2015 IECC
COMMERCIAL ENERGY CODE
COMCHECK WORKSHOP

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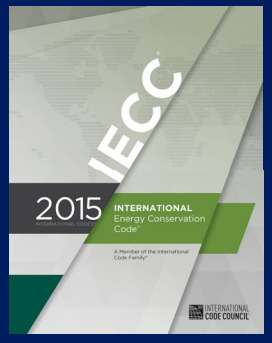
HOUSTON PERMITTING CENTER / BUILDING CODE ENFORCEMENT

CITY OF HOUSTON GREEN BUILDING RESOURCE CENTER

HOUSTON PUBLIC WORKS

COMcheck™



ICC INTERNATIONAL CODE COUNCIL®

CITY OF HOUSTON TEXAS

ICC HISTORY

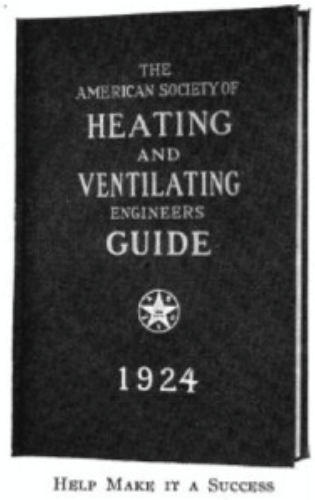
Building codes appeared in the US in 1625

Early codes were concerned with fire safety and roof coverings

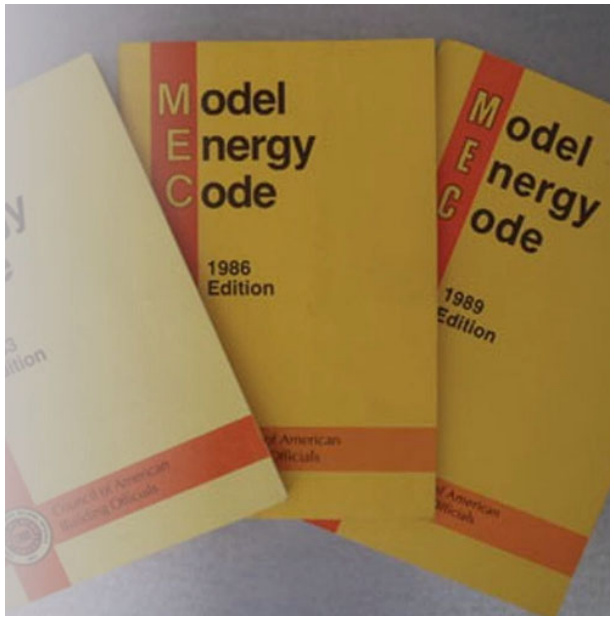
Boston prohibited chimneys made from wood in 1630

American Society of Heating, Refrigeration, & Air Conditioning Engineers (ASHRAE) founded in 1894

Published Standard 90 in 1975



Model Code for Energy Conservation in 1981



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LOCAL ORDINANCES

- Texas adopts International Energy Conservation Code 2015 as STATE LAW in 2016.
- Local jurisdictions are responsible for energy code implementation and enforcement of the law.
- Houston adopts it in 2016.
- Building Code Enforcement enforces the City of Houston Construction Codes for both residential and commercial construction.

WHY ARE WE HERE?

- Beginning **January 1, 2021**, plans submitted with incomplete COMcheck reports will be rejected at pre-screen by our Permit Techs as they review for the completeness of the plan submittals before sending to Plan Review.
- Pre-screen is looking for quantity, not quality. If you have enough quantity, then plan reviewers will judge the quality of the reports.

DISCLOSURE

- This class is to inform you about COMcheck reports and how Houston Plan Review will review them.
- This is not about how to completely navigate COMcheck.
- Informing about COMcheck will inform you about the Commercial Energy Code. Somewhat.
- This is not about teaching you the entire Energy Code, but you might learn something you don't already know.

WHY ARE WE HERE?

Building Code Enforcement enforces the City of Houston Construction Codes, and training is necessary for that.

“For a comprehensive plan review, all code requirements should be incorporated in the design and construction documents.

All of the project information, including specifications, scope, calculations, and detailed drawings, should be submitted… so that code compliance can be verified.” from the IECC Commentary

A STATEMENT ON THE CONSTRUCTION DOCUMENTS, SUCH AS:

“ALL INSULATION LEVELS SHALL COMPLY WITH THE 2015 EDITION OF THE IECC”

IS NOT AN ACCEPTABLE SUBSTITUTE

FOR SHOWING THE REQUIRED INFORMATION.

from the Commentary

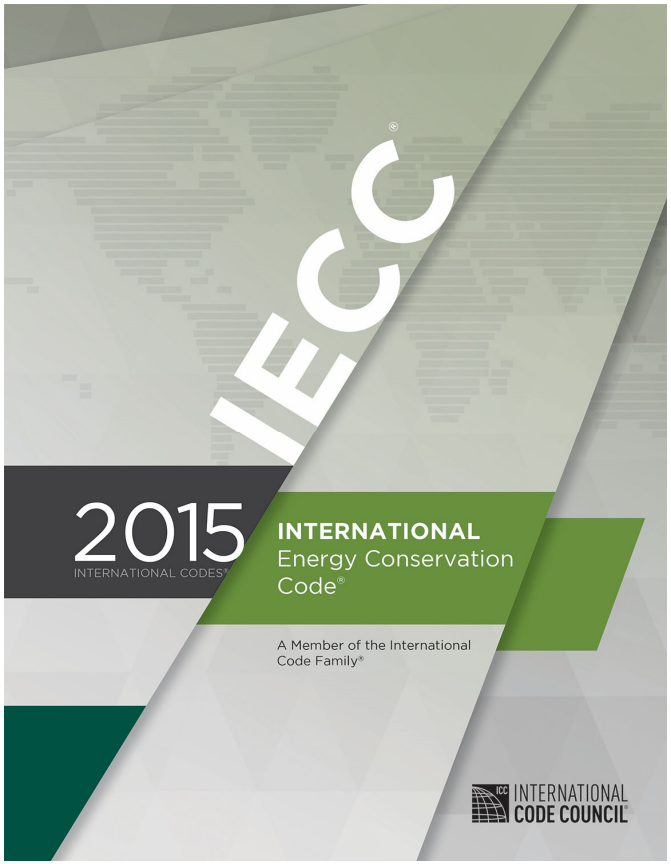
A CERTIFICATION ON THE COMCHECK DOCUMENTS WITH A DESIGNER'S SEAL

IS NOT AN ACCEPTABLE SUBSTITUTE

FOR COMPLETING THE INSPECTION CHECKLIST.

STRUCTURE OF THE IECC COMMERCIAL PROVISIONS

- Ch. 1 [CE] – Scope & Administration
- Ch. 2 [CE] – Definitions
- Ch. 3 [CE] – General Requirements & Climate Zones
- Ch. 4 [CE] – Commercial Energy Efficiency
- Ch. 5 [CE] – Existing Buildings
- Ch. 6 [CE] – Referenced Standards



CHAPTER 1 GENERAL

C103.2 Information on construction documents

THIS IS NOT THE LEAST BIT UNCLEAR.

