Reading COMcheck 2018

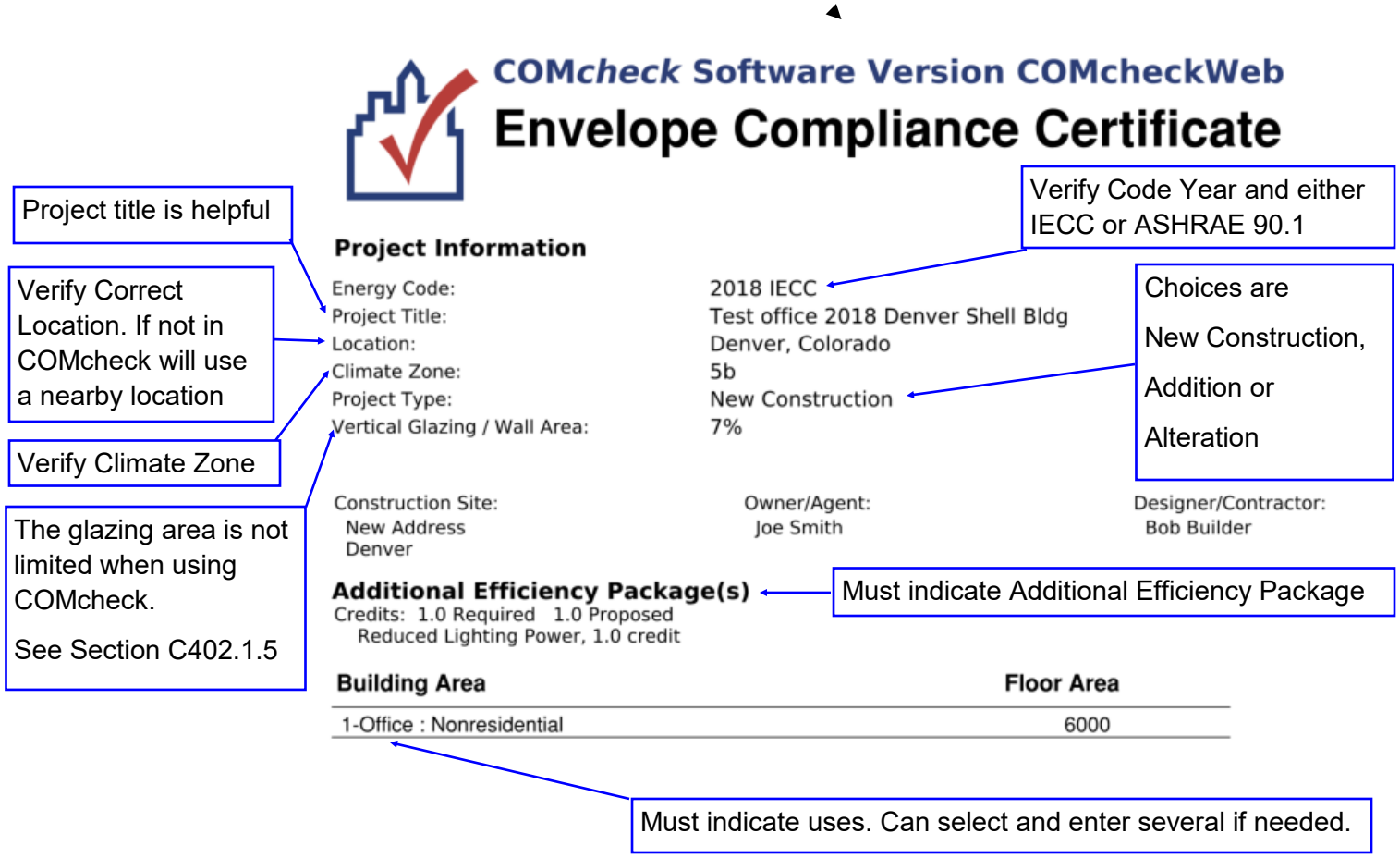
Building Codes Support Program

COMcheck is a free web-based software program provided by the Department of Energy.

Available at https://energycode.pnl.gov/COMcheckWeb/

Knowing how COMcheck works can help you when reviewing the reports. We have created a sample building for the example of a shell building and completed building.

The Thermal Envelope portion of COMcheck is the code allowed "trade off" piece. In the example slab on grade insulation and continuous wall insulation was not provided.



COMcheck Software Version COMcheckWeb

Envelope Compliance Certificate

Project title is helpful

Verify Code Year and either IECC or ASHRAE 90.1

Verify Correct Location. If not in COMcheck will use a nearby location

Verify Climate Zone

The glazing area is not limited when using COMcheck.

See Section C402.1.5

Choices are New Construction, Addition or Alteration

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver Shell Bldg
Location:	Denver, Colorado
Climate Zone:	5b
Project Type:	New Construction
Vertical Glazing / Wall Area:	7%

Construction Site:
New Address
Denver

Owner/Agent:
Joe Smith

Designer/Contractor:
Bob Builder

Additional Efficiency Package(s)

Must indicate Additional Efficiency Package

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Building Area	Floor Area
1-Office : Nonresidential	6000

Must indicate uses. Can select and enter several if needed.

