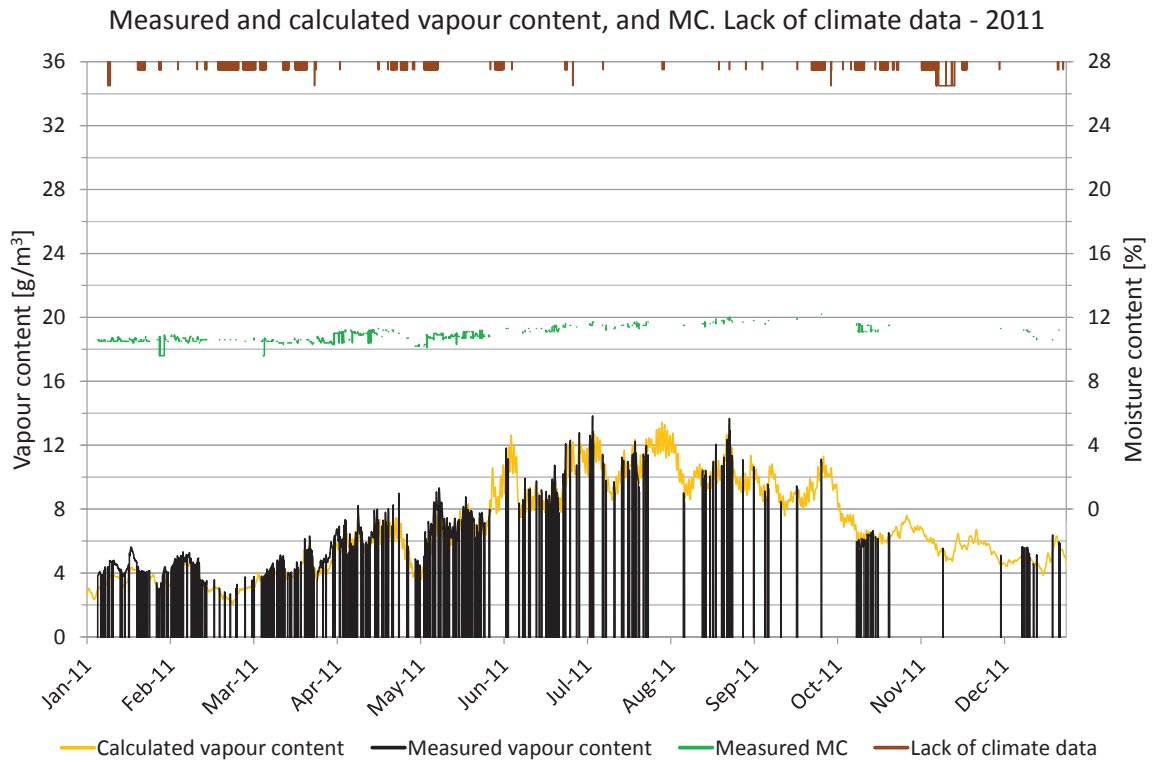


Figure 8.39.15. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

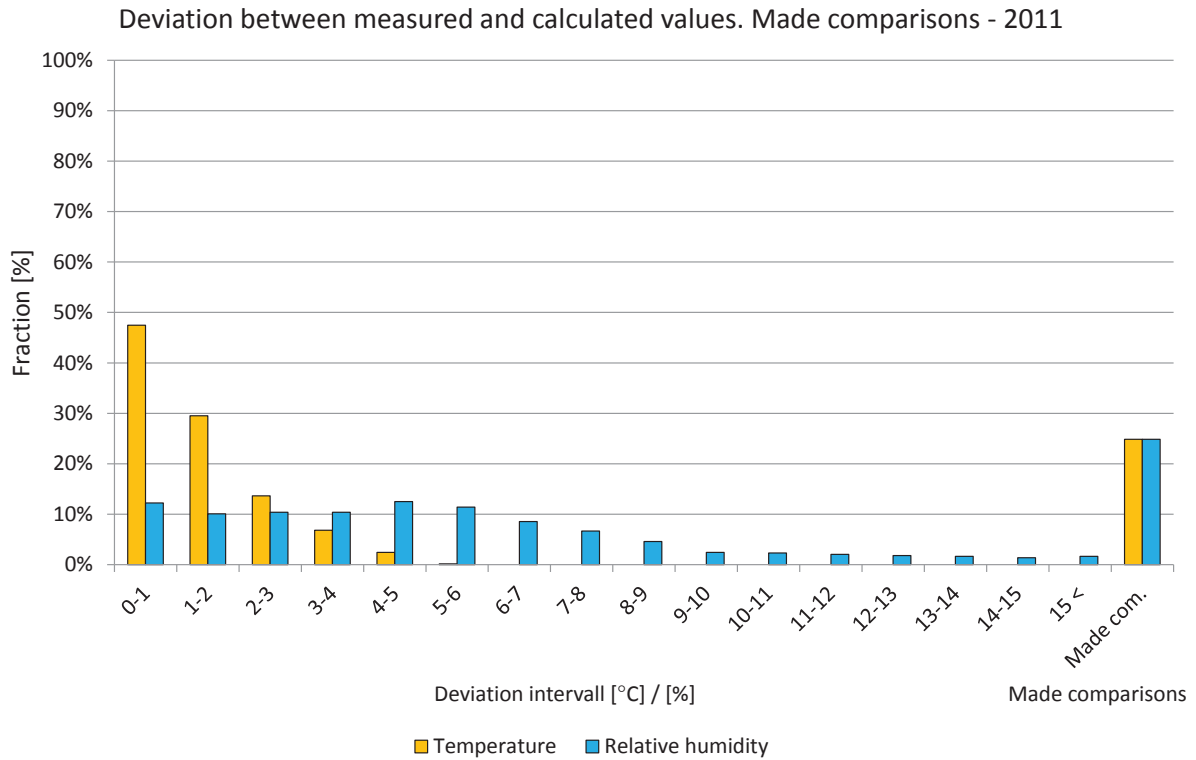


Figure 8.39.16. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

9 Results - Attic

9.40 Position 40

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in the roof with 16 degrees roof angle facing north. The measuring sensor was disassembled for calibration from 24 May 2011 to 8 February 2012 and no measurements were therefore possible during this period.

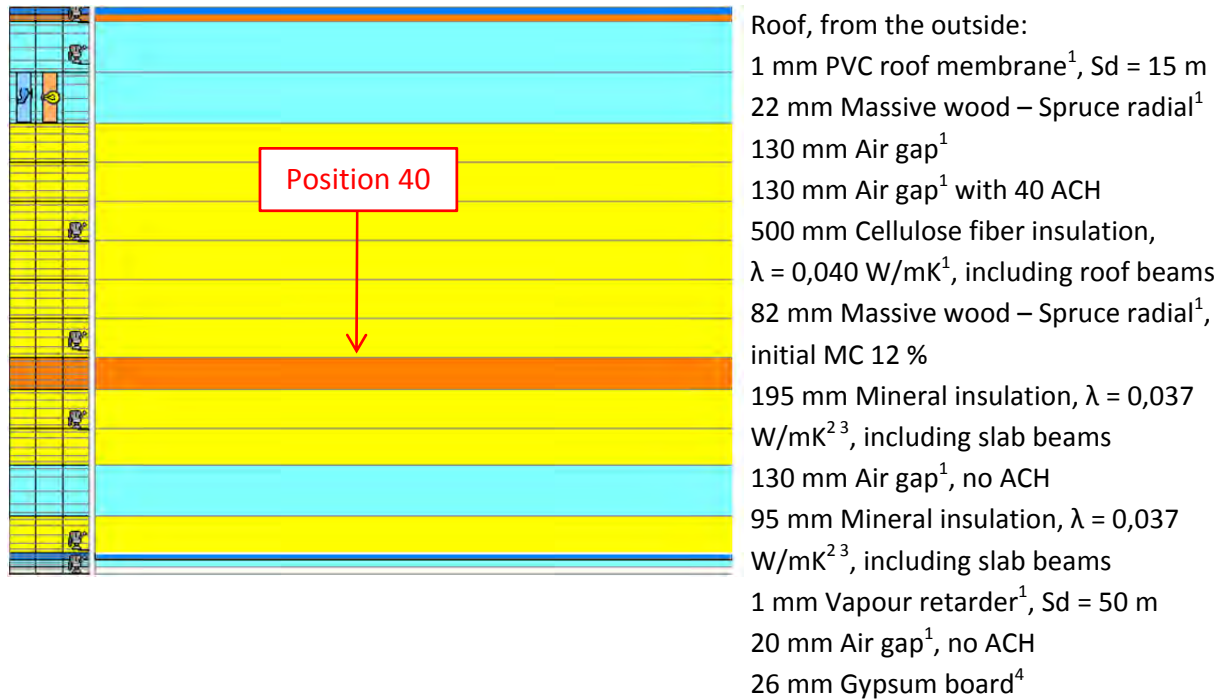


Figure 9.40.1. WUFI calculation model showing the studied position. 1. IBP, 2012, 2. IEA Annex 24, 1996, 3. Paroc, 2002, 4. Krus, M., 1996.

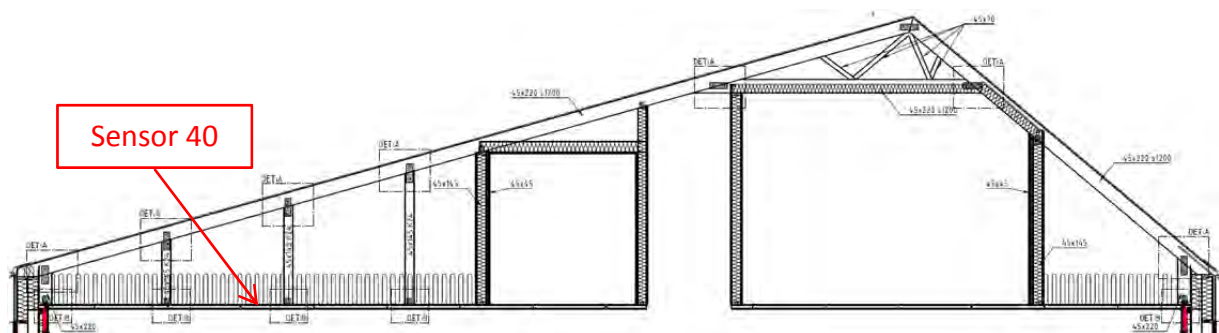


Figure 9.40.2. Location of the studied position.

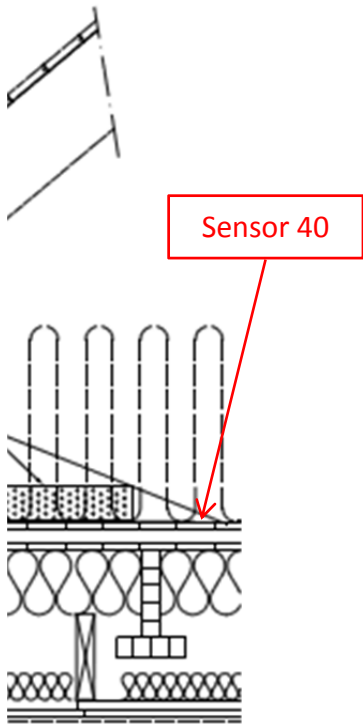


Figure 9.40.3. Location of the studied position.



Figure 9.40.4. Location of the studied position before the cellulose fiber insulation was applied.



Figure 9.40.5. Location of the studied position. The cellulose fiber insulation was temporary removed.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors. However, this position was less affected of those factors compare to other studied positions.