12 items are required by law to be clearly delineated.

Delineation includes stating why they do not apply due to an exception or exemption from the code provisions.

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C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of *daylight* zones on floor plans.
12. Air sealing details.

THESE 12 REQUIREMENTS
ARE INDICATED IN COMCHECK

REPEAT

Delineation includes stating **why** the requirements do not apply to your project due to an *exception or exemption* from the code provisions.

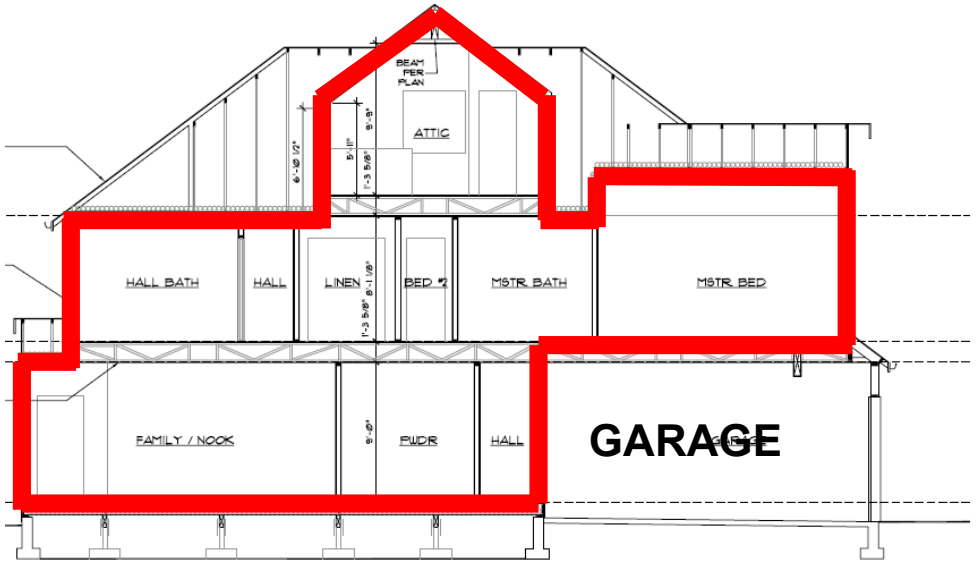
CHAPTER 1 GENERAL

C103.2.1 Building thermal envelope depiction. The *building's thermal envelope* shall be represented on the construction drawings.

THIS IS NOT THE LEAST BIT UNCLEAR.

The envelope depiction is REQUIRED.

The plans are to be rejected until they show compliance.



Yes, above is a residential drawing, this provision is in *both* codes.

OH WAIT!

“You people have never rejected me for that before!
Why are you suddenly doing it now?
This is not fair!”

Let’s think of it as a Grace Period you’ve had since 2016, and (sigh) it is coming to an end.

FROM THE TOP TO PLAN REVIEW: ENFORCING THE LAW

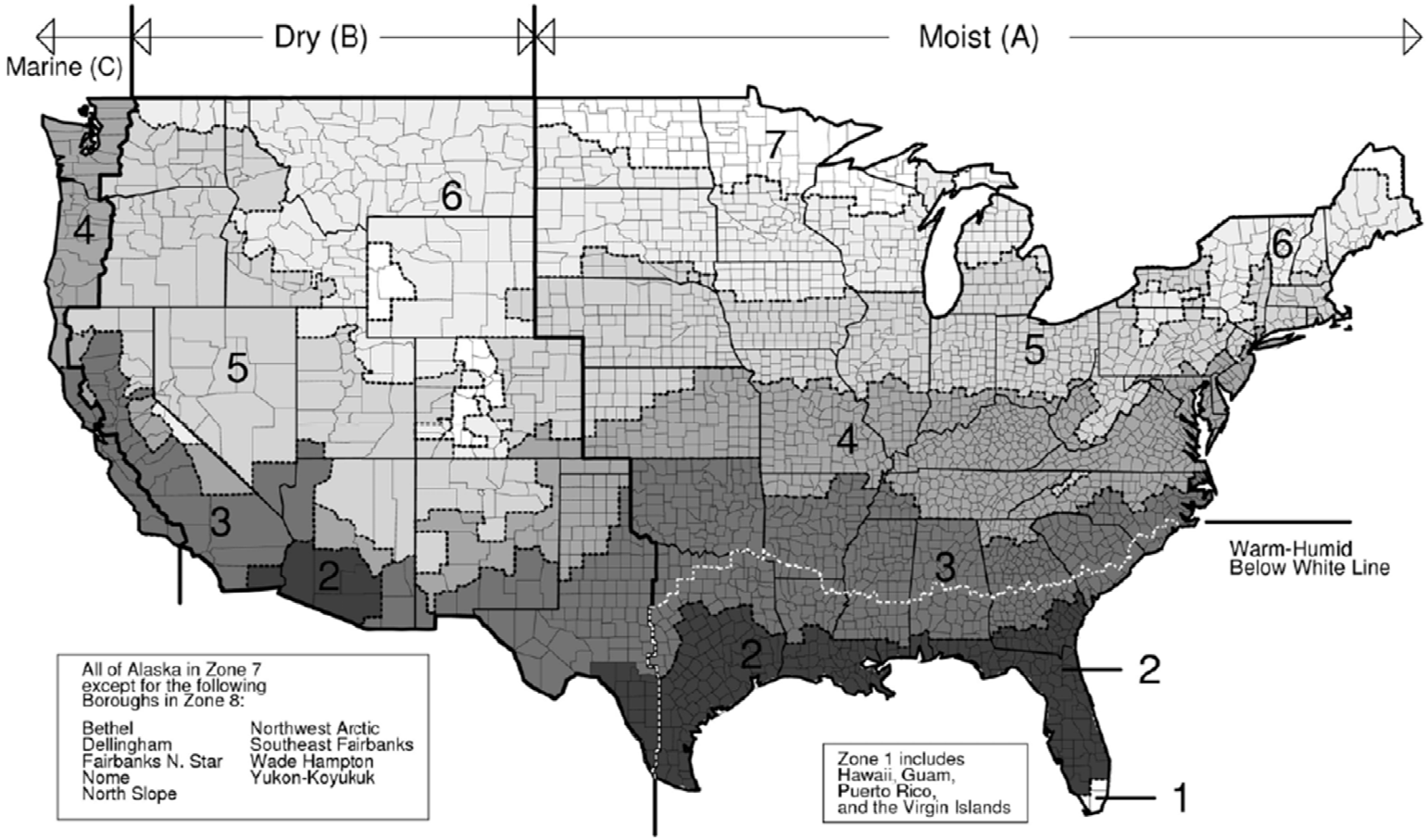
You do not need permission or direction from your supervisor to enforce the building codes.

That’s what you were hired to do.