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All entries are gross areas in square feet. COMcheck knows to subtract the doors and windows from the gross wall area.

Except slab on grade which is the perimeter in linear feet.

Designer would enter the proposed assembly values.

Proposed U-factor can be from the designer in this case the window and doors.

The assemblies with insulation is calculated by the software.

Used for calculation only. See footnote a

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof: Insulation Entirely Above Deck, [Bldg. Use 1 - Office]	12500	---	40.0	0.025	0.032
Ext. Wall: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Office]	6000	21.0	5.0	0.069	0.064
Window: Metal Frame with Thermal Break: Fixed, Perf. Specs.: Product ID Pending, SHGC 0.36, [Bldg. Use 1 - Office] (b)	384	---	---	0.290	0.380
Door: Glass (over 50% glazing): Metal Frame, Entrance Door, Perf. Specs.: Product ID Pending, SHGC 0.36, [Bldg. Use 1 - Office] (b)	63	---	---	0.290	0.770
Door: Insulated Metal, Swinging, [Bldg. Use 1 - Office]	63	---	---	0.380	0.370
Floor: Unheated Slab-On-Grade, [Bldg. Use 1 - Office] (c)	600	---	---	0.730	0.540

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
(b) Fenestration product performance must be certified in accordance with NFRC and requires supporting documentation.
(c) Slab-On-Grade proposed and budget U-factors shown in table are F-factors.

Project Notes

Envelope PASSES: Design 1% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

Project Title: Test office 2018 Denver Shell Bldg Report date: 08/29/23

The designer has the option to group all like assemblies together. Like the example. They could also choose to show by the direction. North, South, East and West. Either is acceptable. The caveat to no direction is the window SHGC. Without the direction the lowest SHGC is needed. In this case 0.36. See Table C402.4

In the example you can see the roof insulation was increased from the minimum R-30 to R-40.

The slab on grade has no insulation. A typical assembly that is traded off. Minimum would be R-10 24” below grade.

The steel framed exterior walls include a higher cavity insulation (R-21) and lower continuous insulation (R-5) than required. Minimum would be R-13 cavity R-7.5 continuous.

The windows is where this example makes up some ground. The problem is that the U-0.29 shown is very likely a center of glass value and not the assembly value. The NFRC document for commercial windows must be part of the submittal.

The example passes by 1%. This will change as the actual window value is likely around U-0.34 to 0.42.

Project Notes

Envelope PASSES: Design 1% better than code

Envelope Compliance Statement

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Name - Title _____ Signature _____ Date _____

Shell Building Only
Tenants to be future permits and will include lighting and mechanical systems

Designers can add notes to help clarify a project. In this case the actual tenant are unknown. It is not unusual for shell buildings to be built without lighting or mechanical systems installed.

It is critical that the thermal envelope complies with the code at the shell building stage.

Reading COMcheck 2018

Building Codes Support Program

COMcheck Interior Lighting is Pass or Fail. No trade offs allowed.

COMcheck Software Version COMcheckWeb

Interior Lighting Compliance Certificate

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver Shell Bldg
Project Type:	New Construction

Construction Site:
New Address
Denver

Owner/Agent:
Joe Smith

Designer/Contractor:
Bob Builder

Additional Efficiency Package(s)

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-Office	6000	0.71	4266
		Total Allowed Watts =	4266

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
1-Office				
LED: LED Linear 10W:	0	0	0	0
			Total Proposed Watts =	0

Interior Lighting TBD: Invalid number of fixtures

Not unusual for the interior lighting COMcheck to be blank and stating TBD.

Because the designer used “Reduced Lighting Power” for their Additional Efficiency Package an entry was need to allow COMcheck to work properly.

Reading COMcheck 2018

Building Codes Support Program

COMcheck Exterior Lighting is Pass or Fail. No trade offs allowed.

COMcheck Software Version COMcheckWeb

Exterior Lighting Compliance Certificate

There are several choices for the lighting zone. Jurisdictions can identify for the designer based on the project location.

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver Shell Bldg
Project Type:	New Construction
Exterior Lighting Zone	4 (High activity metropolitan commercial district (LZ4))

Construction Site:	Owner/Agent:	Designer/Contractor:
New Address Denver	Joe Smith	Bob Builder

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts /	D Tradable Wattage	E Allowed Watts (B X C)
Parking area	6000 ft2	0.08	Yes	480
			Total Tradable Watts (a) =	480
			Total Allowed Watts =	480

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 900 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
Parking area (6000 ft2): Tradable Wattage				
LED: LED A Lamp 25W:	2	25	50	1250
			Total Tradable Proposed Watts =	1250

Exterior Lighting PASSES: Design 9% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

Typically the exterior lighting will be completed with the shell building.