Year 2009

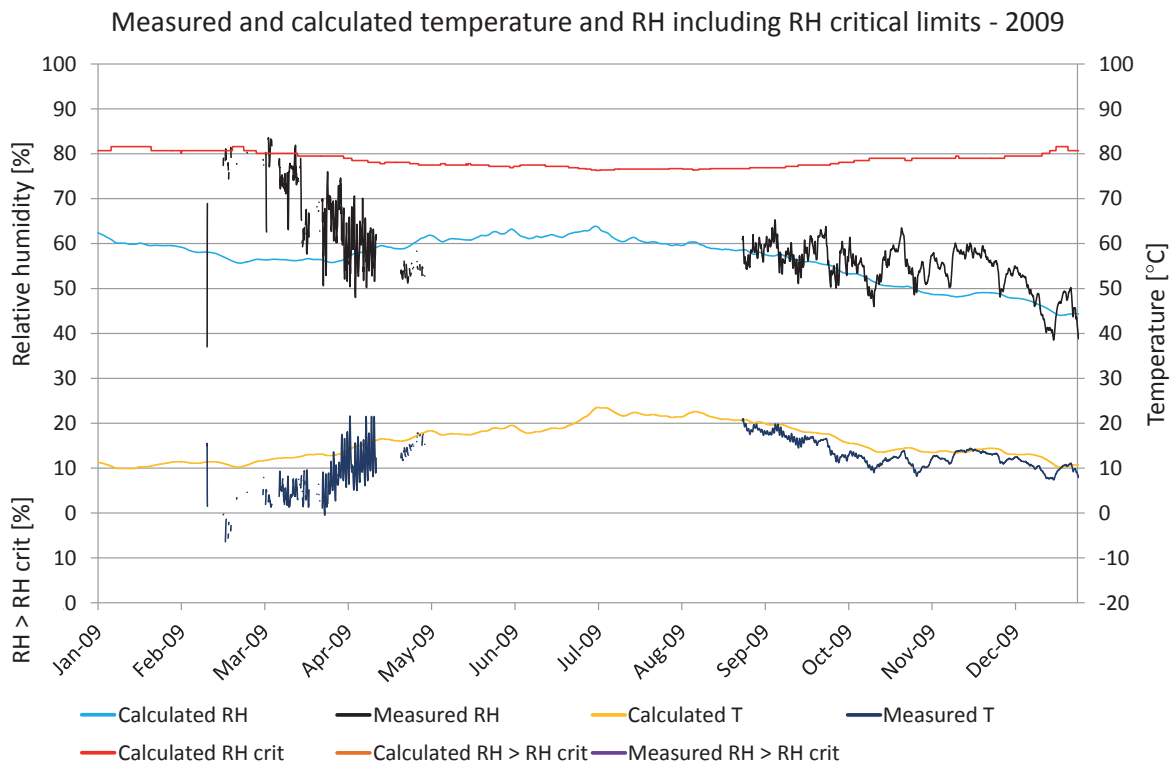


Figure 9.40.6. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

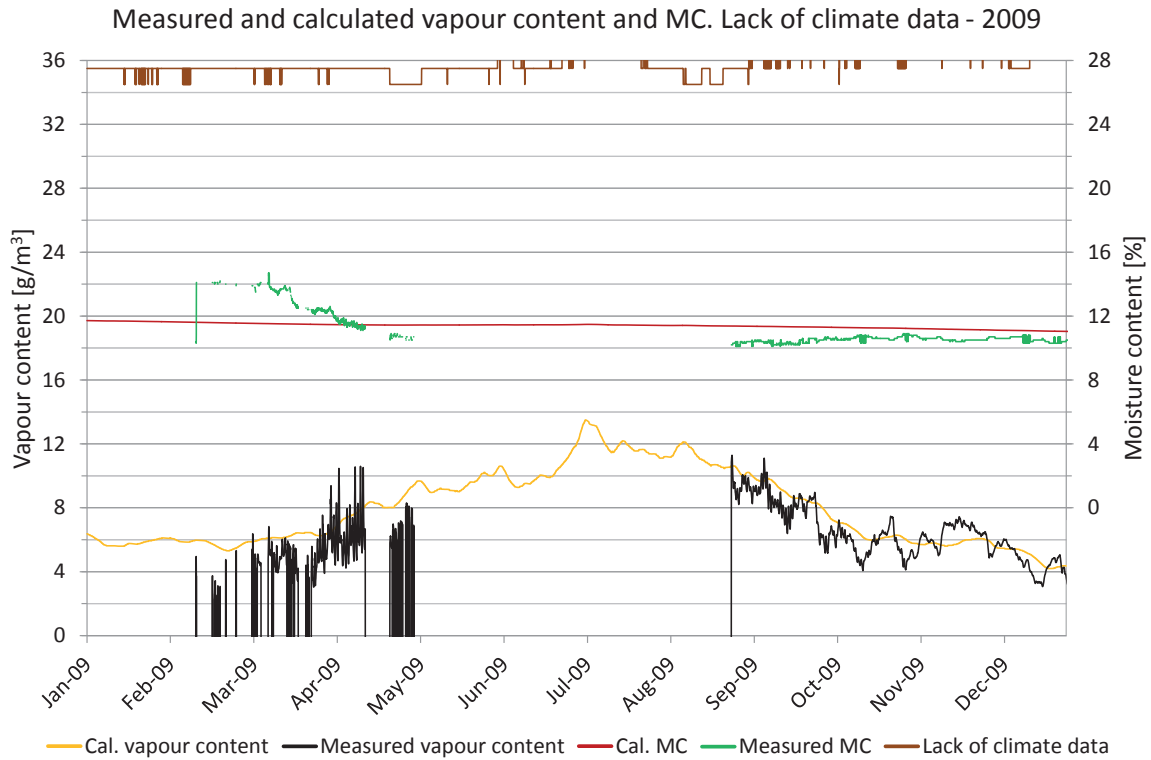


Figure 9.40.7. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

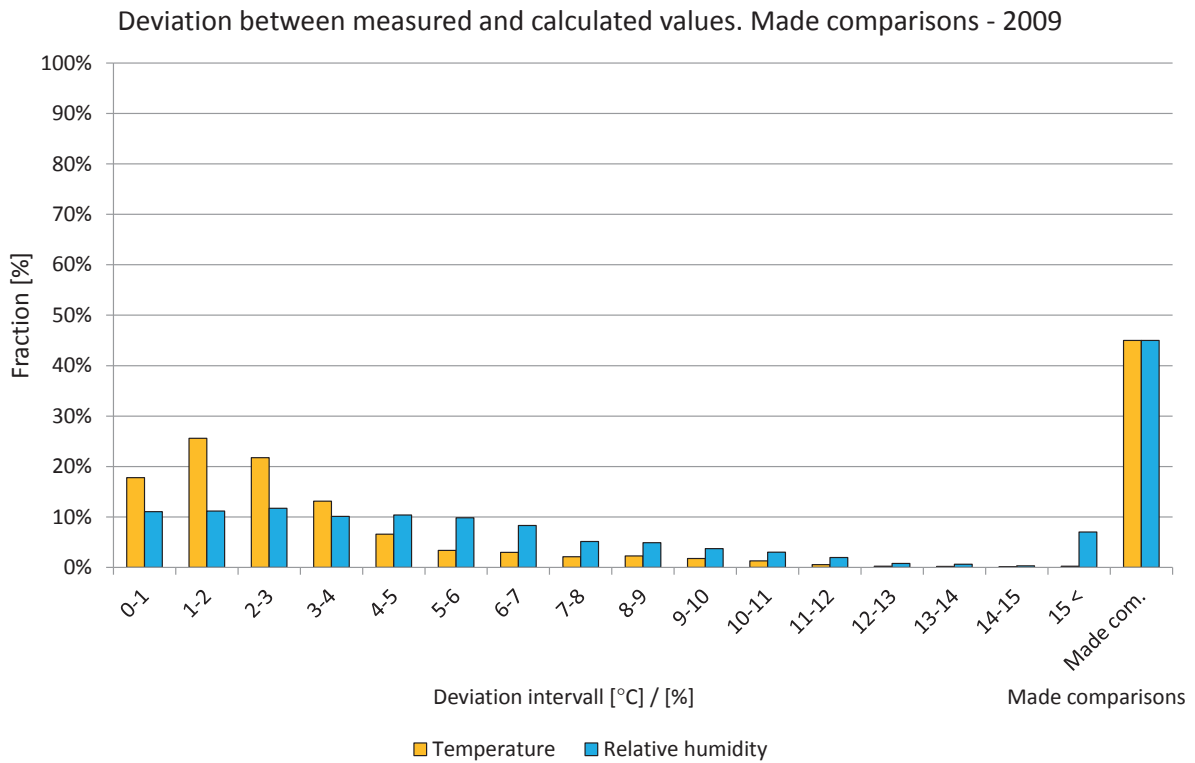


Figure 9.40.8. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

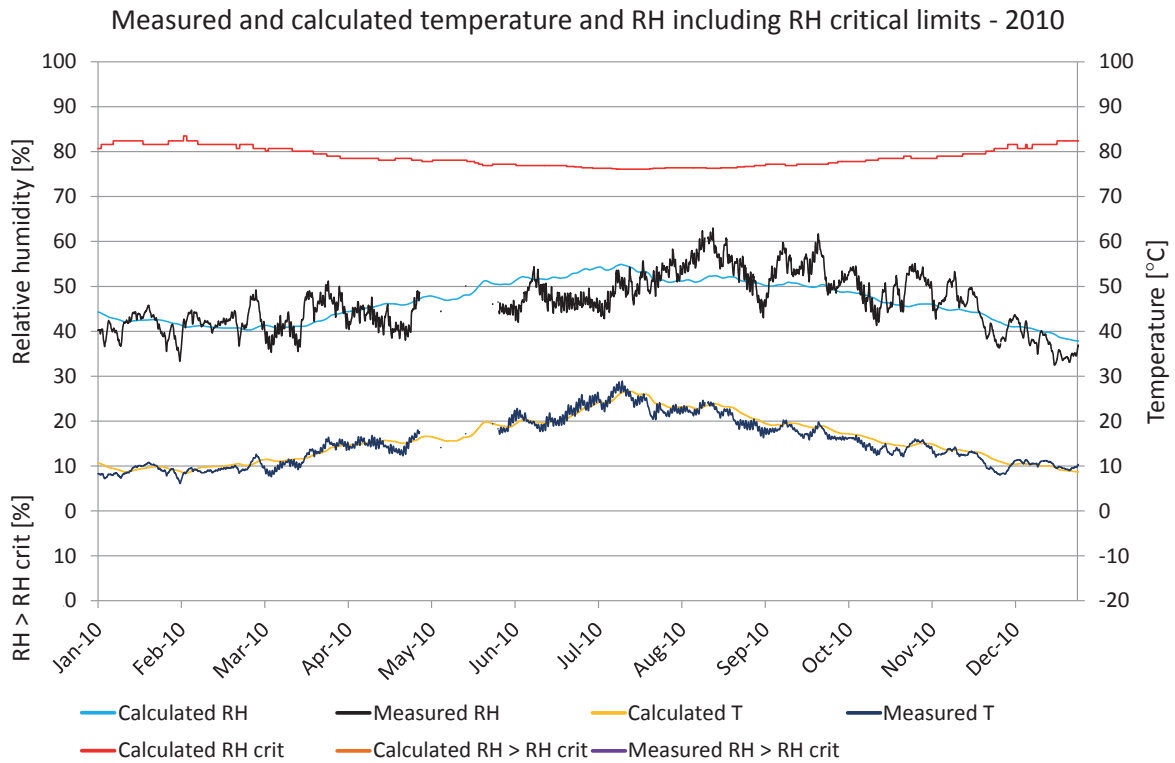


Figure 9.40.9. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

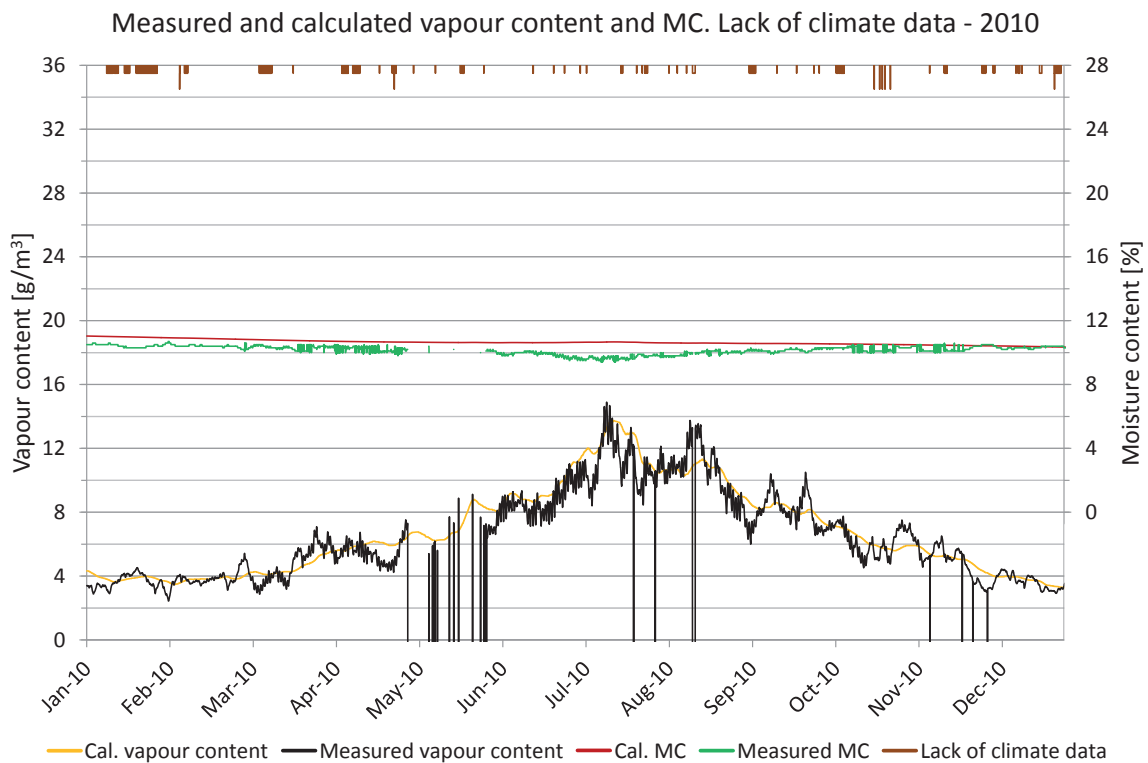


Figure 9.40.10. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

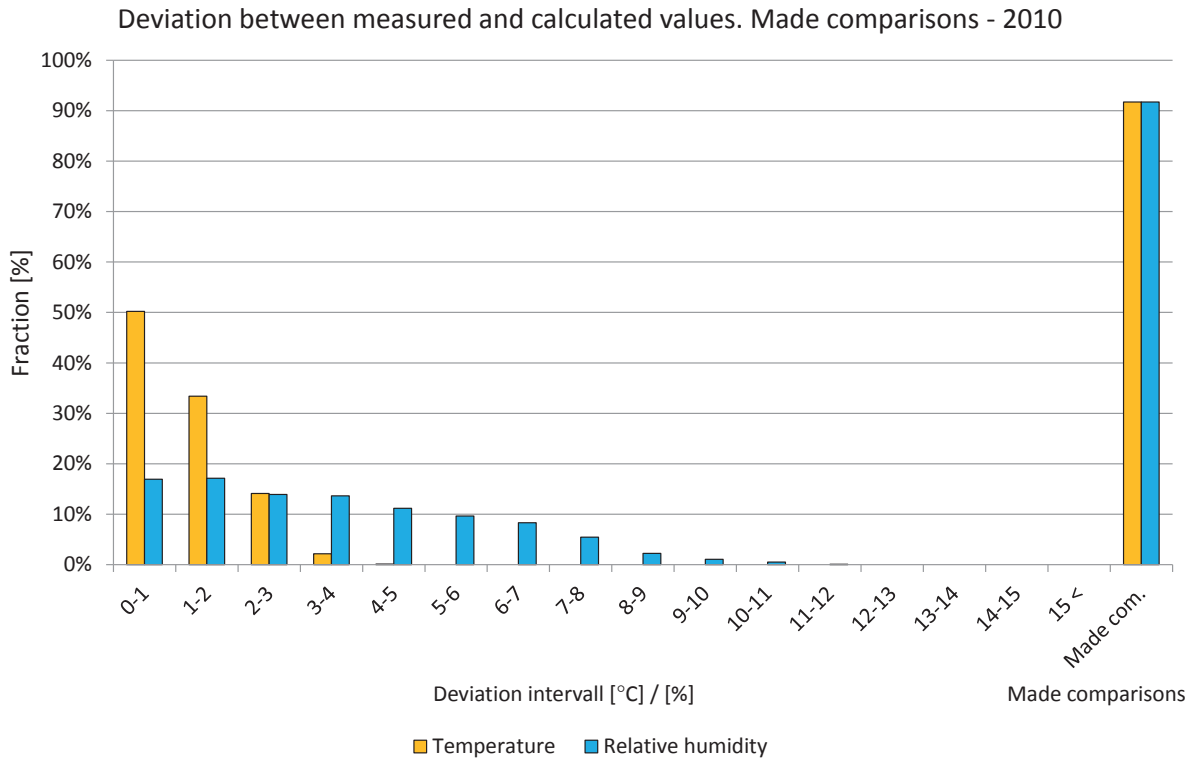


Figure 9.40.11. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

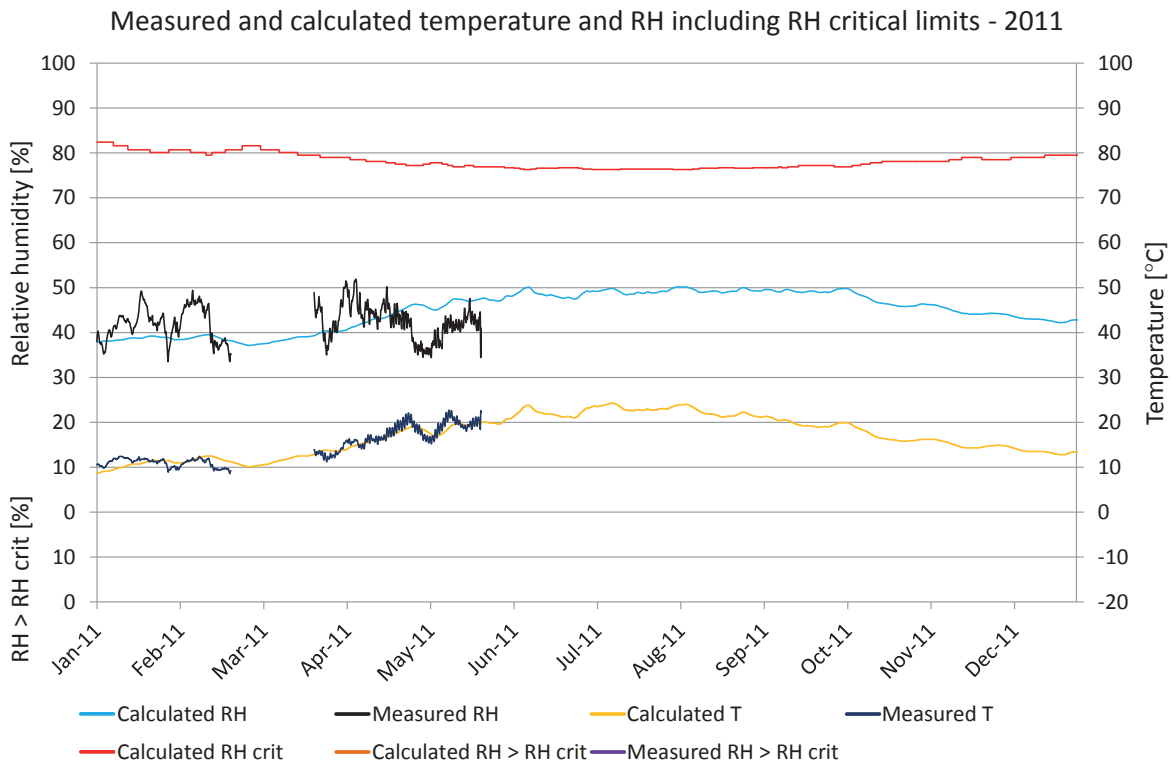


Figure 9.40.12. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

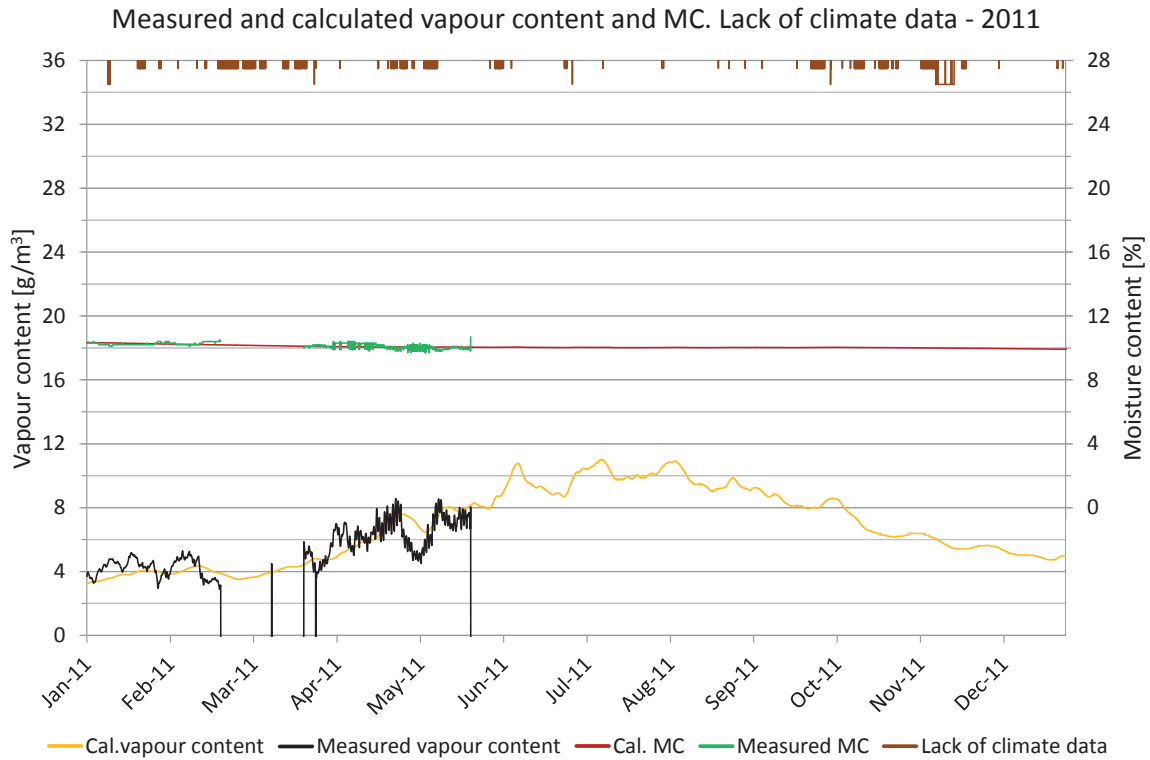


Figure 9.40.13. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

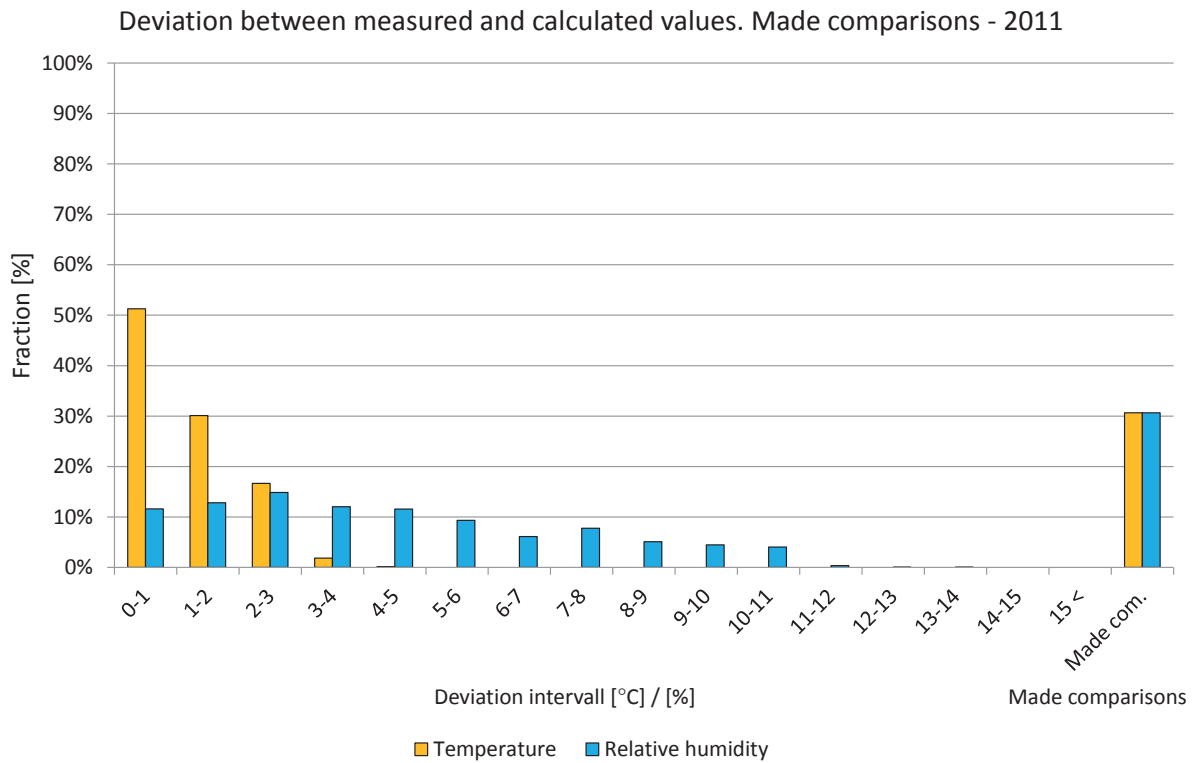


Figure 9.40.14. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

9.41 Position 41

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in the roof with 16 degrees roof angle facing north. The measuring sensor was disassembled for calibration from 24 May 2011 to 8 February 2012 and no measurements were therefore possible during this period.