COMMERCIAL ENERGY CODE MOVING FORWARD

CHAPTER 3 GENERAL REQUIREMENTS

Figure C301.1
Climate Zones



CHAPTER 3 GENERAL REQUIREMENTS

Table C301.1 Climate Zones

4A Williamson
4A Wilson

TEXAS

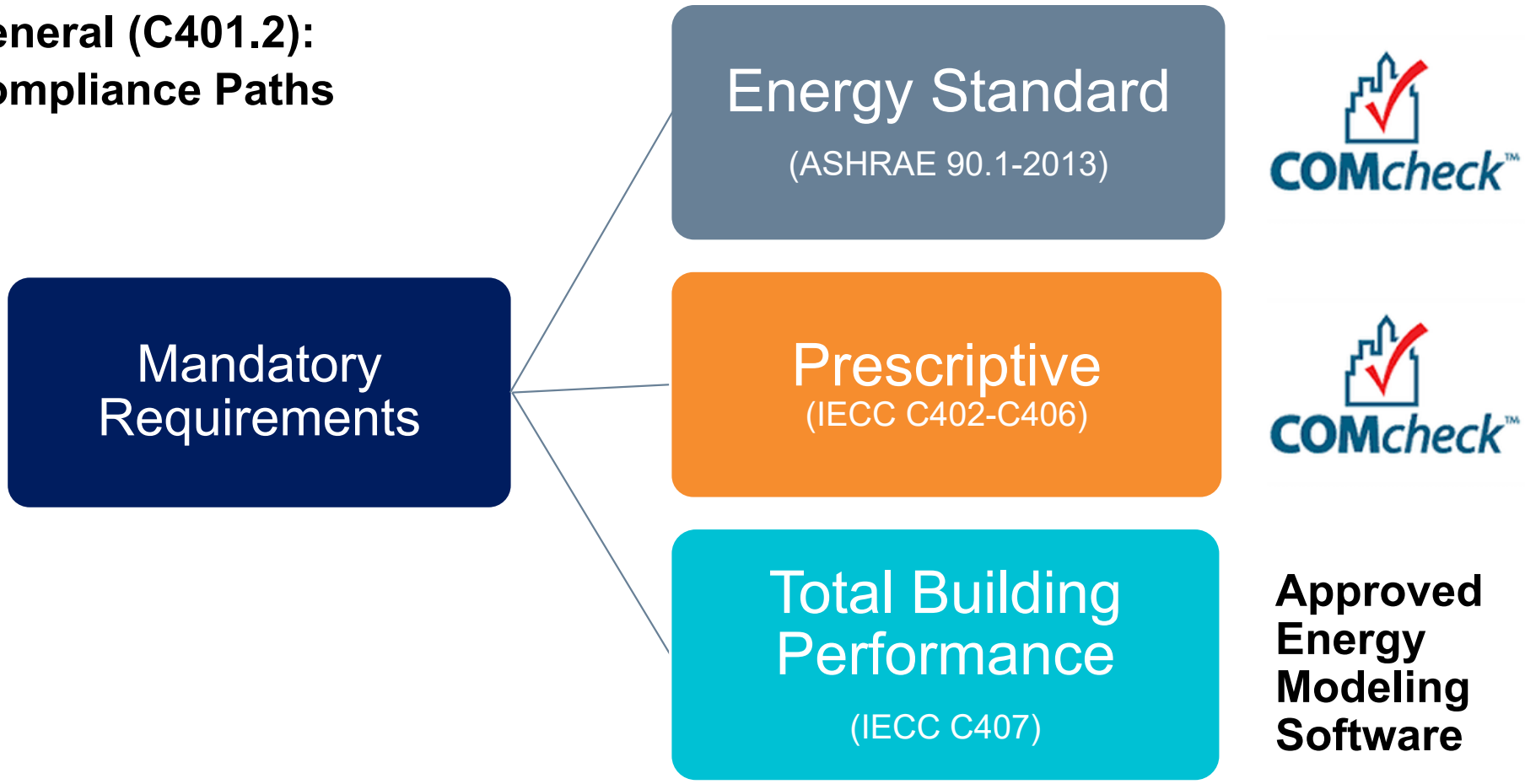
2A Anderson*
3B Andrews
2A Angelina*
2A Aransas*
3A Archer
4B Armstrong
2A Atascosa*
2A Austin*
4B Bailey
2B Bandera
2A Bastrop*
3B Baylor
2A Bee*
2A Bell*
2A Bexar*
3A Collin*
3B Collingsworth
2A Colorado*
2A Comal*
3A Comanche*
3B Concho
3A Cooke
2A Coryell*
3B Cottle
3B Crane
3B Crockett
3B Crosby
3B Culberson
4B Dallam
3A Dallas*
3B Dawson
4B Deaf Smith
3A Delta
2A Gonzales*
4B Gray
3A Grayson
3A Gregg*
2A Grimes*
2A Guadalupe*
4B Hale
3B Hall
3A Hamilton*
4B Hansford
3B Hardeman
2A Hardin*
2A Harris*
3A Harrison*
4B Hartley
3B Haskell
2A Hays*
3B Hemphill
3B King
2B Kinney
2A Kleberg*
3B Knox
3A Lamar*
4B Lamb
3A Lampasas*
2B La Salle
2A Lavaca*
2A Lee*
2A Leon*
2A Liberty*
2A Limestone*
4B Lipscomb
2A Live Oak*
3A Llano*
3B Loving
3B Lubbock
2A Orange*
3A Palo Pinto*
3A Panola*
3A Parker*
4B Parmer
3B Pecos
2A Polk*
4B Potter
3B Presidio
3A Rains*
4B Randall
3B Reagan
2B Real
3A Red River*
3B Reeves
2A Refugio*
4B Roberts
2A Robertson*

THIS IS VERY IMPORTANT

- MANY energy code provisions are specific to the climate zone.
- MANY energy code provisions have exceptions and exemptions based on the climate zone.

CHAPTER 4 COMMERCIAL ENERGY EFFICIENCY

General (C401.2): Compliance Paths



COMPLIANCE PATHS

SECTION C401
GENERAL

C401.1 Scope. The provisions in this chapter are applicable to commercial *buildings* and their *building sites*.

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402 through C405. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Sections C402.5, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C407. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

COMPLIANCE PATHS

PICK ONLY ONE APPROACH

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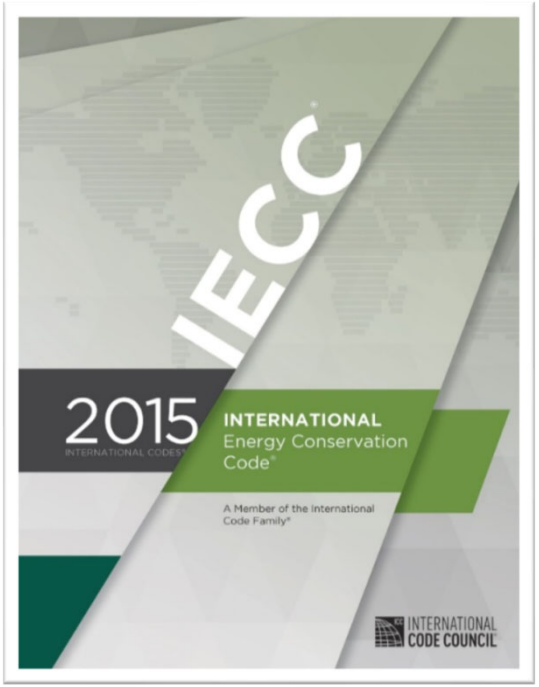

