

Date: 01-01-2021

Re: Sample Retail Building

Please find attached Rational Design Report demonstrating compliance with SANS 10400XA.

The report indicates that the design in the report attached will bring the building into compliance.

The energy modeling conducted shows that the building will theoretically use less energy and have a lower energy demand than tables 2 and 3 specified in SANS 10400 XA.

Note: This report is for information only, and only a sample of a Rational Design



Introduction

It is required that an Energy Modeling is performed in order to evidence that the Proposed design has a lower theoretical energy usage and demand than tables 2 and 3 specified in SANS 10400 XA.

In accordance with the National Building Regulation XA a) the building deemed to be complied.

Compliance methodology of Rational Design

The compliance route selected is that set out in paragraph 4.2.1. a) of SANS 10400XA which is described in Annexure A.

The energy modeling software description and certification is provided in Annexure A.

Details of the competency requirements of the rational designer are provided in Annexure A.

Disclaimer for the use of this report Annexure A.

Detailed building input are stipulated in Annexure B, with a description of the Rational Design essentials necessary to ensure the required energy savings are achieved.

Relevant energy usage, demand outputs and modeling results are provided in Annexure C.

Summary of Rational Design results

Energy Performance	Energy Consumption kWh/m ²	Energy Demand VA/m ²
SANS 10400XA Table 2 & 3	200	80
Rational Design	132.5	55.5

Conclusions

Sample Retail Building will theoretically preform with a lower annual energy usage and energy demand than the comparable tables in SANS 10400XA, and therefor meets the requirements of the National Building Regulations.



Annexure A

Compliance Route

4.2.1. The functional regulations contained in part XA of the National Building Regulations shall be deemed to be satisfied where,

a) in any building of occupancy classified in terms of Regulation A20 as A1, A2, A3, A4, F1, G1 or H1, a competent person certifies that such building (excluding garage and storage areas) has a theoretical annual energy consumption and demand in 4.3 less than or equal to the values specified in tables 2 and 3.

Bsimac software

This Rational Design has been developed by making use of the Bsimac Ver9 Software package.

The Bsimac software has been evaluated and approved by Agrément SA (a division of the CSIR) in accordance with the protocols developed for Energy Modelling software in terms of SANS10400XA.

The climate files used in this modelling are the Test Reference Year (TRY) files supplied with the software.



Disclaimer

RigiFoam (Pty) Ltd has provided this Rational Assessment Calculation in terms of SANS10400XA, which calculation incorporates the specific use of RigiFoam's LAMBDABOARD product in the manner, application, and thickness described. It is recorded that the use of any other product, or deviation in any way whatsoever from the details described in this calculation, shall render the calculation entirely inaccurate and as such RigiFoam does not warrant the correctness in such circumstance, nor shall RigiFoam bear any responsibility or liability in respect thereof.



Annexure B

General Specifications

Sample Retail Building consisting of a retail and showroom areas and a parking level. With a total net floor area measured at 4 847.7m². Parking area excluding from energy model.

Modeling methodology

As per the requirements set out in SANS 10400-XA, a simulation was conducted for the building.

The simulation is of the actual design, with actual specifications of windows, fabric and insulation used. This simulation shows the actual predicted energy consumption and demand for the building.

The results show that the building has a theoretical annual energy consumption and demand less than table 2 & 3 specified in clause 4.2.1a) of SANS 10400-XA, thus proving compliance with the SANS-10400-XA standard.

Simulation Inputs

	Actual Building
Orientation	<ul style="list-style-type: none"> North
Climatic Zone	<ul style="list-style-type: none"> Climate Zone 1 Cold Interior Weather Data approved by Agrément SA
External Walls	<ul style="list-style-type: none"> As per Architectural drawings
Roof Assemblies	<ul style="list-style-type: none"> Steel Roof sheeting with 70mm Lambdaboard over purlin application installed as per manufacturer's specification
Fenestration	<ul style="list-style-type: none"> As per Architectural Drawings Single glazing is (U=7.9 and SHGC=0.81)
Heating and Cooling	<ul style="list-style-type: none"> DX Splits heat pump unit with a COP of 2.5
Hours of occupancy	<ul style="list-style-type: none"> 12h / 7 days
Design Population	<ul style="list-style-type: none"> 1 person per 10m²
Metabolic Rates	<ul style="list-style-type: none"> 75 W Sensible heat gain per person 55 W Latent heat gain per person
Ventilation fresh air	<ul style="list-style-type: none"> 7.5 liters per person
Lighting	<ul style="list-style-type: none"> 15 W / m²
Hot water Services	<ul style="list-style-type: none"> 50% of the annual hot water heated by means of a heat pump



Annexure C

Energy Modeling Results

The Bsimac computer runs are set out below:

Energy consumption for all Plants for the whole Year (or period computed)

Category	Energy consumption for the period indicated	
	Per sq metre, kWh/m ²	Total, kWh
Cooling, Dehumidifying	40.5	196 485
Heating	1.0	4 831
Humidifying	0.0	0
Sub-Total	41.5	201 317
Fans and pumps	6.6	31 921
TOTAL	48.1	233 238
Lights: electrical input	71.2	345 038
Hot water	12.8	61 838
Vertical transport	0.5	2 230
GRAND TOTAL	132.5	642 344

** Based on the 'Nett Floor Area' of 4 847.7 m².

Month	Electrical demand for the period indicated	
	Per sq metre**, VA/m ²	Total, kVA
January	63.1	306.1
February	60.8	294.7
March	61.5	298.4
April	51.9	251.8
May	49.3	238.9
June	45.9	222.5
July	47.0	228.0
August	51.0	247.1
September	55.9	271.0
October	54.3	263.0
November	66.5	322.4
December	59.0	286.2
Average for the year	55.5	269.2

** Based on the 'Nett Floor Area' of 4 847.7 m².