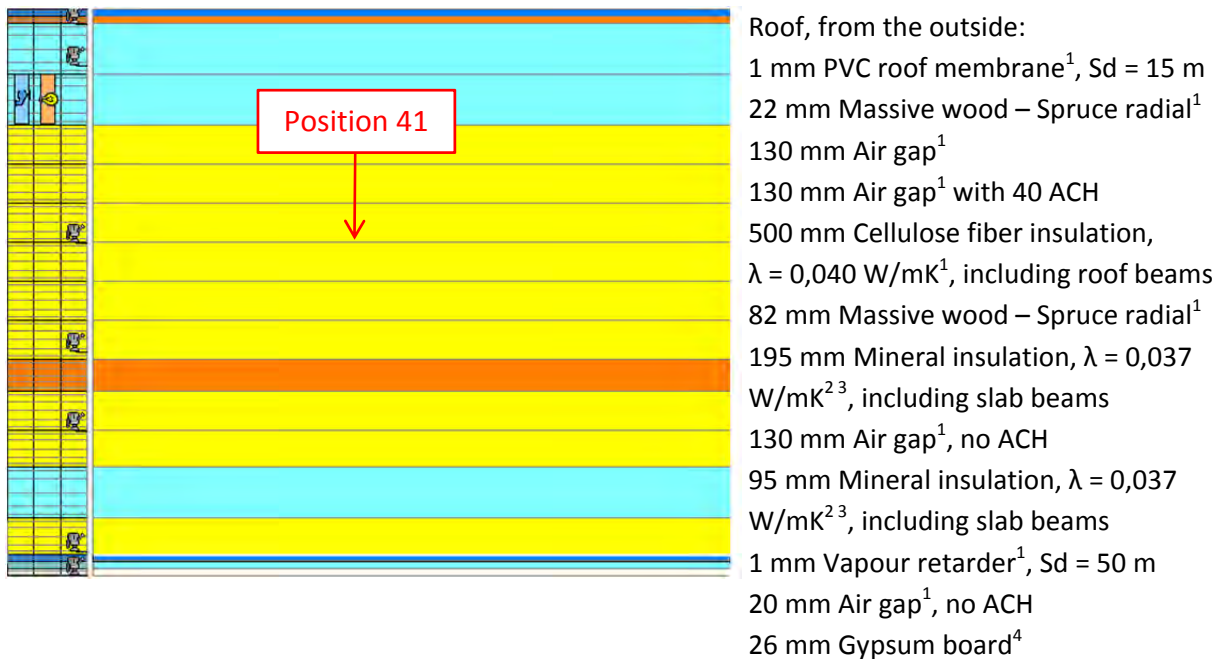


Figure 9.41.1. WUFI calculation model showing the studied position. 1. IBP, 2012, 2. IEA Annex 24, 1996, 3. Paroc, 2002, 4. Krus, M., 1996.

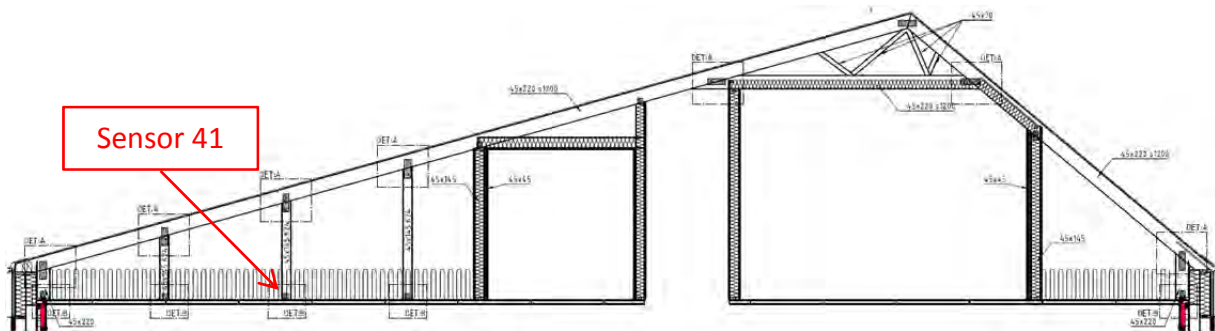


Figure 9.41.2. Location of the studied position.

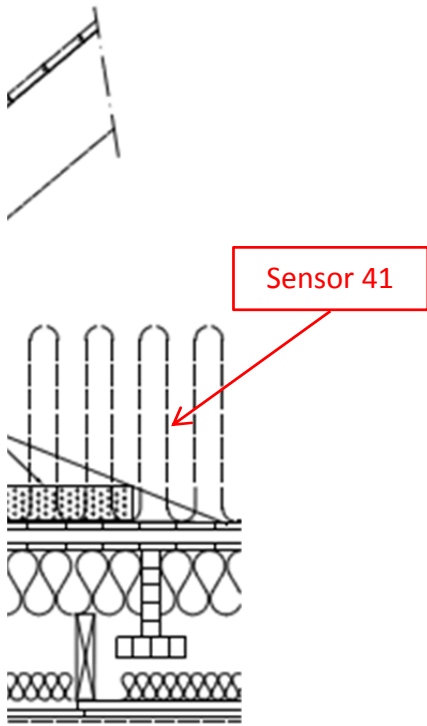


Figure 9.41.3. Location of the studied position.



Figure 9.41.4. Location of the studied position before the cellulose fiber insulation was applied.



Figure 9.41.4. Location of the studied position. The cellulose fiber insulation was temporarily removed.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2009