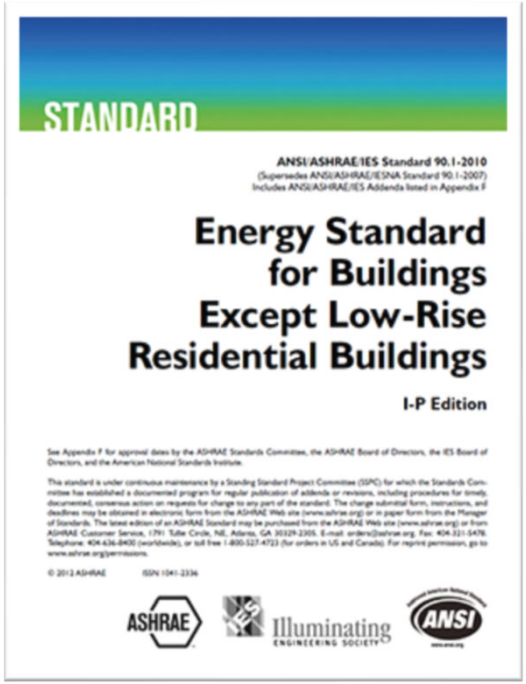

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COMPLIANCE PATHS

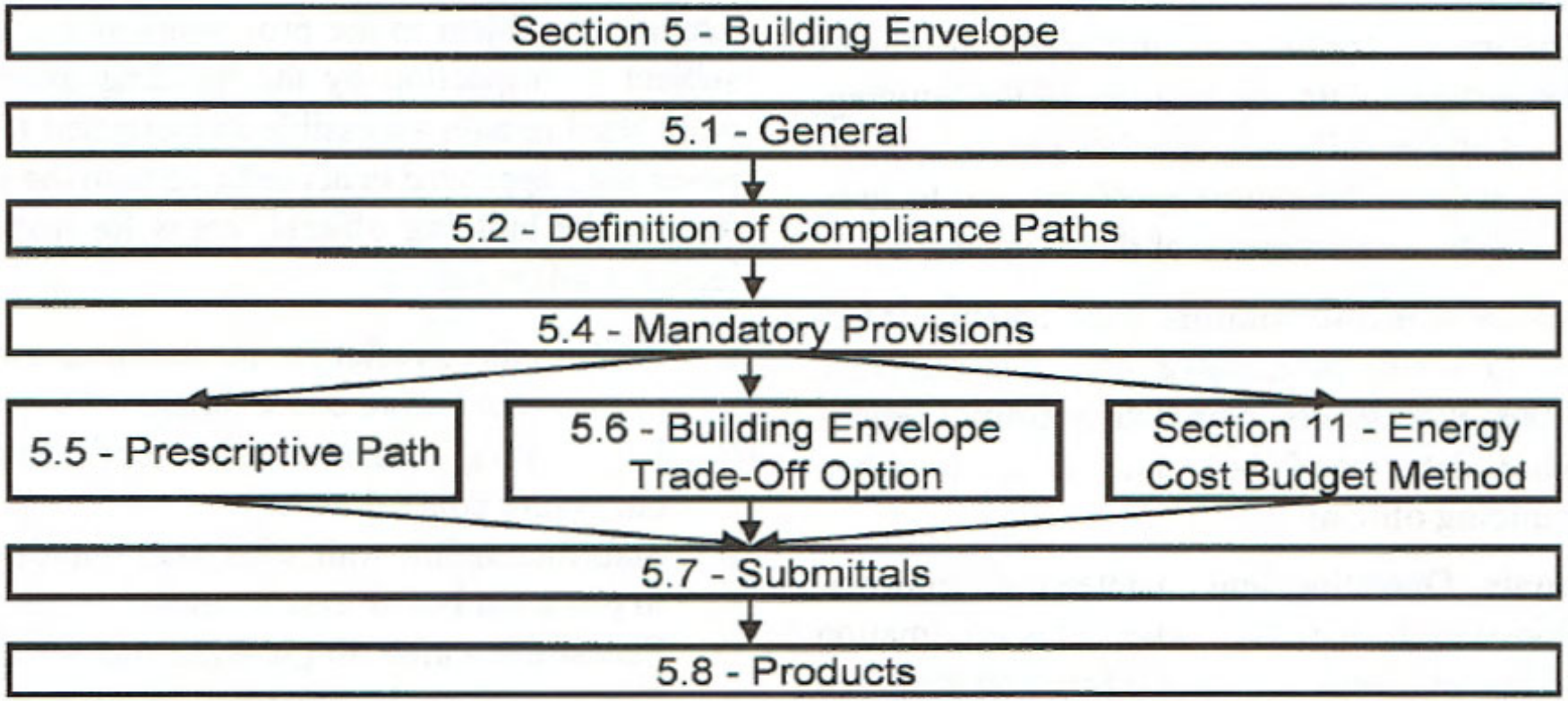
Provisions within the pathways are NOT interchangeable.

Applicant must make a choice and take it all the way through.

All three pathways have Mandatory Requirements, which are not ‘tradeable’.

ASHRAE PATHWAYS

Section 5



COMMERCIAL CHECKLIST FOR PERMIT APPLICATION

HOUSTON PUBLIC WORKS

BUILDING CODE ENFORCEMENT
COMMERCIAL PREREQUISITE CHECKLIST

INSTRUCTIONS: Complete this checklist and attach this form to the plan set or include a completed copy in the Electronic Plan Review (EPR) folder. All submitted commercial plans must include this completed form along with all applicable documents identified below before they are considered complete and meeting the prerequisite requirements for plan review. Plan submittals resulting in incomplete plans do not qualify to utilize the customer paid overtime service (See Form CE-1251). The following items are required in the plans where applicable to the scope of work proposed. Mark each appropriate box and identify the applicable sheet number or location where the item(s) may be found or specify Not Applicable. *Note:* Omitted items applicable to the scope of work will extend the permit process. It is the responsibility of all permit applicants to notify plan intake personnel of modifications to any previously approved plan sheets during each subsequent plan submittal for re-review of the modifications.