The are many choices for exterior lighting areas. Parking in the example. The allowed watts per square foot is automatically generated based on the area type (parking) and the lighting zone.

The designer enters the proper fixture type, wattage per fixture and number of fixtures. These should match the construction plans.

Reading COMcheck 2018

Building Codes Support Program

COMcheck Mechanical is Pass or Fail. No trade offs allowed.

COM*check* Software Version COMcheckWeb

Mechanical Compliance Certificate

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver Shell Bldg
Location:	Denver, Colorado
Climate Zone:	5b
Project Type:	New Construction

Construction Site:
New Address
Denver

Owner/Agent:
Joe Smith

Designer/Contractor:
Bob Builder

Additional Efficiency Package(s)

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Mechanical Systems List

Quantity **System Type & Description**

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

Like the interior lighting the mechanical COMcheck may be blank for a shell building.

Same example building now with fixtures. Typically you will see several different fixture types. The entries in COMcheck should match the fixtures shown on the construction plans. Remember this is pass or fail. The example passes by 6%.

COMcheck Software Version COMcheckWeb

Interior Lighting Compliance Certificate

When an entire building is provided the Additional Efficiency Package must match on each report. Envelope, Lighting and Mechanical. In this case the reduced lighting power is automatically calculated in COMcheck.

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver
Project Type:	New Construction

Construction Site:
New Address
Denver

Owner/Agent:
Joe Smith

Designer/Contractor:
Bob Builder

Additional Efficiency Package(s)
Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-Office	6000	0.71	4266
		Total Allowed Watts =	4266

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
1-Office				
LED: LED Linear 20W:	4	50	80	4000
			Total Proposed Watts =	4000

Interior Lighting PASSES: Design 6% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

Same example building now with mechanical systems. Typically you will see several different fixture types. The entries in COMcheck should match the heating, cooling and water heating systems shown on the construction plans. Remember this is pass or fail.

COM*check* Software Version COMcheckWeb

Mechanical Compliance Certificate

When an entire building is provided the Additional Efficiency Package must match on each report. Envelope, Lighting and Mechanical.

Matches!

Project Information

Energy Code:	2018 IECC
Project Title:	Test office 2018 Denver
Location:	Denver, Colorado
Climate Zone:	5b
Project Type:	New Construction

Construction Site:
New Address
Denver

Owner/Agent:
Joe Smith

Designer/Contractor:
Bob Builder

Additional Efficiency Package(s)

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Mechanical Systems List

Quantity	System Type & Description
1	HVAC System (Single Zone): Heating: 3 each - Duct Furnace, Gas, Capacity = 100000 kBtu/h Proposed Efficiency = 80.00% Ec, Required Efficiency: 80.00 % Ec Cooling: 3 each - Single Package DX Unit, Capacity = 60000 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 14.00 EER, Required Efficiency = 9.50 EER Proposed Part Load Efficiency = 0.00 IEER, Required Part Load Efficiency = 11.00 IEER
3	Water Heater: Gas Storage Water Heater, Capacity: 40 gallons, Input Rating: 75 kBtu/h No minimum efficiency requirement applies

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

The example has three ducted roof to units with a single package (DX) air conditioning. Meaning the gas fired furnace and the air conditioner (compressor and coil) are all contained in the same unit. A nice feature in COMcheck is that the designer cannot enter an efficiency lees than allowed by code.

Another nice feature are the inspection/review sheets. Theses are great visual checklists that are generic and not project specific. The designer has the opportunity to add notes and/or plan location for specific details.

COMcheck Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2018 IECC

Indicate the designer made no comments.

Requirements: 0.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR1][1]	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR3][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR8][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.1 [PR10][1]	The vertical fenestration area <= 30 percent of the gross above-grade wall area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

There are different check lists for Plan Review, Footing / Foundation Inspection, Framing / Rough-In Inspection, Plumbing Rough-In Inspection, Mechanical Rough-In Inspection, Rough-In Electrical Inspection, Insulation Inspection and, Final Inspection. Having the inspection checklists on site is very helpful for the contractor and field inspector.

Would be great if the designer made comments and check the appropriate box.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.3, C408.2.5.3 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5.6 [FI37][1]	Weatherseals installed on all loading dock cargo door openings and provide direct contact along the top and sides of vehicles parked in the doorway.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5.8 [FI26][3]	Recessed luminaires in thermal envelope to limit infiltration and be IC rated and labeled. Seal between interior finish and luminaire housing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.2 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.4.1.2 [FI38][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.4.1.3 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.4.2 [FI39][3]	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.4.2.1, C403.2.4.2.2 [FI40][3]	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C404.3 [FI11][3]	Heat traps installed on supply and discharge piping of non-circulating systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C404.4 [FI25][2]	All piping insulated in accordance with section details and Table C403.11.3.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Each item on the checklist has an order of importance.

#1 Highest priority and large impact on energy efficiency.

#2 Medium priority and less of an impact on energy efficiency

#3 Lowest priority and low impact on energy efficiency

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)