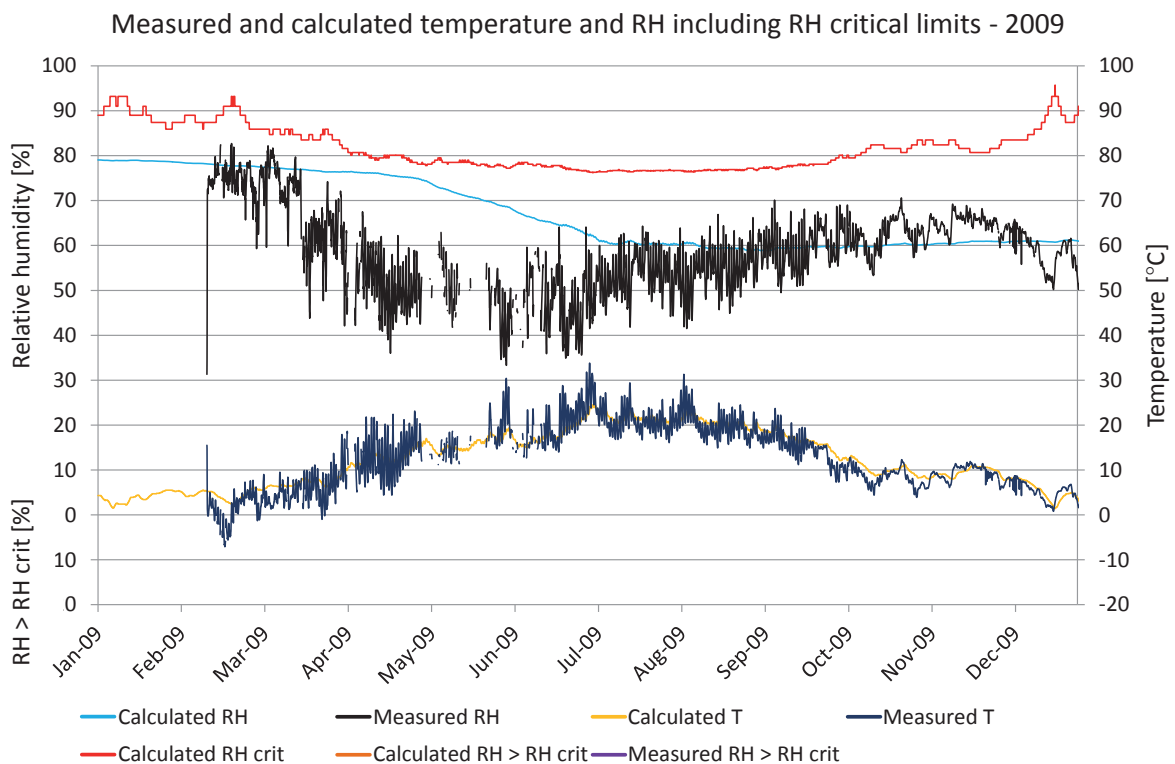


Figure 9.41.5. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

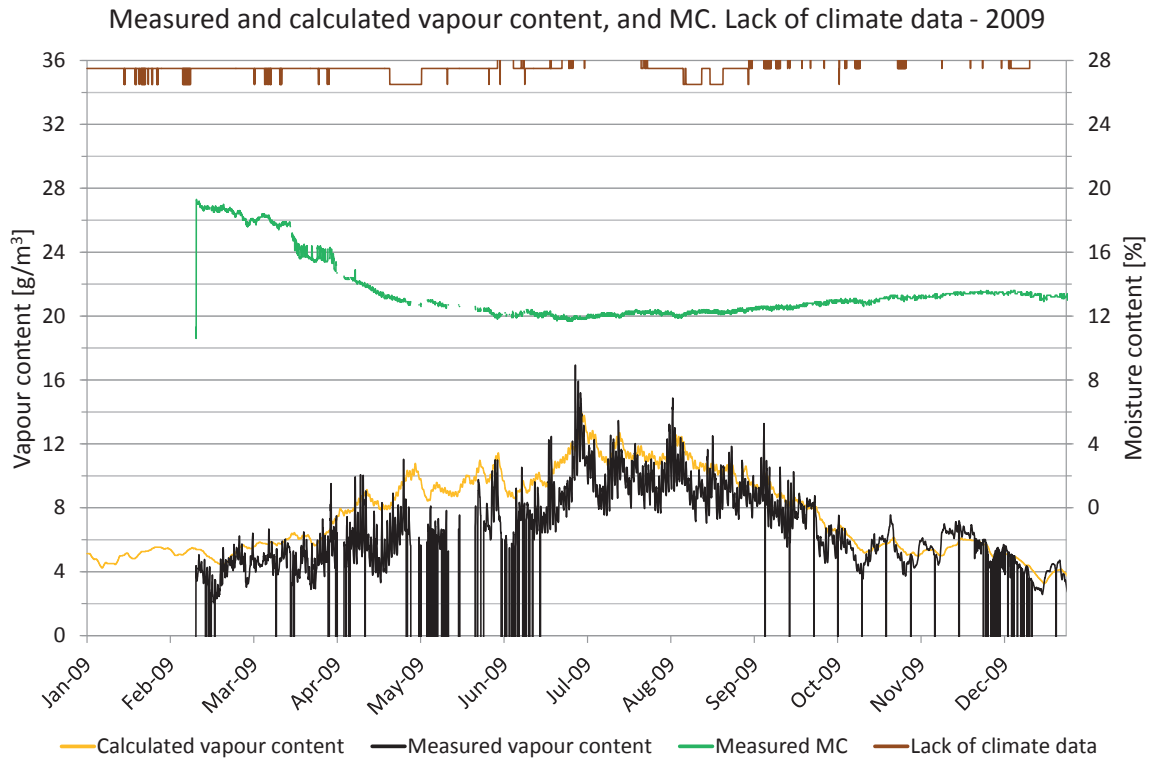


Figure 9.41.6. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

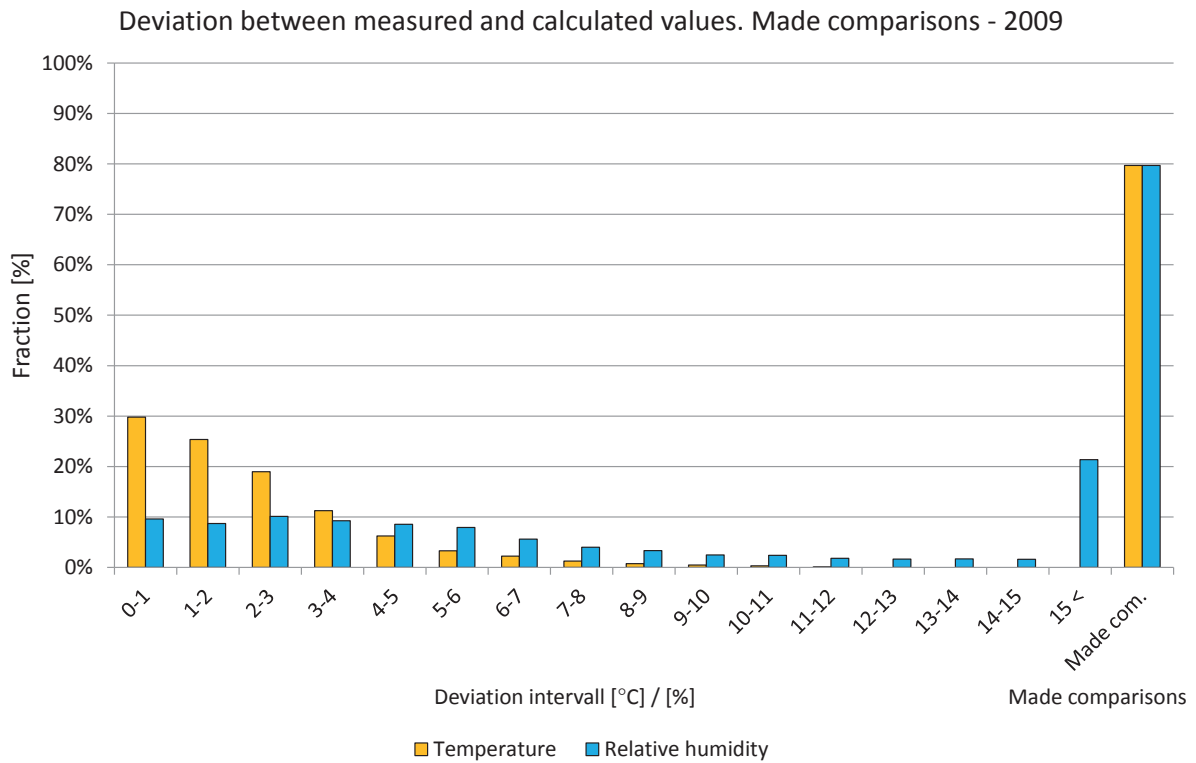


Figure 9.41.7. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

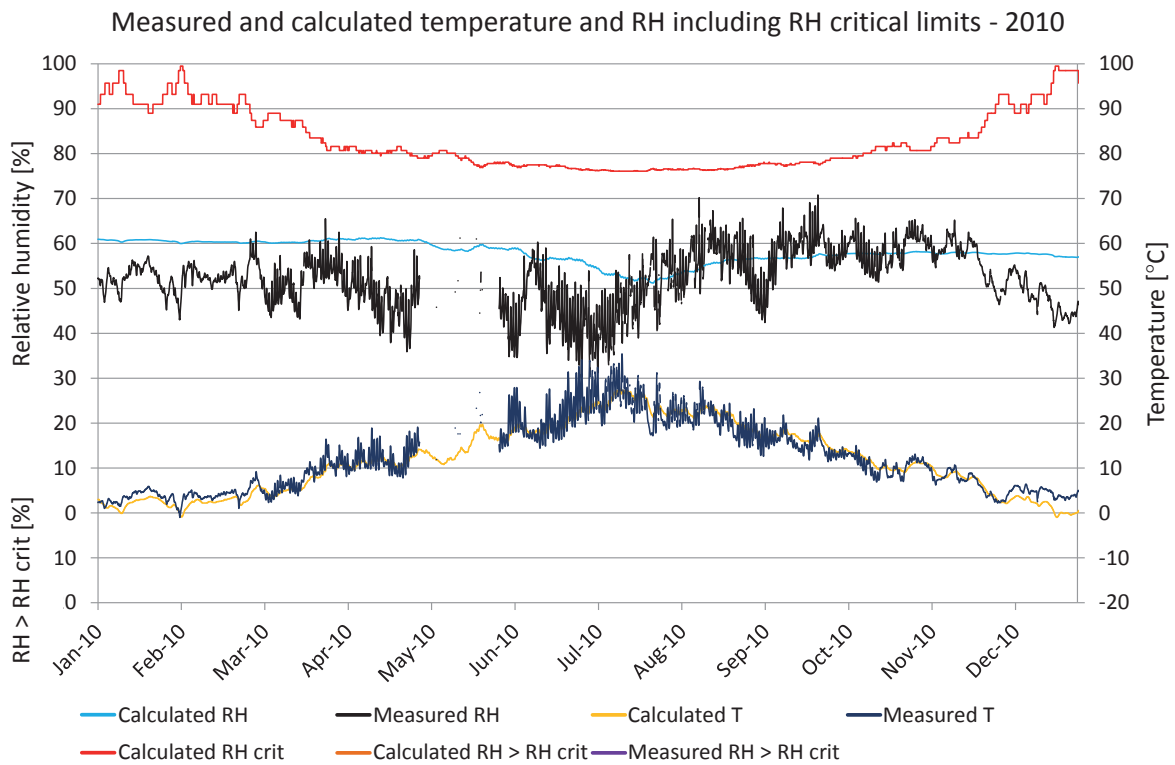


Figure 9.41.8. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

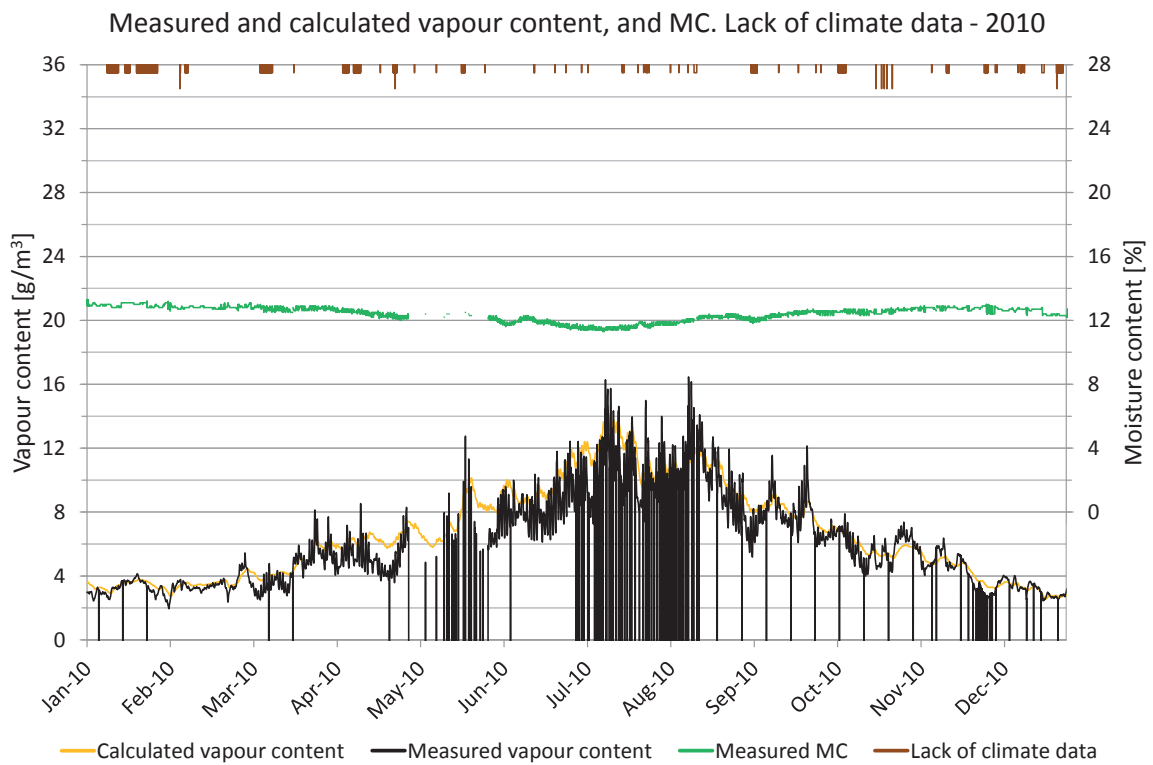


Figure 9.41.9. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

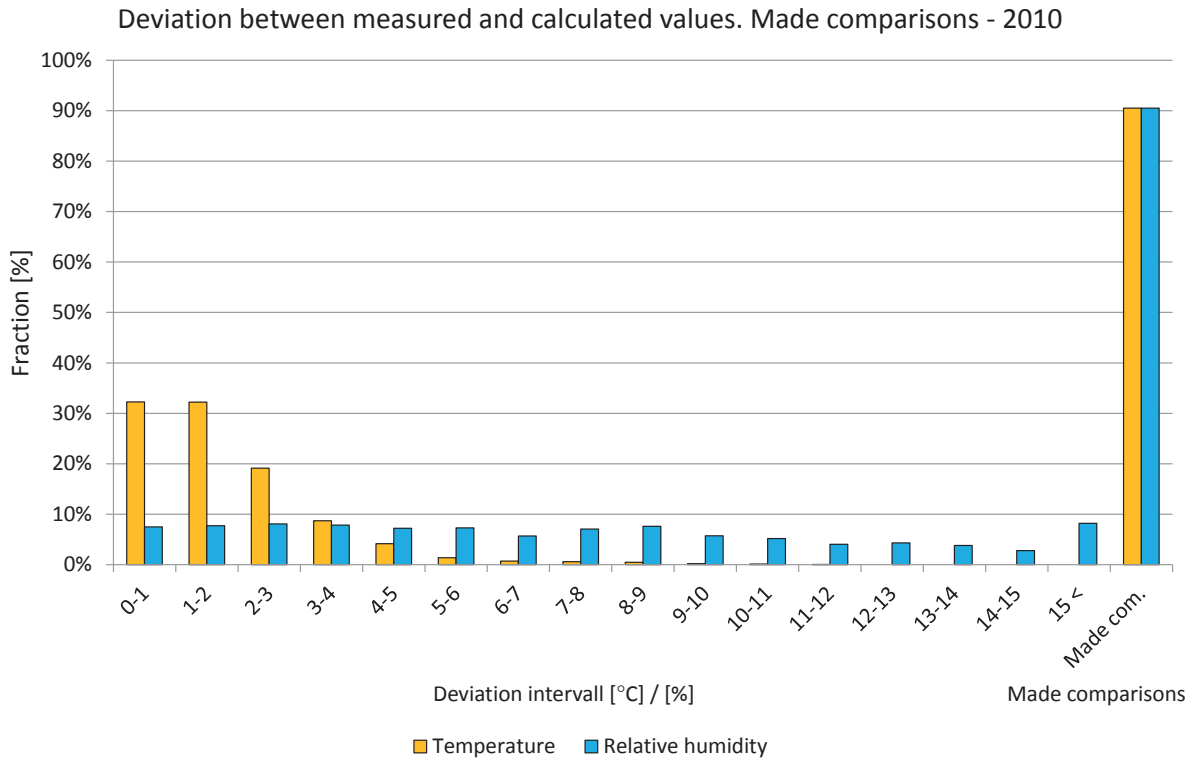


Figure 9.41.10. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

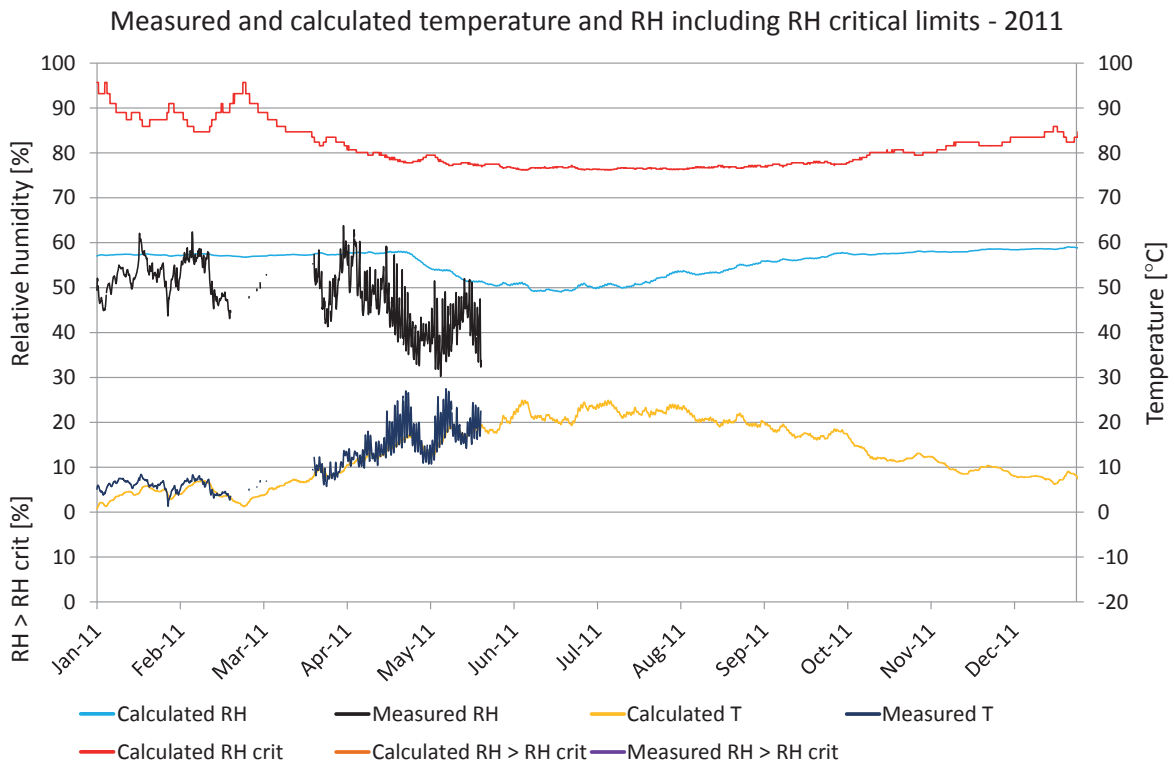


Figure 9.41.11. Comparisons between measured and calculated temperature and relative humidity. Calculated temperature (yellow), measured temperature (dark blue), calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

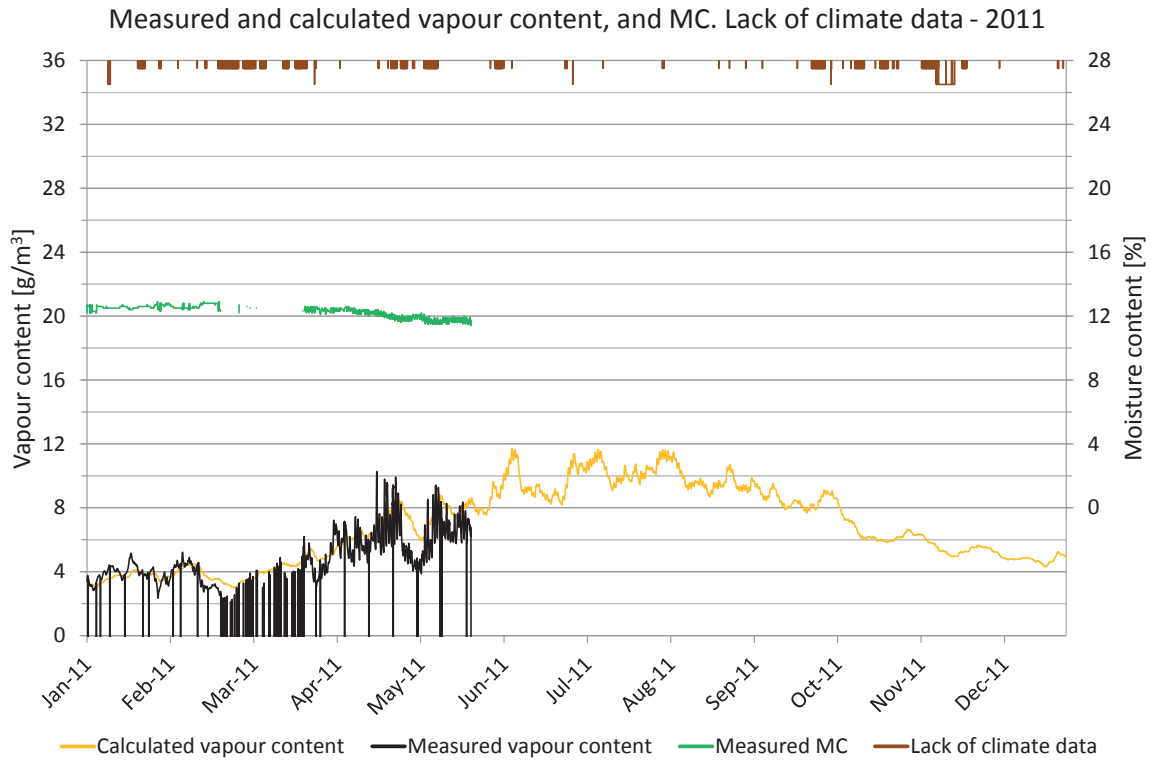


Figure 9.41.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

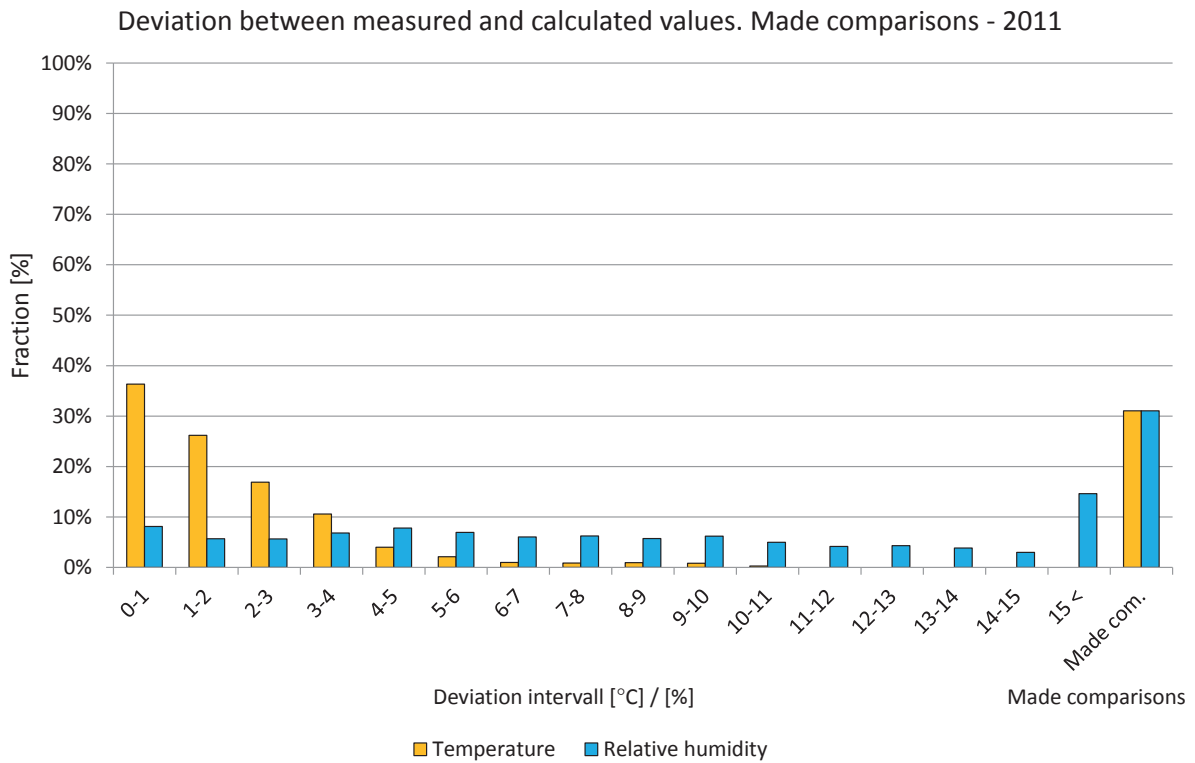


Figure 9.41.13 Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

9.42 Position 42

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in the roof with 16 degrees roof angle facing north. The measuring sensor was disassembled for calibration from 24 May 2011 to 8 February 2012 and no measurements were therefore possible during this period.

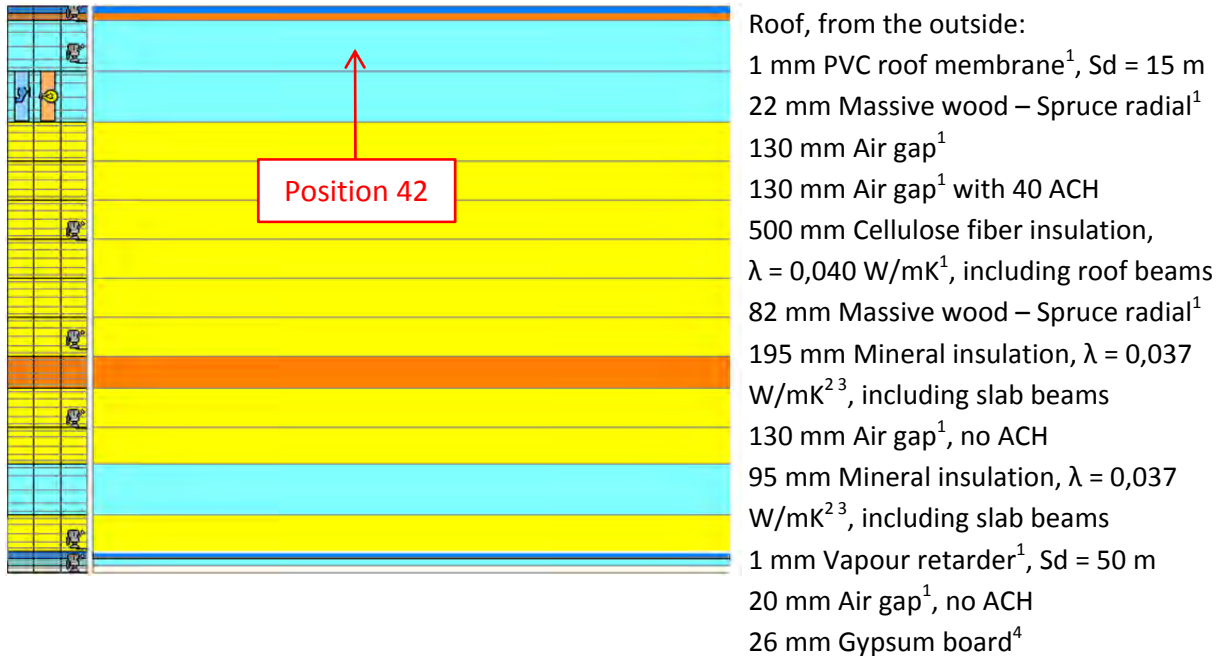


Figure 9.42.1. WUFI calculation model showing the studied position. 1. IBP, 2012, 2. IEA Annex 24, 1996, 3. Paroc, 2002, 4. Krus, M., 1996.

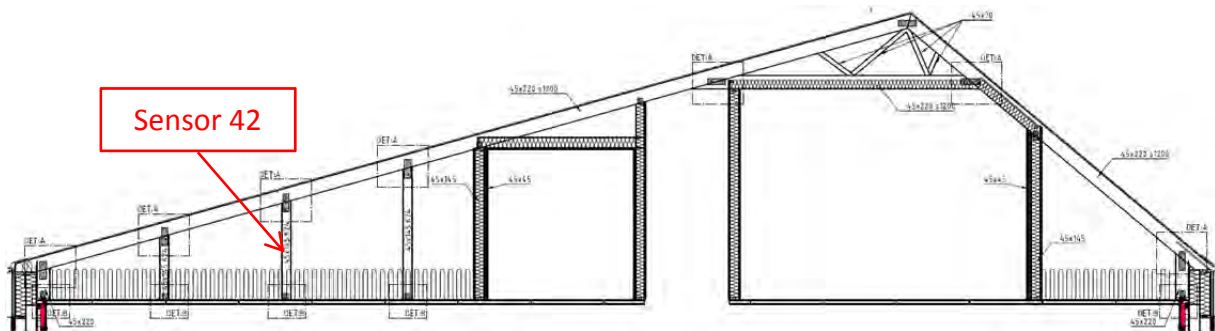


Figure 9.42.2 Location of the studied position.

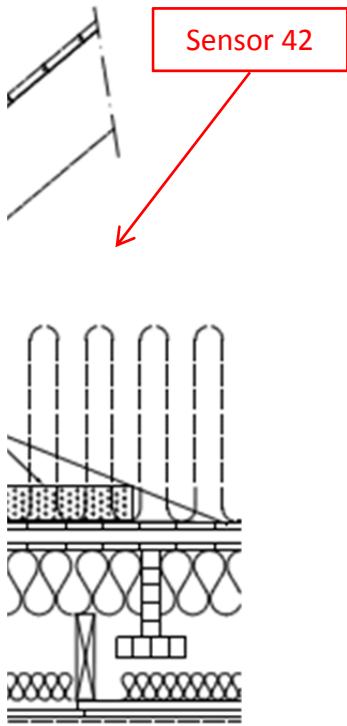


Figure 9.42.3. Location of the studied position.



Figure 9.42.4. Location of the studied position before the cellulose fiber insulation was applied.



Figure 9.42.5. Location of the studied position. The cellulose fiber insulation was temporary removed.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors.