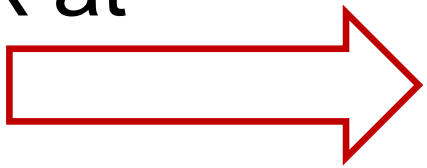
RQ	N/A	EXTENDED LEAD TIME ITEMS REQUIRED PRIOR TO PLAN APPROVAL	SHEET NO./ LOCATION
		ric Preservation) *(Plan Attachment)*	
		ere trees are present in the right of way and (ROW). *(Plan Attachment)*	
		r construction within or connecting to TXDot right ates, streets or roads. *(Plan Attachment)*	
		plicable) *(Plan Attachment)*	
		REREQUISITE REQUIREMENTS	**SHEET NO./ LOCATION**
		fications to existing buildings. *(Plan Attachment)*	
		ter letters are required for new construction, change crease of capacity for any proposed development. ust be attached to the front of each plan set when ed, photocopies of the short form must be attached chment)	
		rs (EAB) as required by Texas Accessibility \$50,000 require Texas *EAB #* *(Plan Attachment)*	
		Attachment)	
		quired if in the 100-year or 500-year floodplain and s prepared, signed, and sealed by Texas registered ional engineer (3 copies if submitting paper). *(Plan Attachment)*	
☐	☐	**Mitigation Plan** – Required if in the 100-year or 500-year floodplain. Construction drawings shall be prepared, signed, and sealed by Texas professional engineer (3 copies if submitting by paper). *Note: **Additional flood requirements may apply. Contact** Floodplain Management Office at (832) 394-8854, fmo@houstontx.gov or review Chapter 19 for more information. (Plan Attachment)*	
X		**Plan Sets** – Minimum 2 bound sets that match, with appropriate forms and worksheets applicable to the project. Plans may "*NOT*" be marked "*Preliminary* or *Not for Construction*".	Submittal Package
X		**Building Permit Application** – A complete application is required for each new structure, lease remodel or build-out proposed, and declaration (when appropriate).	Submittal Package
X		**Plan Review Fee Valuation (Cost of Improvements)** – Permit fees are based on the total cost for all work proposed including labor and design costs and must be provided for the scope of work associated with each separate permit. The cost shown on each permit application shall reflect the cost associated with the scope of work for each separate project number at each address or lease space.	Building Permit Application
X		**Energy Code Software**– Required for building projects. Where proposed scope of work is exempt, indicate on the plans why exempt. *(Plan Attachment)*	
☐	☐	**Site Plan** – Required for new buildings, structures, parking lots, grading permits and additions. Also required for change in use or occupancy group.	
☐	☐	**Landscaping** – For new parking lots, new buildings, and for additions greater than 1,000 square feet. Planning's landscape analysis form shall be included when applicable.	

HoustonPermittingCenter.org
832.394-8810

1

revised: January 1, 2020
Form CE-1105

Our Permit Techs already check for COMcheck at Prescreen



HOUSTON PUBLIC WORKS

COMMERCIAL CHECKLIST FOR PERMIT APPLICATION

HOUSTON PUBLIC WORKS

BUILDING CODE ENFORCEMENT
COMMERCIAL PREREQUISITE CHECKLIST

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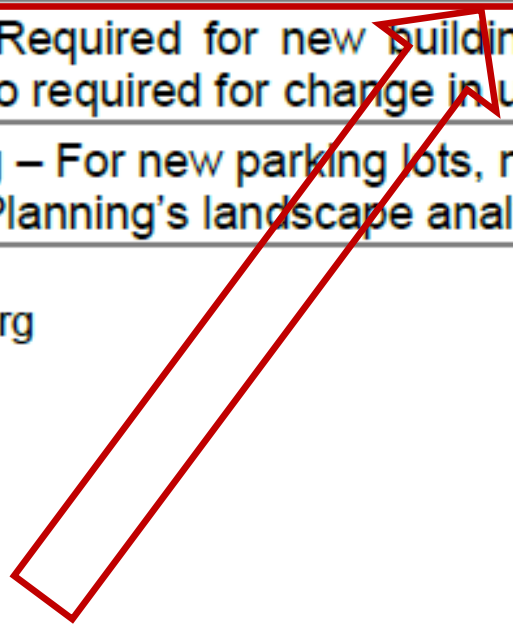
RQ	N/A	EXTENDED LEAD TIME ITEMS REQUIRED PRIOR TO PLAN APPROVAL	SHEET NO./ LOCATION
		number at each address or lease space.	
X		**Energy Code Software–** Required for building projects. Where proposed scope of work is exempt, indicate on the plans why exempt. *(Plan Attachment)*	
☐	☐	**Site Plan** – Required for new buildings, structures, parking lots, grading permits and additions. Also required for change in use or occupancy group.	
☐	☐	**Landscaping** – For new parking lots, new buildings, and for additions greater than 1,000 square feet. Planning's landscape analysis form shall be included when applicable.	



X		scope of work associated with each separate permit. The cost shown on each permit application shall reflect the cost associated with the scope of work for each separate project number at each address or lease space.	Building Permit Application
X		**Energy Code Software–** Required for building projects. Where proposed scope of work is exempt, indicate on the plans why exempt. *(Plan Attachment)*	
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1
revised: January 1, 2020
Form CE-1105

