BOPTEST Reference Test Case Peer Review Document

This document serves a peer review template for an emulation model that is to be a reference test case. There are four sections:

I. General Information

II. General Comments

III. Model Checks

IV. Test Case Checks

Section I is to be completed by the Model Developer. The remaining sections are to be completed by the designated Model Reviewer, and returned to the Model Developer so that they may make the appropriate edits. This process should be repeated until all concerns of the reviewer are addressed. Each review should be documented using a separate version of this document, specified by the Review # in Section 1 below.

# I. General Information

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| --- | --- |
| **Reference Case** | Single-zone, hydronic heating, CO2-driven ventilation |
| **Current Location** | Odense, Denmark |
| **Model Developer** (Name, Institution, Email) | Tao Yang, University of Southern Denmark (SDU), [taoy@mmmi.sdu.dk](mailto:taoy@mmmi.sdu.dk) ; Konstantin Filonenko, SDU, kfi@mmmi.sdu.dk |
| **Model Reviewer**  (Name, Institution, Email) | Valentin Gavan, Engie, [valentin.gavan@engie.com](mailto:valentin.gavan@engie.com) |
| **Review #** | 1 |

# II. General Comments List each comment in separate row with number. Additional rows may be added as needed. They should be supported by the responses in Sections III and IV.

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| --- | --- |
| **#** | **Comment** |
| 1 | 1st version of documentation available, more details to be added soon |
| 2 | Realistic occupancy schedule has been added based on data collected by sensors. |
| 3 | Model has been validated against measured data (OU44 building is equipped with meters and sensors) |
| 4 | Not all features for test cases are not implemented yet. Should be included soon. |

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# III. Model Checks

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| **Criteria** | **Reviewer Response** |
| **Reference Case Representation** |  |
| Does the model represent overall intent of reference case?  Are the relevant thermal systems, heat loads, and control signals accounted for? | Yes |
| **Climate** |  |
| Complete weather data file, similar to TMY? | Yes, use TMY |
| Sufficiently long period, e.g. one year? | Yes |
| **Internal Gains** |  |
| Occupancy schedule? | Realistic occupancy from measured data |
| Occupancy gain values reasonable for building type? | Yes (120 W, 0.4/0.4/0.2 for conv./rad./latent). Consider changing to the same values as in Filip’s model. |
| Lighting schedule/control? | Not included |
| Lighting gain values reasonable for building type? | Not included |
| Equipment schedule? | Not included |
| Equipment gain values reasonable for building type? | No. |
| **Envelope Modeling** |  |
| Are IDEAS, Buildings, or AixLib component models used for building envelope and window modeling? | Yes - Buildings. |
| If not IDEAS, Buildings, or AixLib component models, are dynamic wall heat transfer models used? | NA |
| If not IDEAS, Buildings, or AixLib component models, are complex fenestration models used? | NA |
| It not IDEAS, Buildings, or AixLib component models, is latitude and longitude consistent with intended region or weather file? | NA |
| It not IDEAS, Buildings, or AixLib component models, are convection models for inside and outside nonlinear? | NA |
| Are window surface areas reasonable? | Yes - based on the building design documentation. |
| Are insulation levels reasonable? | Yes - based on the building design documentation. |
| Are all surfaces accounted for? (e.g. the roof is not forgotten) | Yes - based on the building design documentation. |
| Which of the following is used for modeling air infiltration?  *None*  *Constant*  *Pressure-driven flow*  *Buoyancy-driven flow*  *Mixed pressure and buoyancy-driven flow* | Constant. |
| Inter-zone airflow and common wall heat transfer properly accounted for? | NA (it’s a single zone model) |
| Are the inside and outside radiation models appropriate? | Yes (detailed mixed air zone model from the Buildings library) |
| **HVAC Modeling** |  |
| Are moisture and condensation effects properly accounted for? | Yes |
| Are fluid components such as ducts, pipes, actuators, pumps, fans, and heat exchangers modeled with pressure-flow relationships? Are pressure drops reasonable? | Yes, has been validated |
| Is the heat transfer performance of other equipment such as heat exchangers and plant equipment modeled reasonably? | Yes - based on the building design documentation and measurements. Validation results could be presented in documentation. |
| Are equipment capacities reasonable? | Yes. |
| Are equipment efficiencies such as COP, heating, hydraulic, and motor reasonable? | Yes - based on the building design documentation. |
| Is a reasonable level of control provided such that the model can simulate without use of external controller? | Yes. Basic control has been provided |
| **External control Input Signals** |  |
| Reasonable given state of the art actuation? | Not included yet, will add for BOPTEST |
| Units assigned? | Not included yet, will add for BOPTEST |
| **Measurement Output Signals** |  |
| Reasonable given state of the art sensors? | Yes |
| Are all equipment power/fuel consumptions computed and measured for KPI calculations? | Will adjust according to KPIs |
| Are all zone temperatures measured for KPI calculations? | Yes (one zone only) |
| Units assigned? | No. will implement |
| **Compilation and Simulation** |  |
| Uses official library release versions (with Modelica “Uses” statement)? | Yes. |
| Can be compiled into FMU free of commercial licensing? | Yes |
| Simulates for full year? | Yes, one-year data is provided |
| Compatible with variable time-step solver? Otherwise, minimum timestep acceptable? | Tested with DASSL. |

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# IV. Test Case Checks

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| **Criteria** | **Response** |
| **Documentation** |  |
| Building Design and Use (including architecture, constructions, occupancy schedules and comfort, internal loads and schedules, climate) | Has been included |
| HVAC System Design (including primary and secondary system designs, equipment specifications and performance maps, rule based and/or local loop controllers) | Has been included |
| Additional System Design  (such as lighting, shading, onsite generation and storage) | Has been included |
| Points List (including control inputs signals and measurement output signals with descriptions and meta-data) | Not very detailed |
| Important Model Assumptions  (such as infiltration models, moist/dry air assumptions, well-mixed assumptions) | Yes, has been documented |
| Scenario Information (including energy pricing and emission factors) | Not included yet |
| HTML template followed? | Yes. |
| **KPI Calculations and Scenario Information** |  |
| JSON map for matching output signals to KPI calculation provided? | Yes |
| Reference comfort temperature(s) for each zone provided? | Yes, has been documented |
| GHG emission factors provided? | Not included yet |
| Pricing scenario 1 (constant) provided? | Not included yet |
| Pricing scenario 2 (dynamic) provided? | Not included yet |
| Pricing scenario 3 (highly dynamic) provided? | Not included yet |