Year 2009

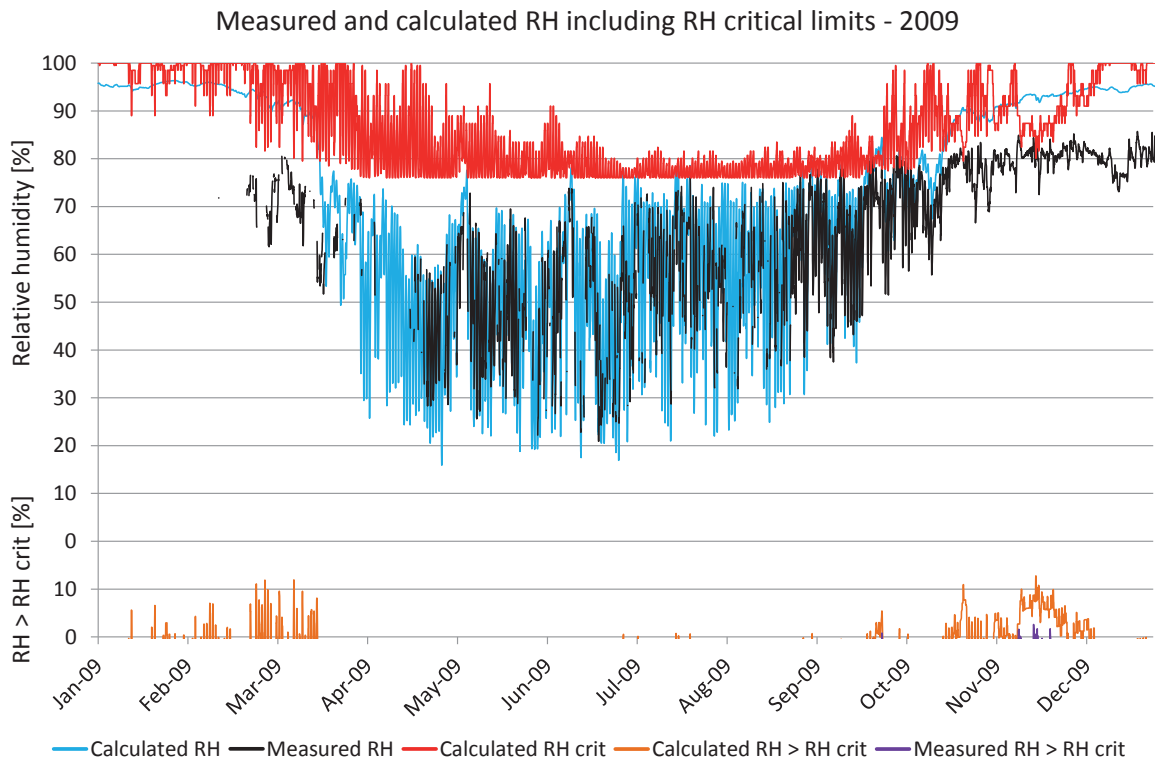


Figure 9.42.6. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

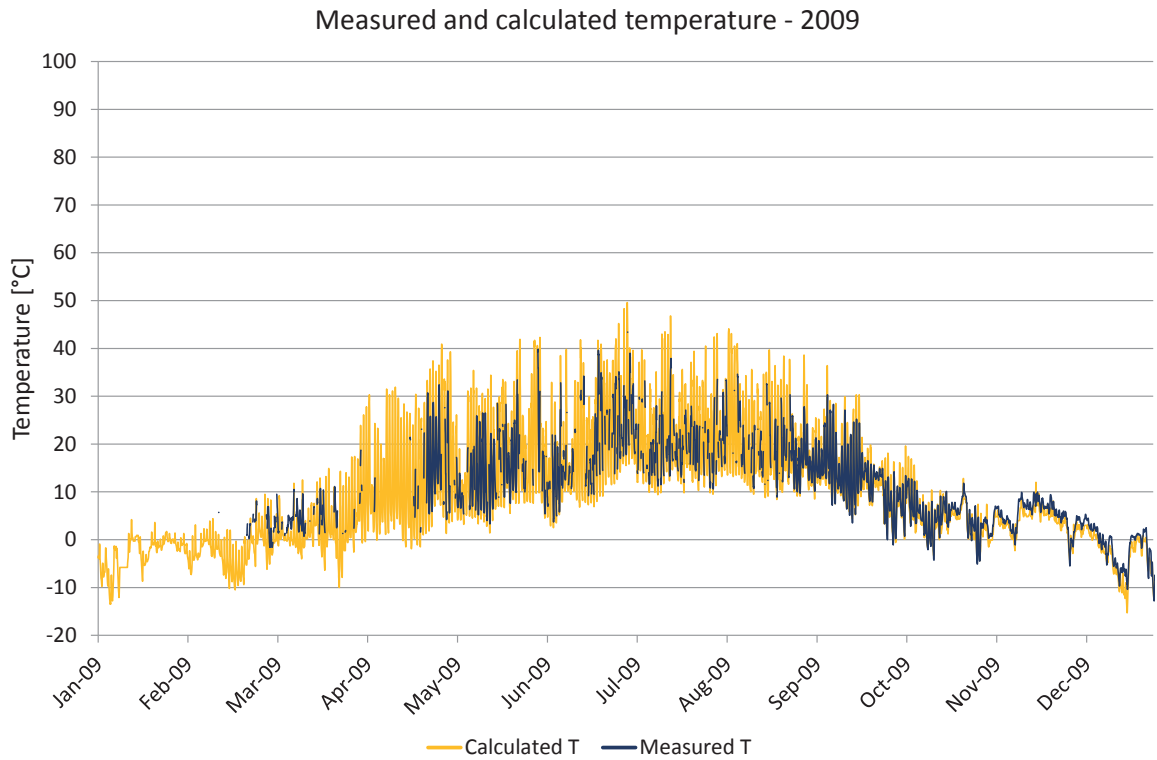


Figure 9.42.7. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

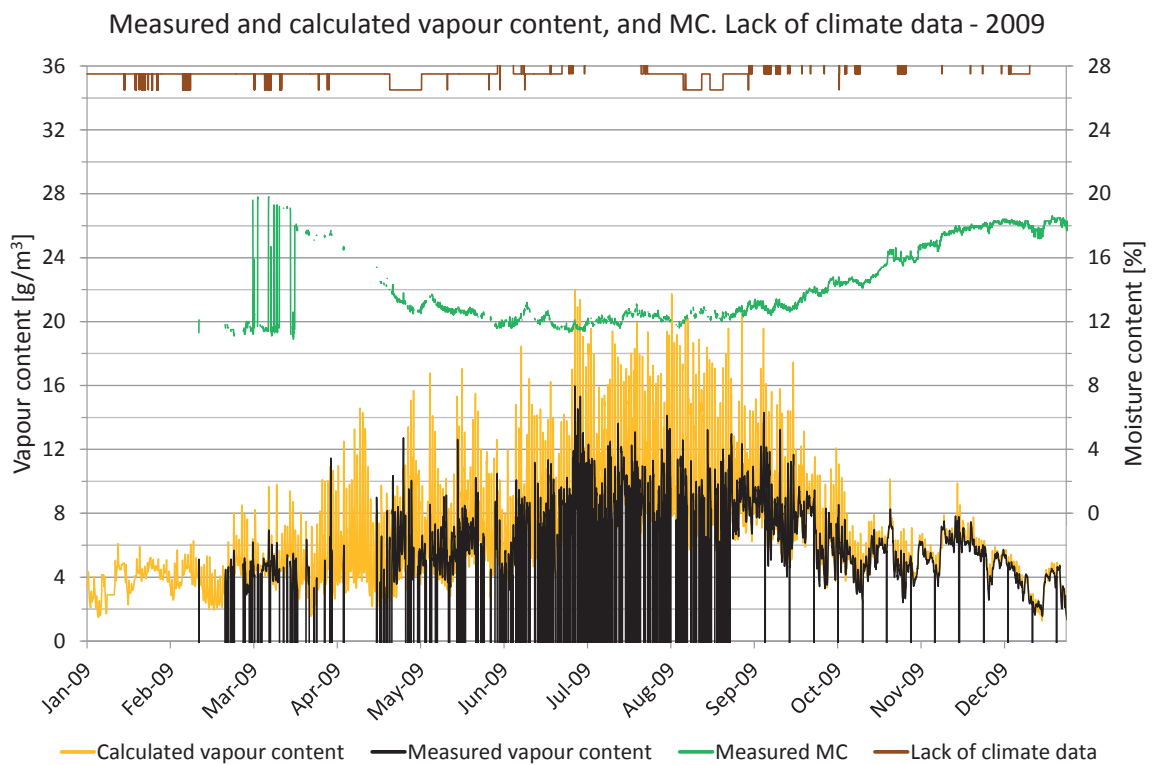


Figure 9.42.8. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

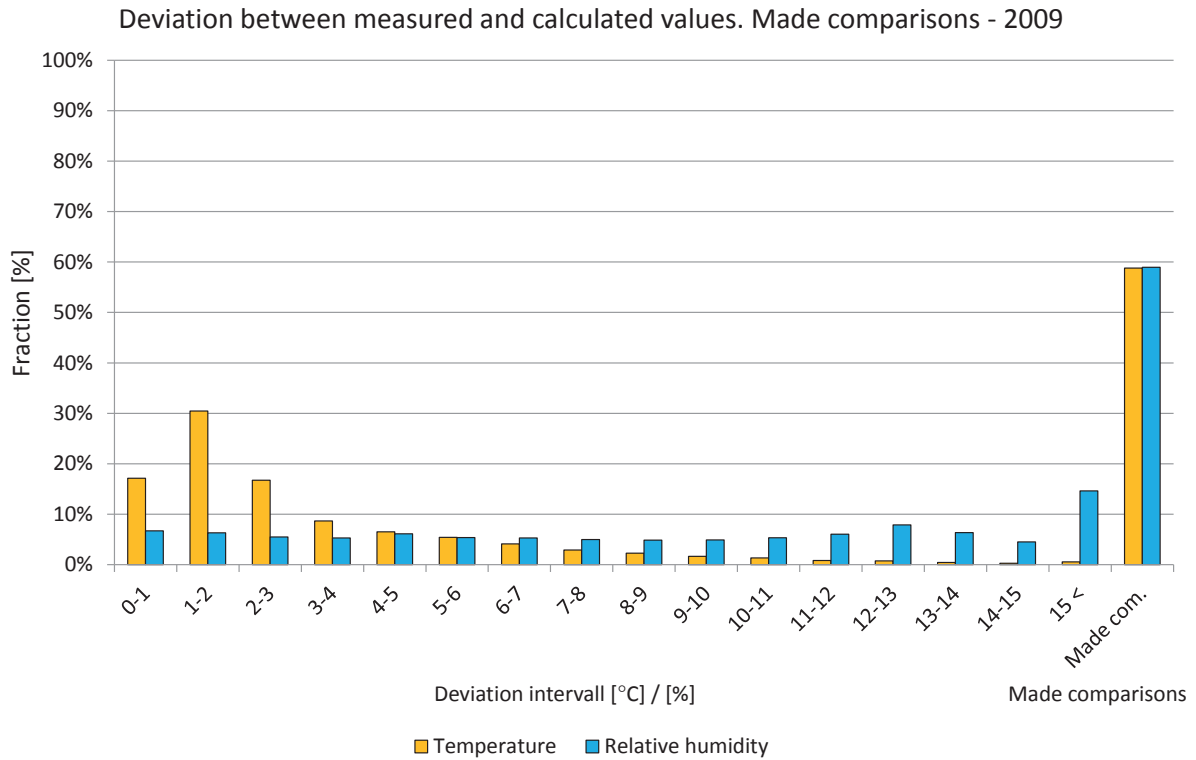


Figure 9.42.9. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

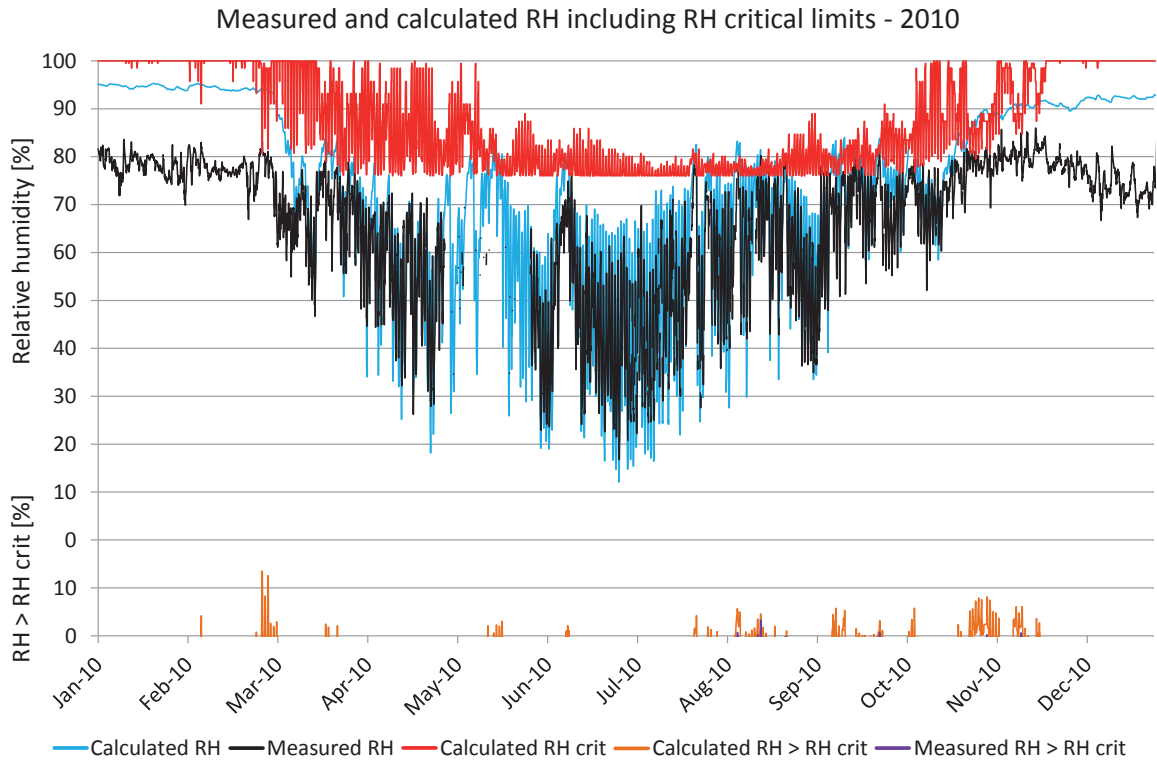


Figure 9.42.10. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

Measured and calculated temperature - 2010

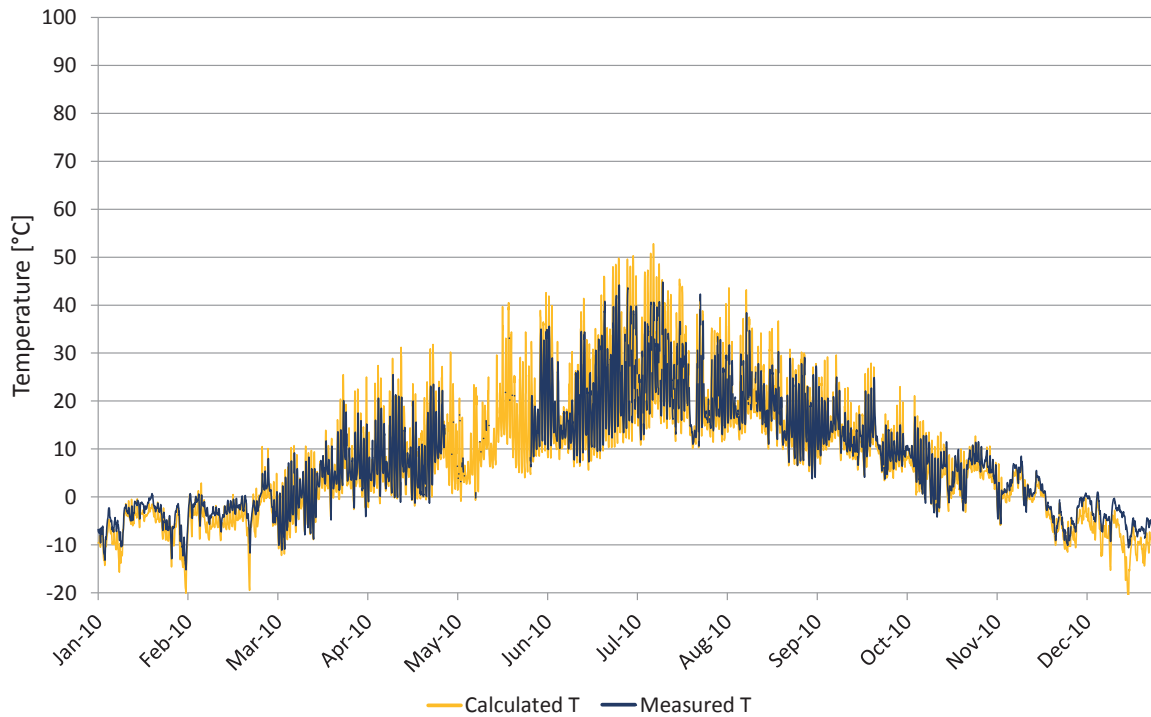


Figure 9.42.11. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

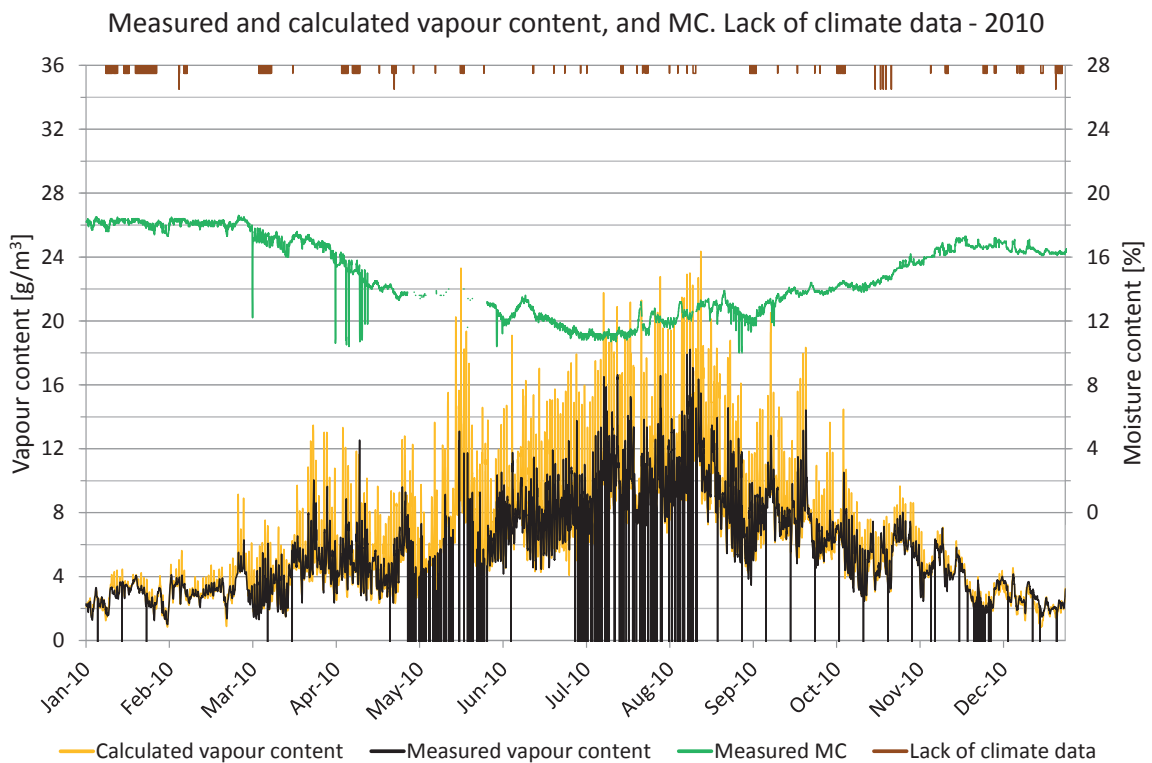


Figure 9.42.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

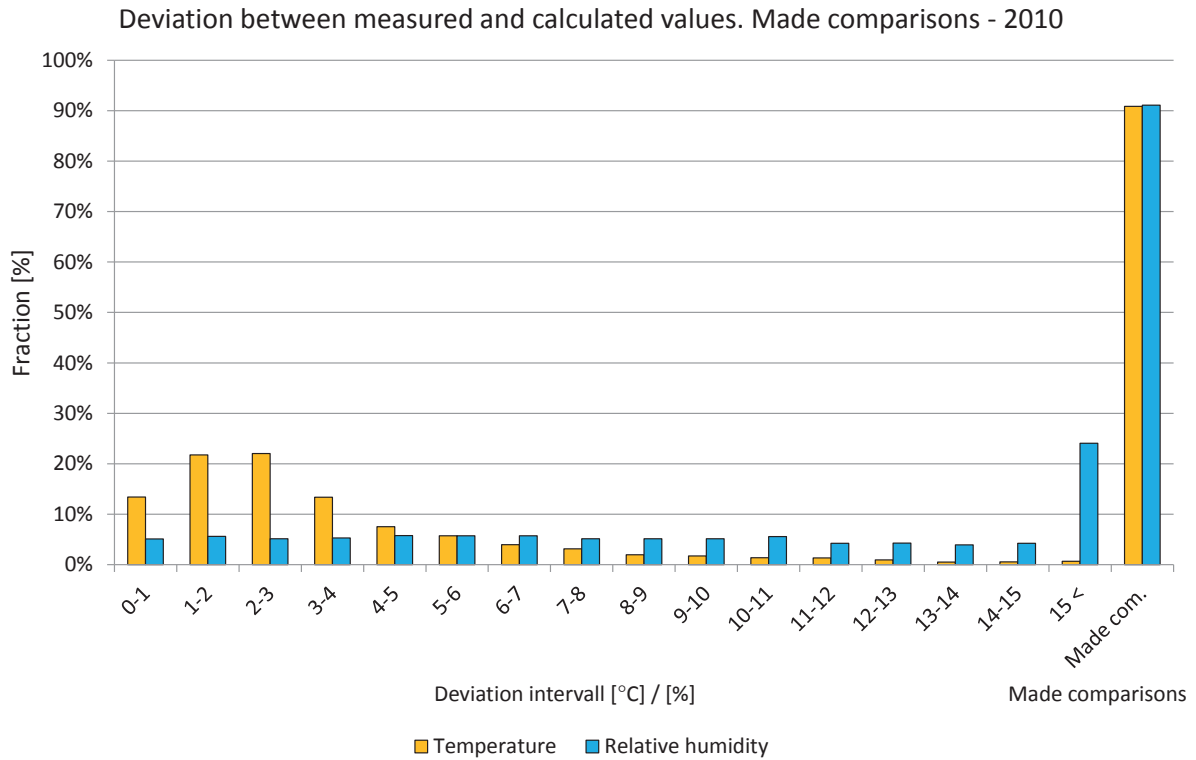


Figure 9.42.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

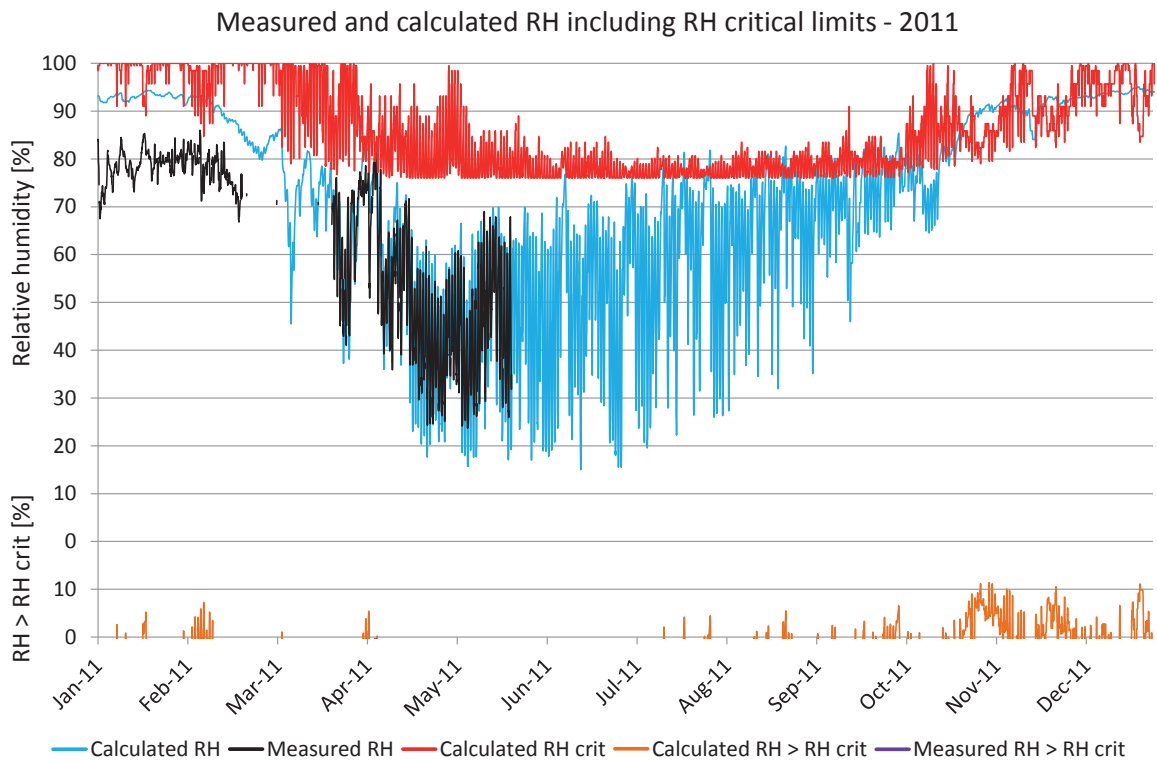


Figure 9.42.14. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