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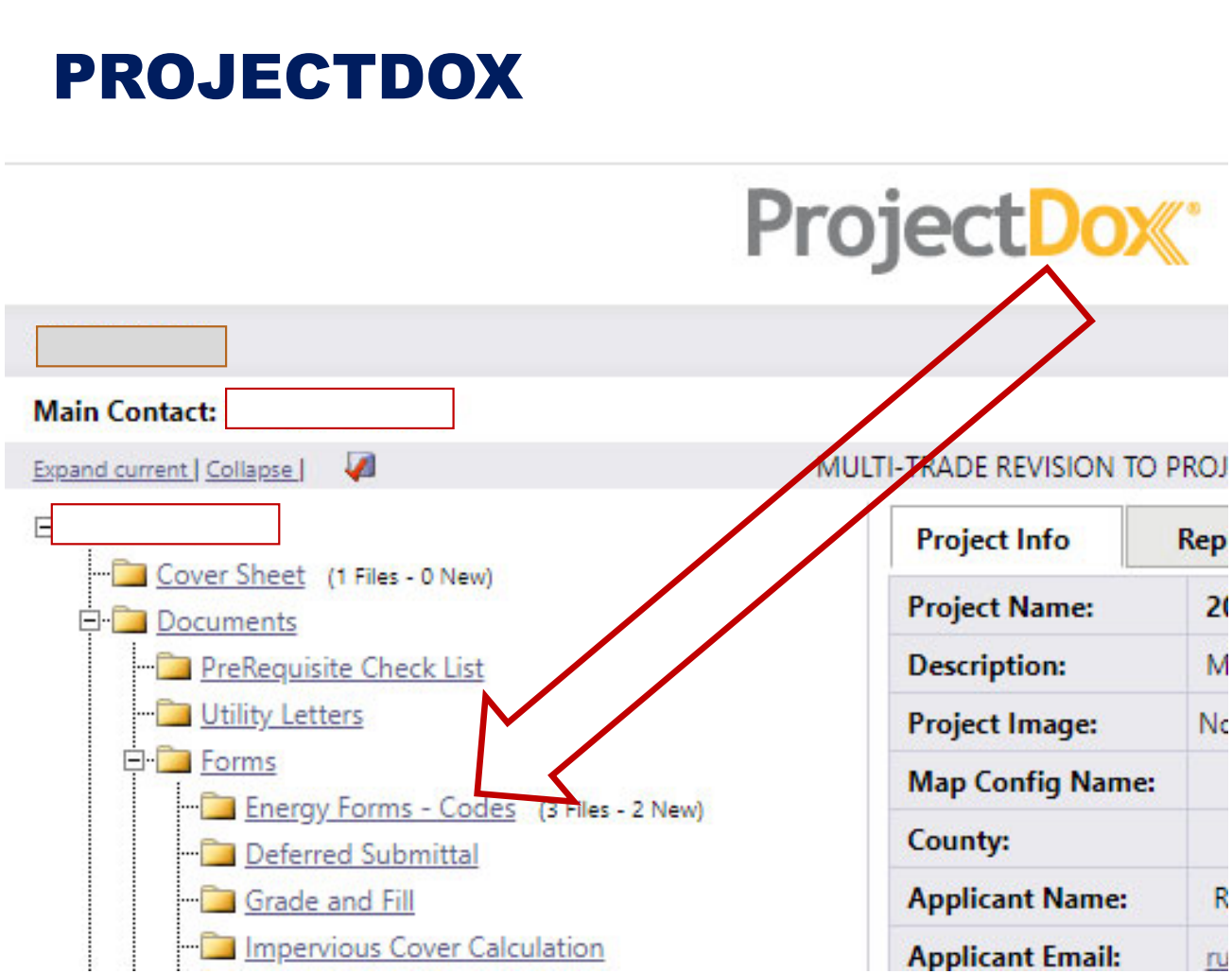
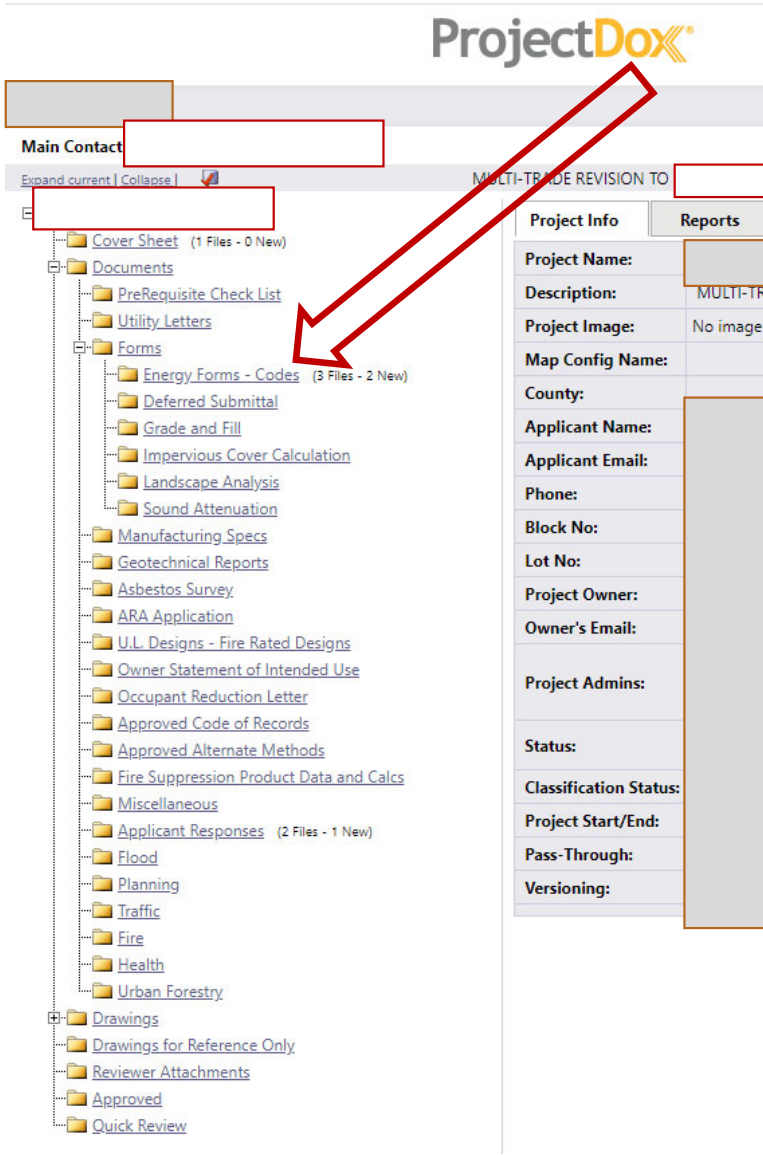
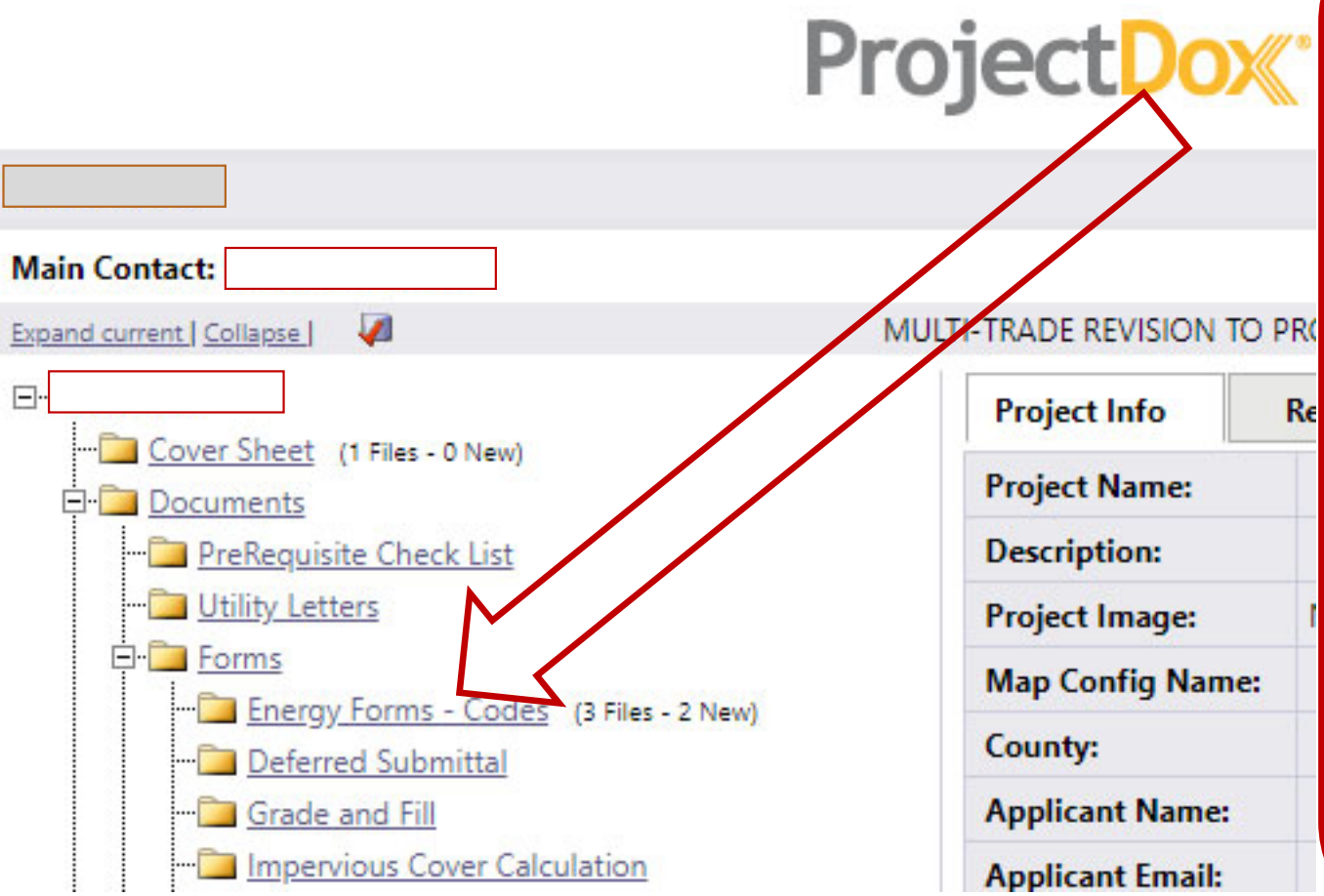
PROJECTDOX





HOUSTON PUBLIC WORKS

PROJECTDOX



PLACE THE COMcheck IN THE ENERGY FORMS-CODES FOLDER IN ProjectDox.