Measured and calculated temperature - 2011

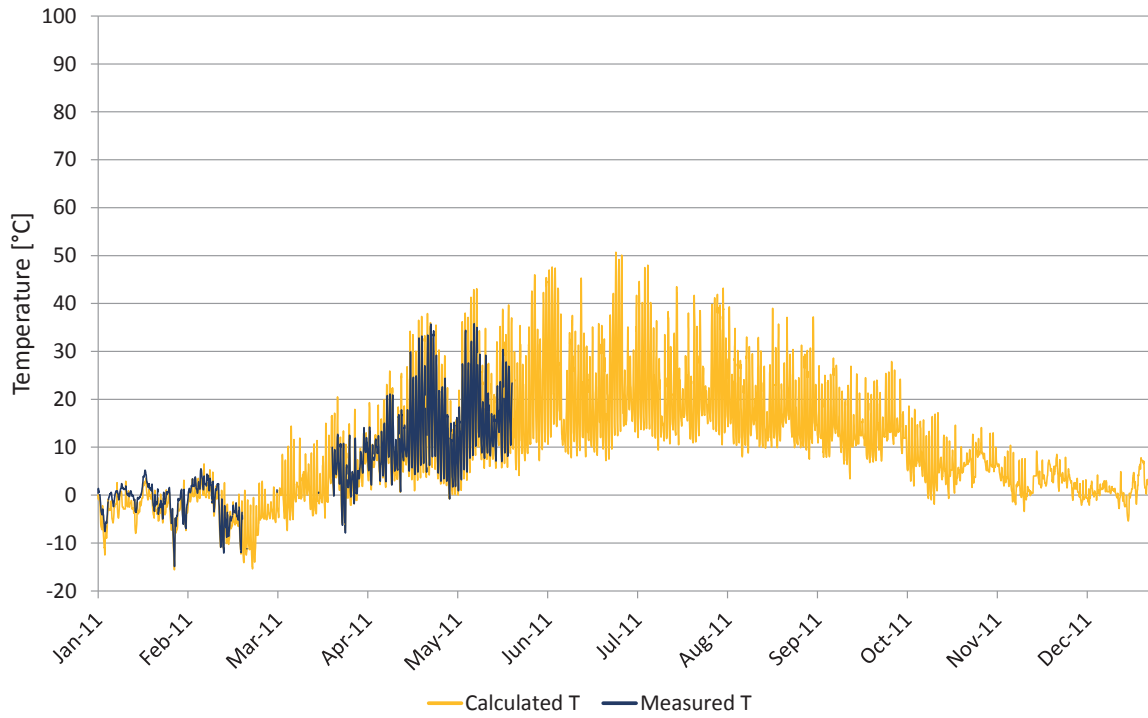


Figure 9.42.15. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

Measured and calculated vapour content, and MC. Lack of climate data - 2011

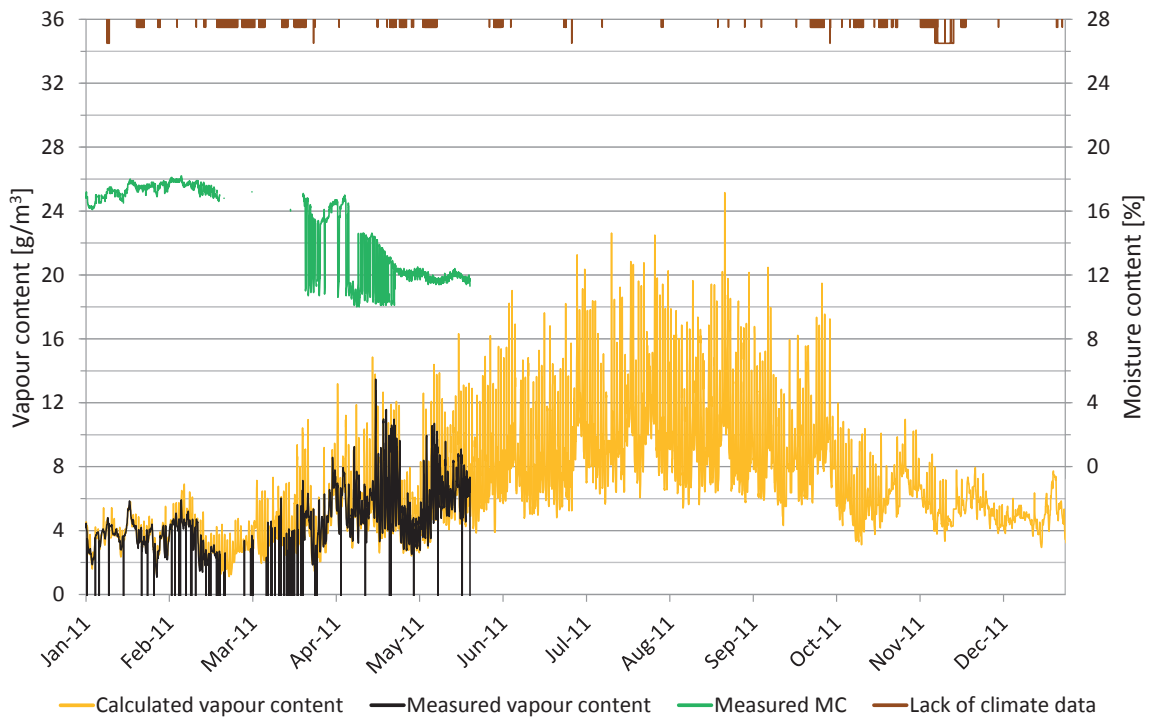


Figure 9.42.16. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content (green), periods with lack of climate data (brown).

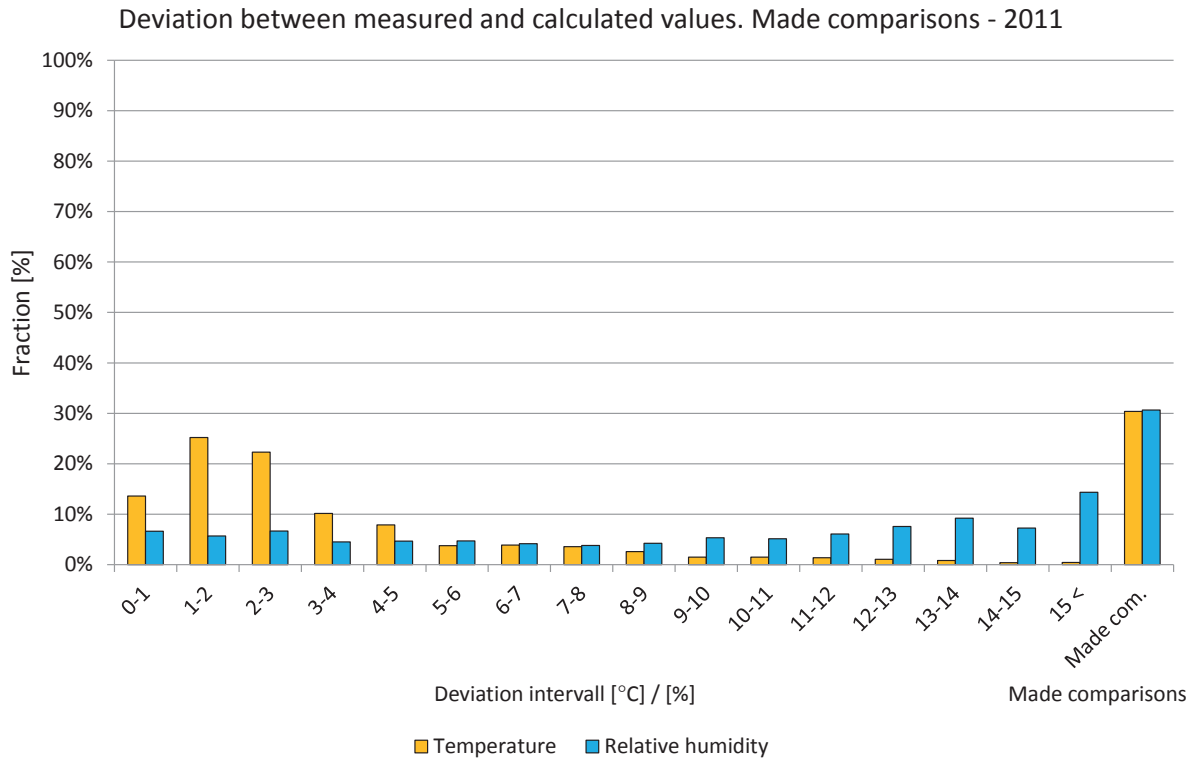


Figure 9.42.17. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

9.43 Position 43

The locations of the measured and calculated position are shown in the drawings and figures below. The studied position is located in the roof with 16 degrees roof angle facing north. The measuring sensor was disassembled for calibration from 24 May 2011 to 8 February 2012 and no measurements were therefore possible during this period.

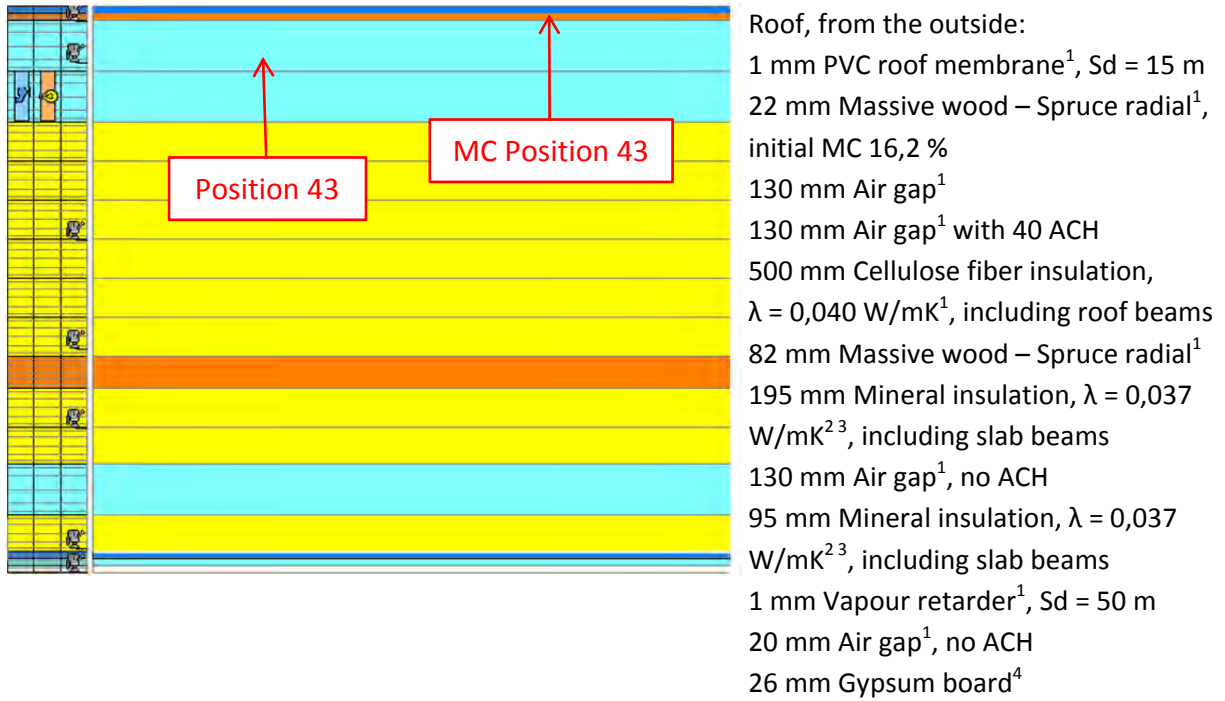


Figure 9.43.1. WUFI calculation model showing the studied position. 1. IBP, 2012, 2. IEA Annex 24, 1996, 3. Paroc, 2002, 4. Krus, M., 1996.

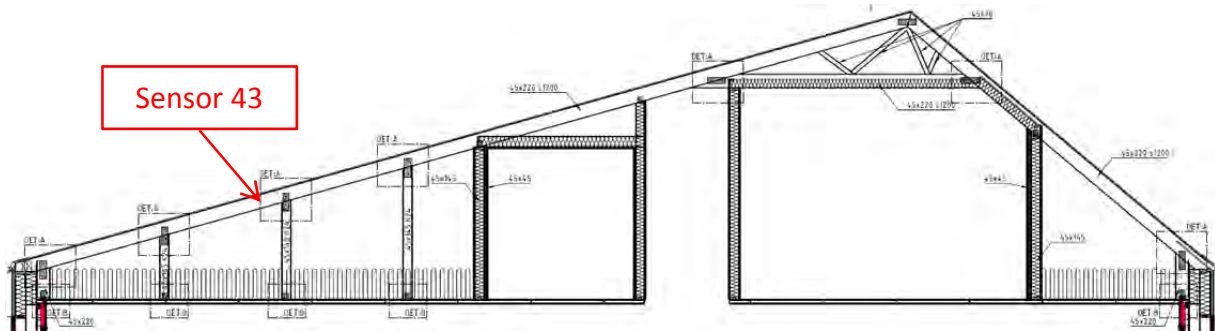


Figure 9.43.2. Location of the studied position.

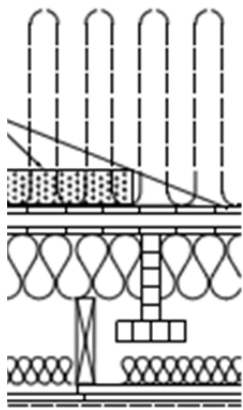
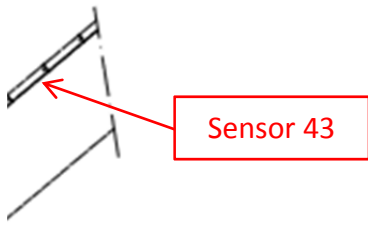


Figure 9.43.3. Location of the studied position.



Figure 9.43.4. Location of the studied position before the cellulose fiber insulation was applied.



Figure 9.43.5. Location of the studied position. The cellulose fiber insulation was temporary removed.

A perfect match between the measured and calculated values cannot be expected due to e.g. the influence of two- and three-dimensional effects and the accuracy of the sensors. However, this position was less affected of those factors compare to other studied positions.