THIS IS WHERE IT WILL BE REVIEWED IN PRE-SCREEN.

Some drawings contain the COMcheck. This is permissible, but MAKE SURE the COMcheck is in the folder.

BUILDING ENVELOPE REQUIREMENTS

IECC Commercial Provisions Chapter 4 Section 402

BUILDING ENVELOPE

1. Walls
2. Roofs
3. Windows
4. Leakage

SECTION C402
BUILDING ENVELOPE REQUIREMENTS

C402.1 General (Prescriptive). Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis, in accordance with the compliance path described in Item 2 of Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the *R*-value-based method of Section C402.1.3; the *U*-, *C*- and *F*-factor-based method of Section C402.1.4; or the component performance alternative of Section 402.1.5.
2. Roof solar reflectance and thermal emittance shall comply with Section C402.3.
3. Fenestration in building envelope assemblies shall comply with Section C402.4.
4. Air leakage of building envelope assemblies shall comply with Section C402.5.

Alternatively, where buildings have a vertical fenestration area or skylight area exceeding that allowed in Section C402.4, the building and building thermal envelope shall comply with Section C401.2, Item 1 or Section C401.2, Item 3.

GENERAL

THERMAL ENVELOPE VALUES PER CLIMATE ZONE

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, *R*-VALUE METHOD[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings[a, b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, above grade																
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R13 + R-15.6ci or R-20 + R-10ci	R13 + R-15.6ci or R-20 + R-10ci
Walls, below grade																
Below-grade wall[d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass[e]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30[f]	R-30[f]	R-30[f]	R-30[f]	R-30[f]
Slab-on-grade floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-20 for 24" below
Heated slabs[f]	R-7.5 for 12" below	R-7.5 for 12" below	R-7.5 for 12" below	R-7.5 for 12" below	R-10 for 24" below	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 36" below	R-15 for 36" below	R-15 for 36" below	R-20 for 48" below	R-20 for 24" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below

BUILDING ENVELOPE

Your building might be exempt or have exemptions.

C402.1.1 Low-energy buildings. The following low-energy buildings, or portions thereof separated from the remainder of the building by *building thermal envelope* assemblies complying with this section, shall be exempt from the *building thermal envelope* provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft^2 (10.7 W/m^2) or 1.0 watt per square foot (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.
3. Greenhouses.

HOUSTON PUBLIC WORKS

BUILDING ENVELOPE

If you want to claim an exemption, you must state it in your submittal.

C402.1.2 Equipment buildings. Buildings that comply with the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area not more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling not less than 7 watts per square foot (75 W/m^2) and not intended for human occupancy.
3. Have a heating system capacity not greater than (17,000 Btu/hr) (5 kW) and a heating thermostat set point that is restricted to not more than 50°F (10°C).
4. Have an average wall and roof *U*-factor less than 0.200 in *Climate Zones* 1 through 5 and less than 0.120 in *Climate Zones* 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for *Climate Zone* 1.

BUILDING ENVELOPE

1. Eyes
2. Glaze
3. Over

C402.1.4 Assembly *U*-factor, *C*-factor or *F*-factor-based method. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-, *C*- or *F*-factor basis shall have a *U*-, *C*- or *F*-factor not greater than that specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-, *C*- or *F*-factor from the "Group R" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-, *C*- or *F*-factor from the "All other" column of Table C402.1.4. The *C*-factor for the below-grade exterior walls of the building envelope, as required in accordance with Table C402.1.4, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less. Opaque swinging doors shall comply with Table C402.1.4 and opaque roll-up or sliding doors shall comply with Table C402.1.3.

BUILDING ENVELOPE

Worse

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be permitted in lieu of compliance with the *U*-, *F*- and *C*-factors in Tables C402.1.3 and C402.1.4 and the maximum allowable fenestration areas in Section C402.4.1.

$A + B + C + D + E \leq Zero$ **(Equation 4-2)**

where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.

- UA Dif = UA Proposed - UA Table.
- UA Proposed = Proposed *U*-value · Area.
- UA Table = (*U*-factor from Table C402.1.3 or Table C402.1.4) · Area.

B = Sum of the (FL Dif) values for each distinct slab-on-grade perimeter condition of the building thermal envelope.

- FL Dif = FL Proposed - FL Table.
- FL Proposed = Proposed *F*-value · Perimeter length.
- FL Table = (*F*-factor specified in Table C402.1.4) · Perimeter length.

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope.

- CA Dif = CA Proposed - CA Table
- CA Proposed = Proposed *C*-value · Area.
- CA Table = (Maximum allowable *C*-factor specified in Table C402.1.4) · Area.

D = (DA · UV) - (DA · U_{Wall}), but not less than zero.

- DA = (Proposed Vertical Glazing Area) - (Vertical Glazing Area allowed by Section C402.4.1).
- UA Wall = Sum of the (UA Proposed) values for each opaque assembly of the exterior wall.
- U_{Wall} = Area-weighted average *U*-value of all above-grade wall assemblies.
- UAV = Sum of the (UA Proposed) values for each vertical glazing assembly.
- UV = UAV/total vertical glazing area.

Where the proposed skylight area is less than or equal to the skylight area allowed by Section C402.4.1, the value of E (Excess Skylight Value) shall be zero. Otherwise:

E = (EA · US) - (EA · U_{Roof}), but not less than zero.

- EA = (Proposed Skylight Area) - (Allowable Skylight Area as specified in Section C402.4.1).
- U_{Roof} = Area-weighted average *U*-value of all roof assemblies.
- UAS = Sum of the (UA Proposed) values for each skylight assembly.
- US = UAS/total skylight area.