Year 2009

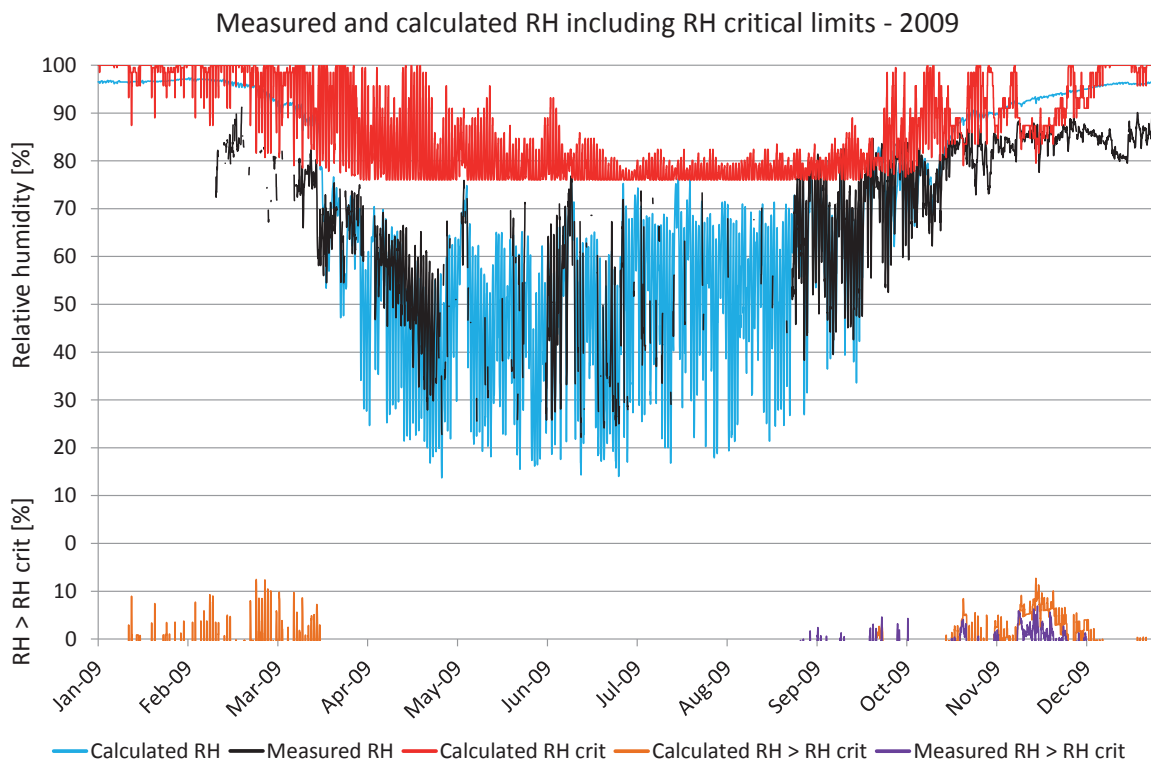


Figure 9.43.6. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

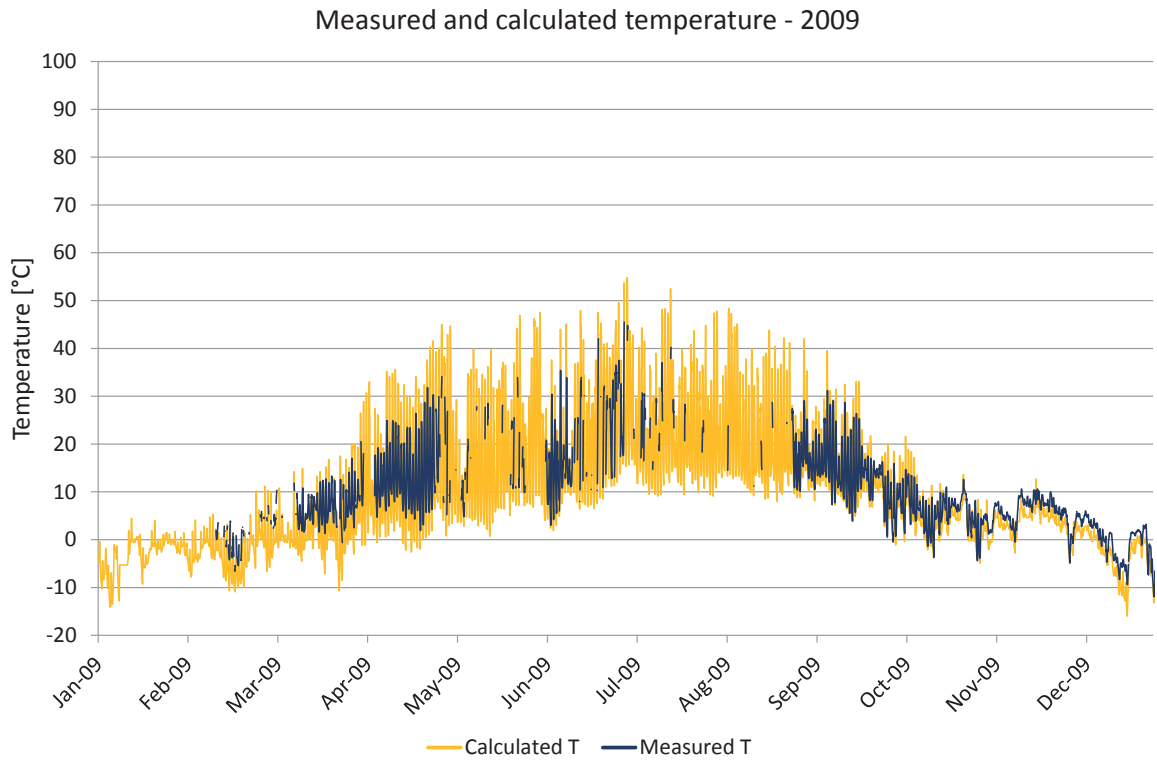


Figure 9.43.7. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

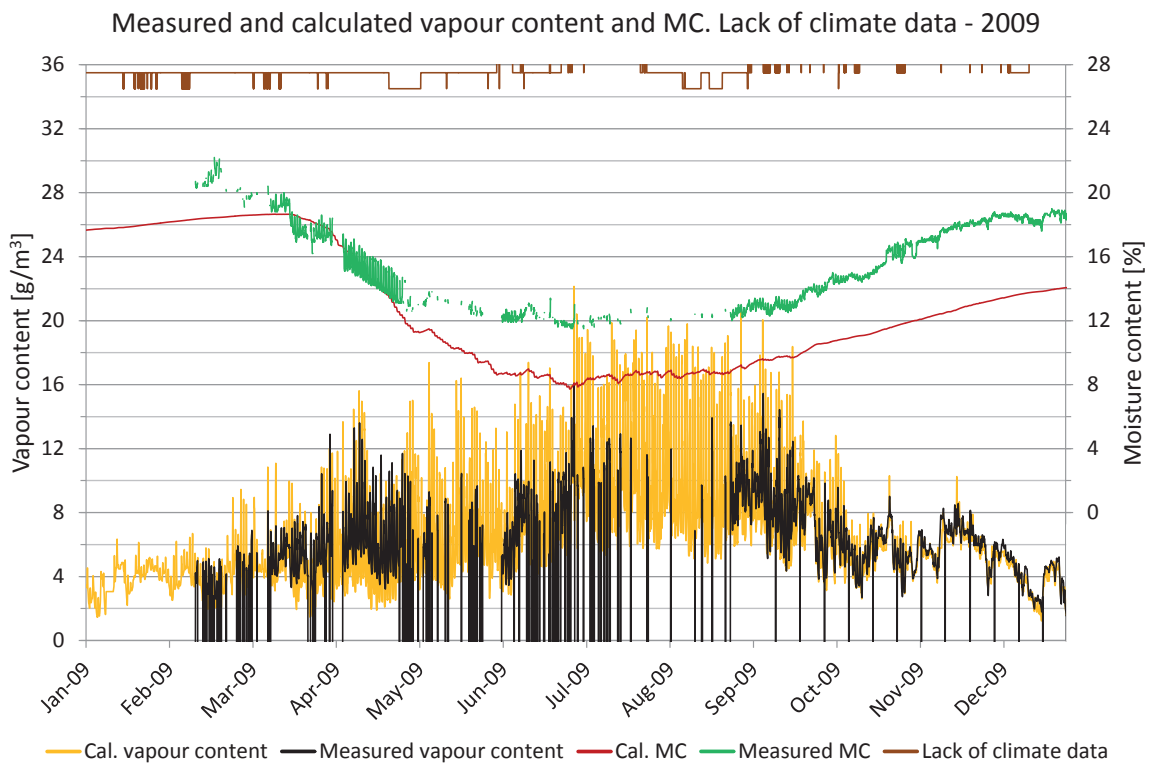


Figure 9.43.8. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

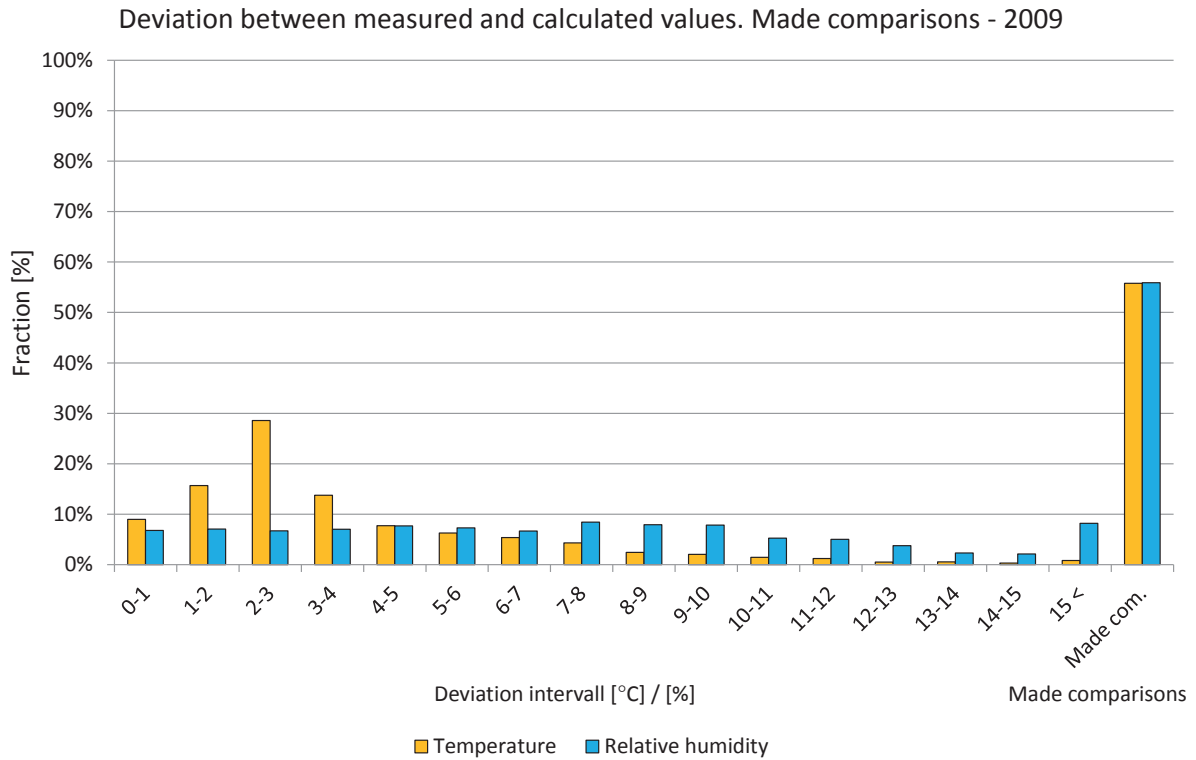


Figure 9.43.9. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2010

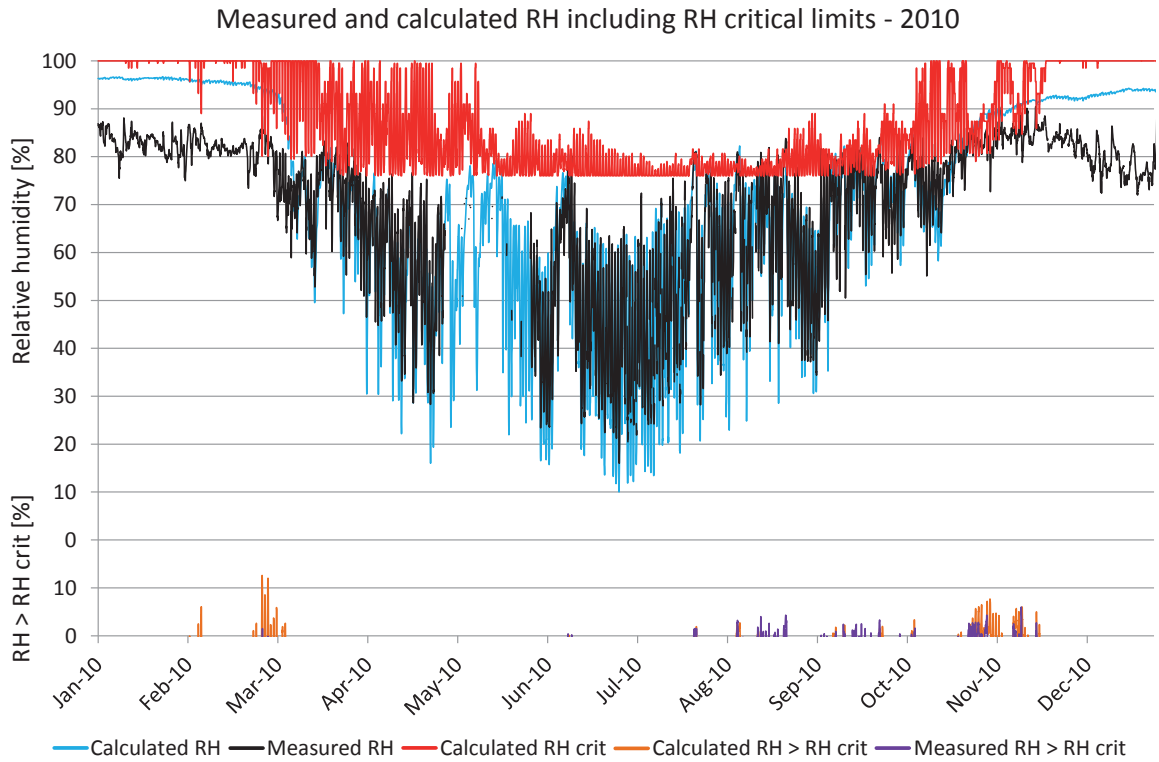


Figure 9.43.10. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

Measured and calculated temperature - 2010

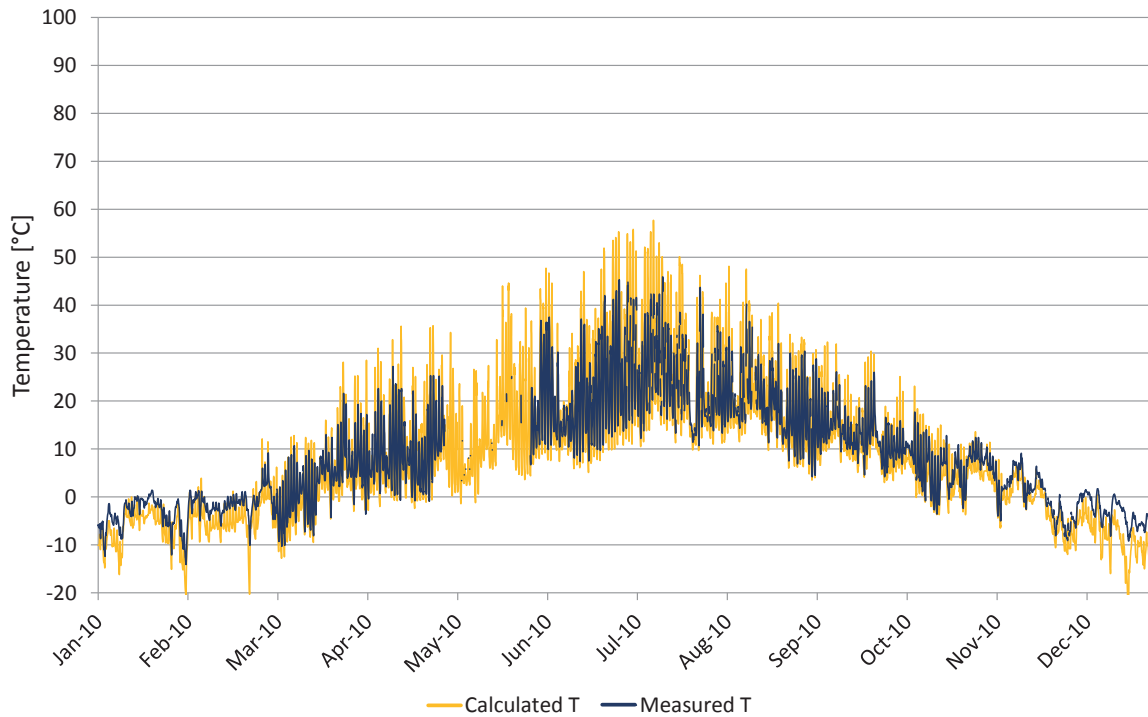


Figure 9.43.11. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

Measured and calculated vapour content and MC. Lack of climate data - 2010

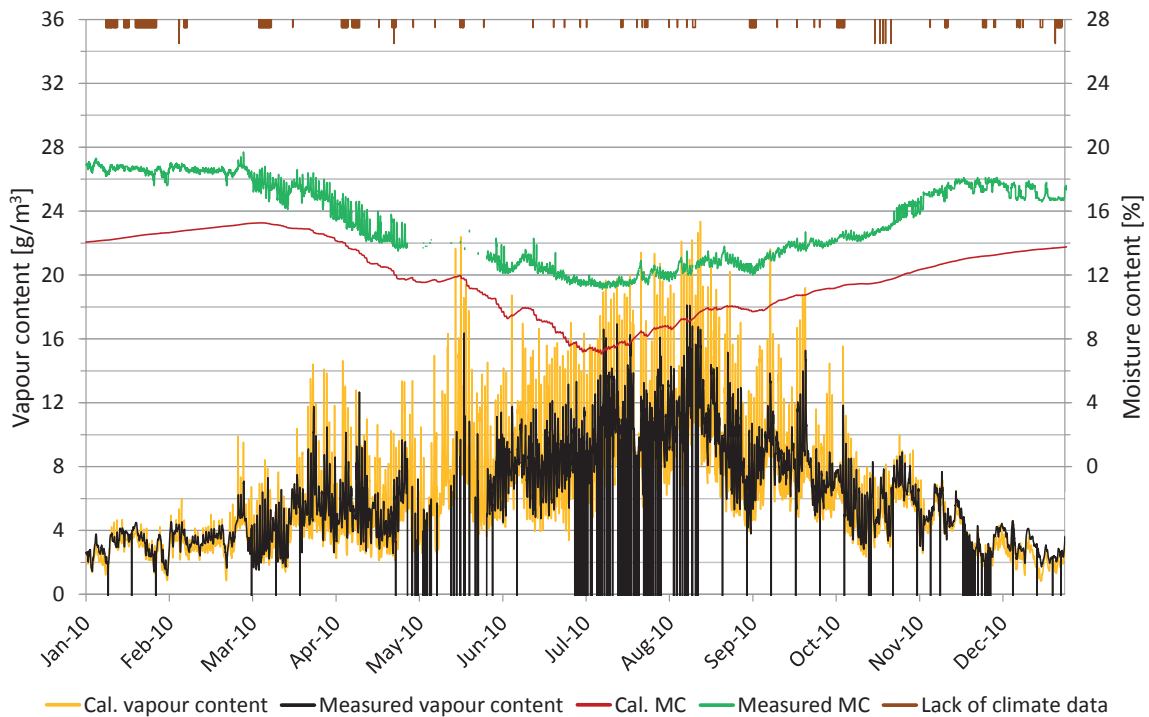


Figure 9.43.12. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

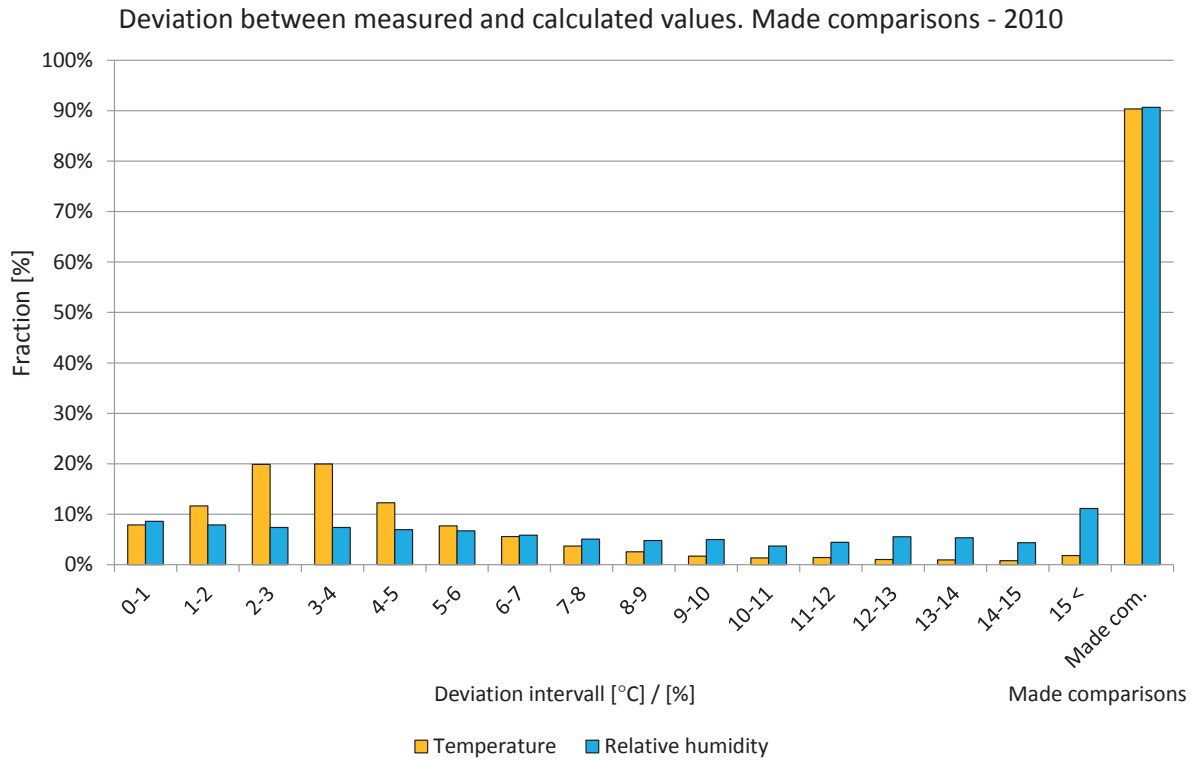


Figure 9.43.13. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

Year 2011

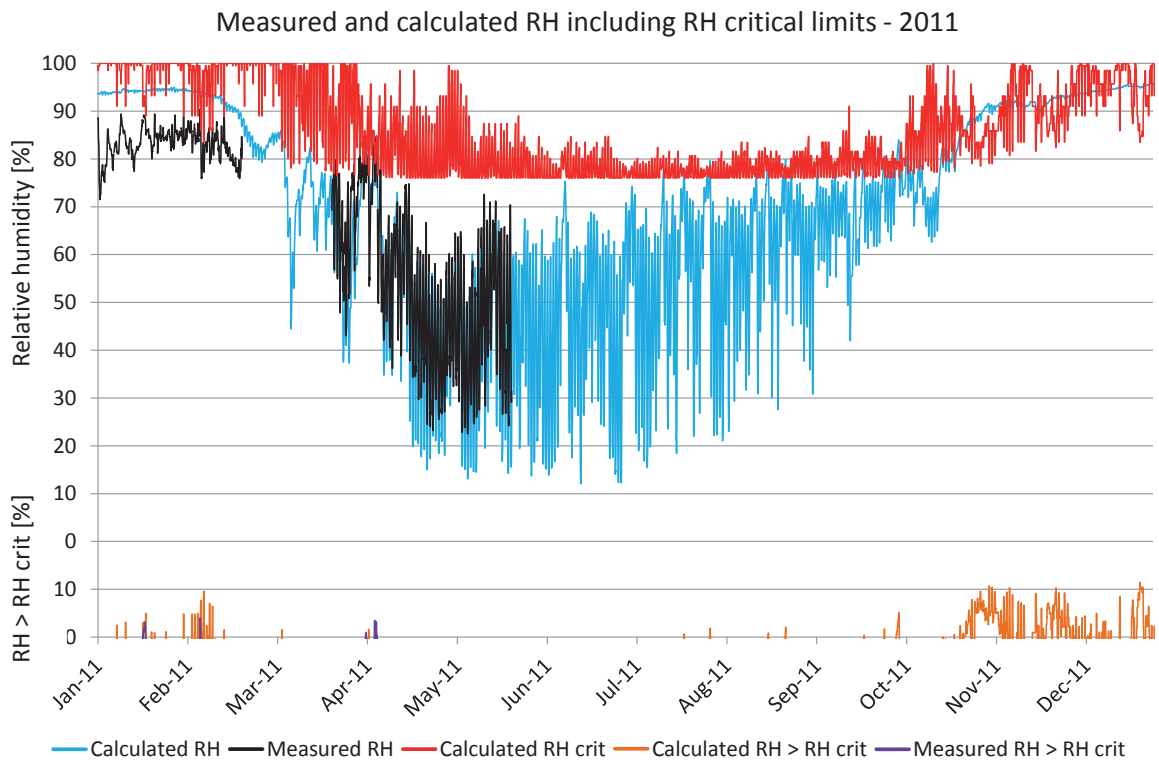


Figure 9.43.14. Comparisons between measured and calculated relative humidity. Calculated RH (turquoise), measured RH (black), RH_{crit} for calculated values (red), calculated $RH > RH_{crit}$ (light brown), measured $RH > RH_{crit}$ (purple).

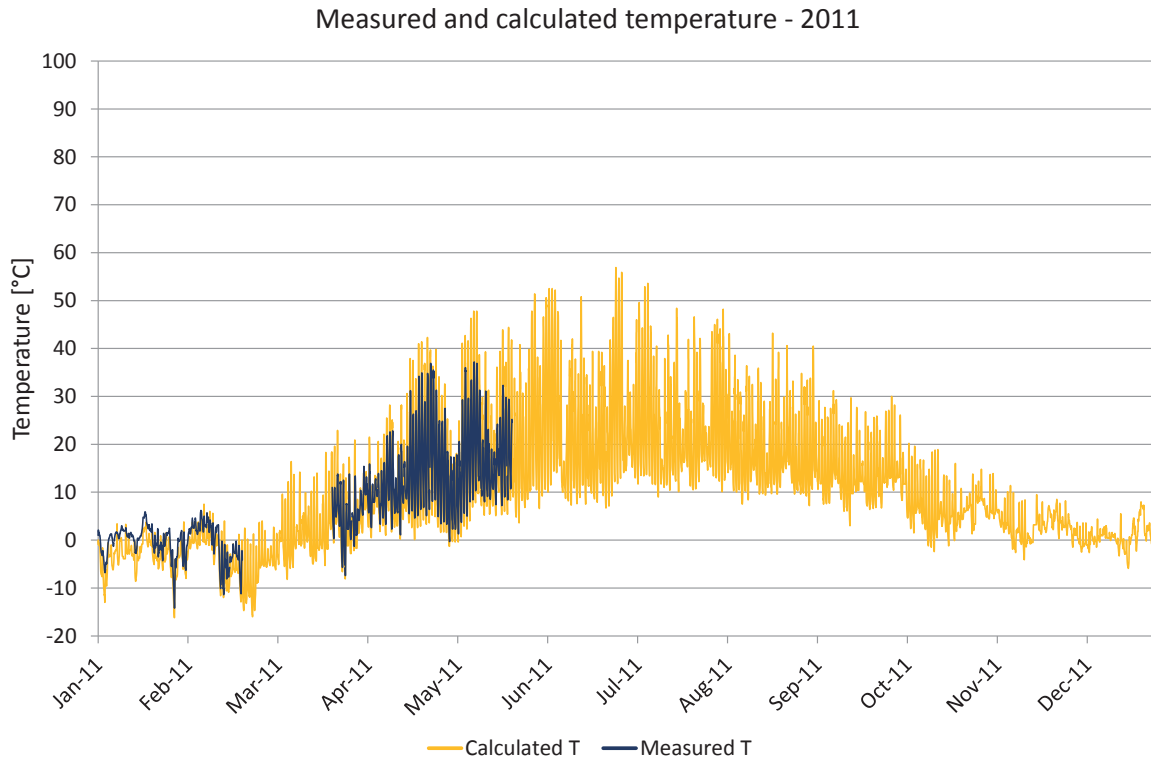


Figure 9.43.15. Comparisons between measured and calculated temperature. Calculated temperature (yellow), measured temperature (dark blue).

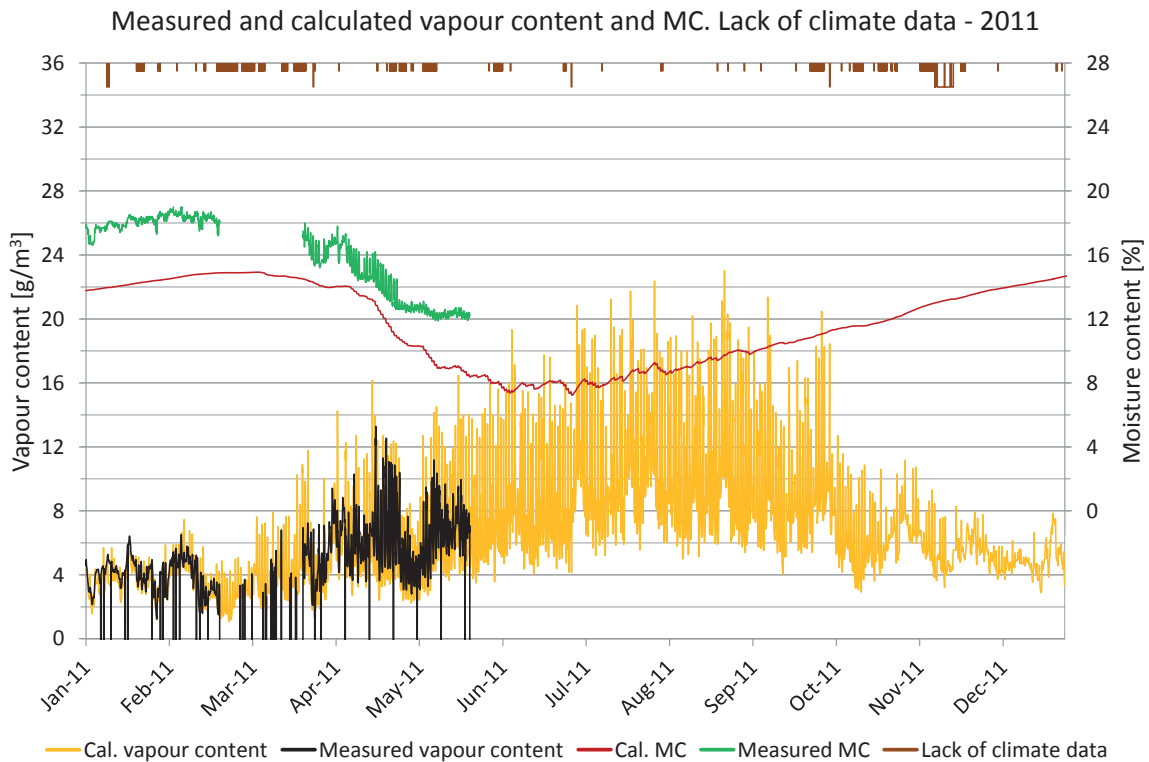


Figure 9.43.16. Measured moisture content, periods lacking climate data and comparisons of vapour content. Vapour content for calculated values (yellow) and measured values (black). Moisture content for calculated values (red) and measured values (green), periods with lack of climate data (brown).

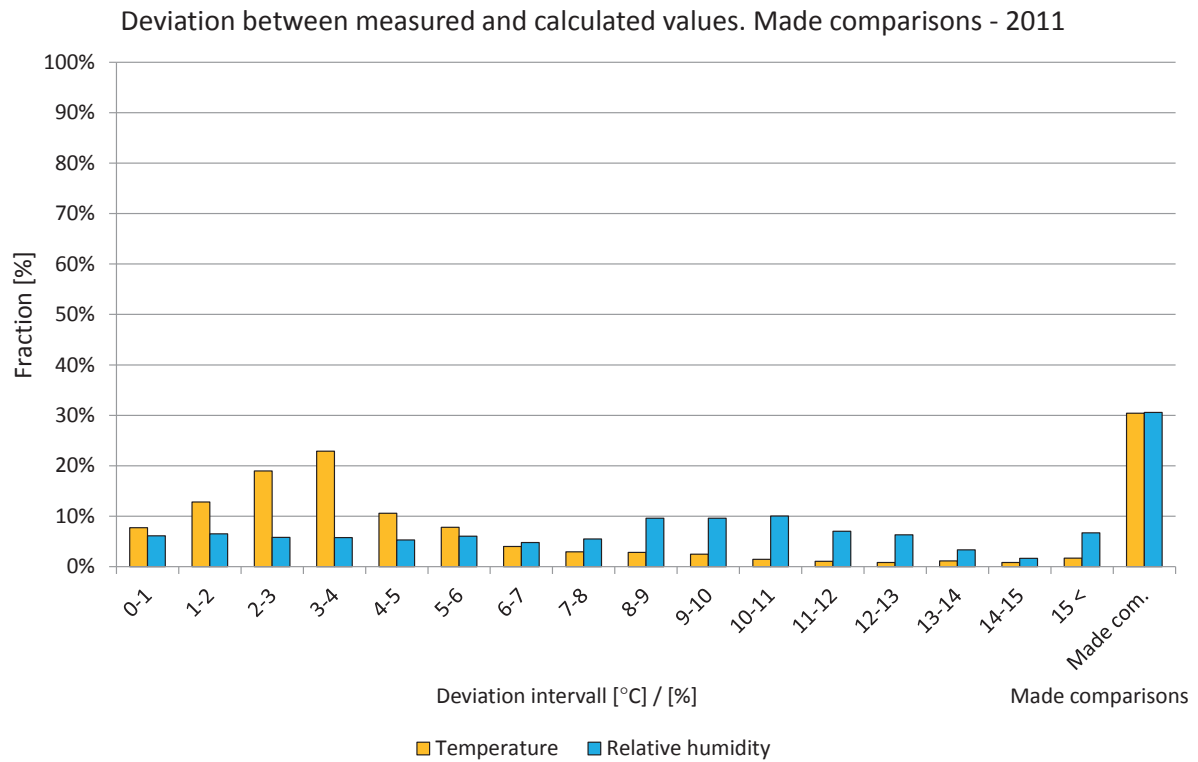


Figure 9.43.17. Deviations in comparisons shown in intervals from 0 to 15 °C or %. The two right-hand bars show the percentage of comparisons during the year. Temperature (yellow) and relative humidity (light blue).