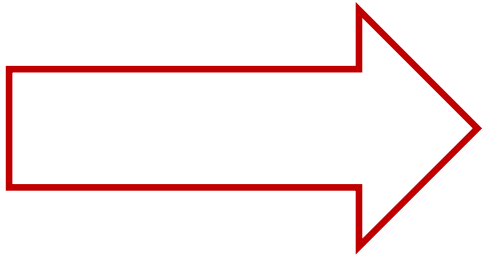
HOUSTON PUBLIC WORKS

THIS IS WHY YOU WANT COMCHECK

And so does Building Code Enforcement

THE ICC LIKES COMCHECK

ICC INTERNATIONAL CODE COUNCIL®



Compliance

COMcheck → free and easy-to-use software program for verifying code compliance

code official must approve the use of specific computer software such as COMcheck

user inputs building areas, efficiencies and other specifications for the building envelope, mechanical systems and interior and exterior lighting systems

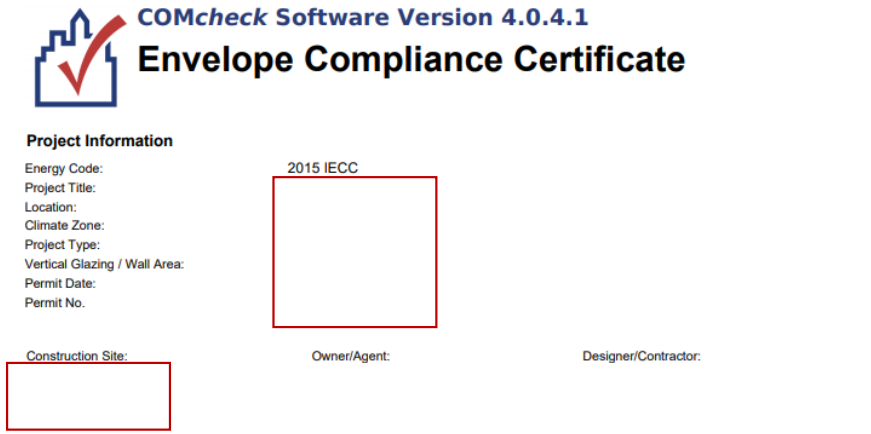
generates a compliance report for the approved plans and a customized field inspection checklist

available for ASHRAE 90.1, IECC, specific state programs

COMCHECK

Let's start looking at a COMcheck since that's what we want.

This is a Compliance Certificate. There are 4 types.



COMcheck Software Version 4.0.4.1

Envelope Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Location:
Climate Zone:
Project Type:
Vertical Glazing / Wall Area:
Permit Date:
Permit No.

Construction Site: Owner/Agent: Designer/Contractor:

Building Area	Floor Area
1-Dining: Cafeteria/Fast Food : Nonresidential	2053

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Insulation Entirely Above Deck: High Albedo Roof Required, 3-Year-Aged Solar Reflectance Index = 64.00 (d), [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	2053	---	20.0	0.048	0.039
Floor 1: Slab-On-Grade:Unheated, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (c)	2053	---	---	0.730	0.730
NORTH					
North Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	391	19.0	3.8	0.052	0.064
EAST					
East Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	1150	19.0	3.8	0.052	0.064
Window 4: Metal Frame with Thermal Break:Fixed, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	140	---	---	0.290	0.500
Door 2: Glass (> 50% glazing):Metal Frame, Entrance Door, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	48	---	---	0.290	0.830
Door 3: Insulated Metal, Swinging, [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	28	---	---	0.600	0.610

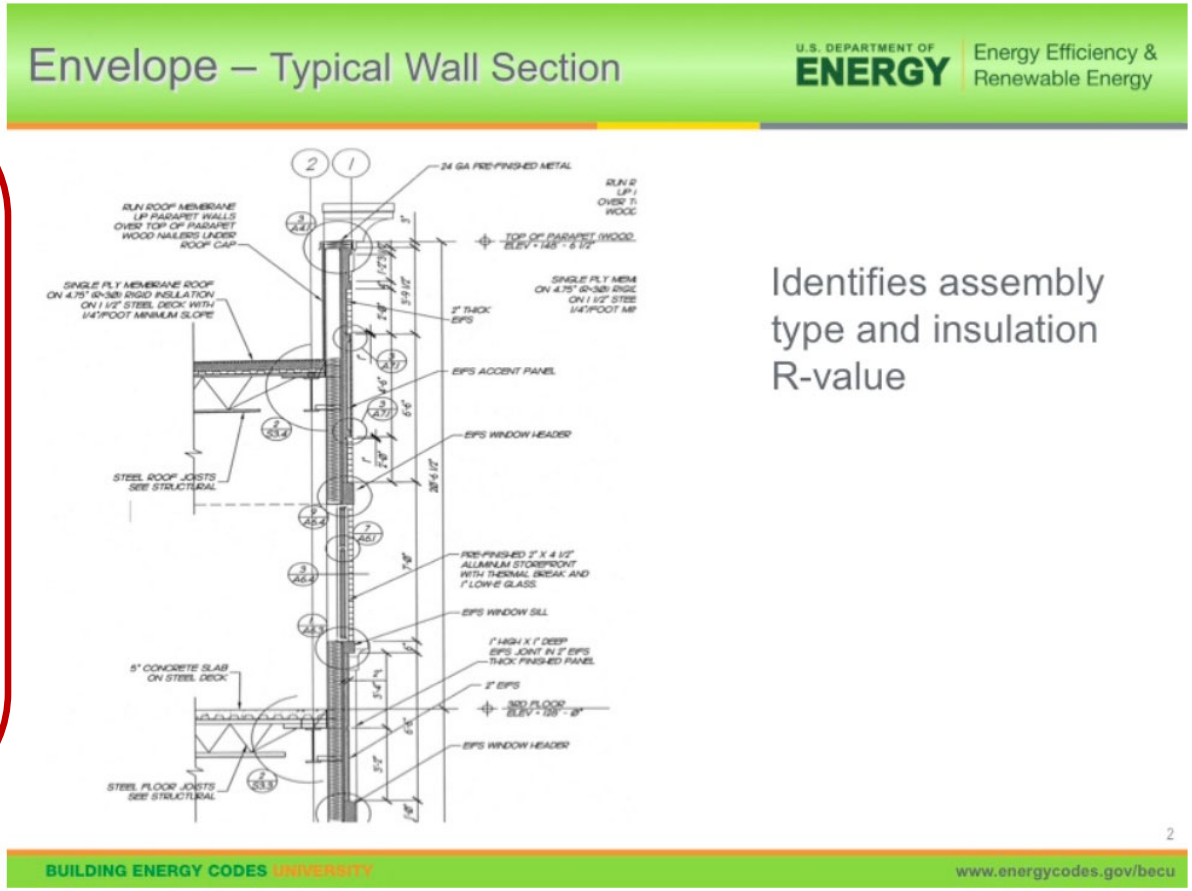
Project Title: Taco Bell Barker Cypress Report date: 08/20/19
Data filename: N:\Projects\19017 Taco Bell Barker Cypress\File Cabinet\ComCheck\Taco Bell Barker Cypress.c Page 1 of 9

HOUSTON PUBLIC WORKS

BUT FIRST, SOME INFO FROM US DEPT OF ENERGY

The designer inputs into COMcheck *from the plans.*

That means if we see a COMcheck item with nothing in the plans, *something is wrong*.



Wall and roof sections from the plans help identify the assembly type and proposed insulation value for the assembly. For example proposed wall type for this building is Steel frame, 16 o.c. with R21 cavity insulation. The roof is a single membrane roof with R-30 continuous insulation.

HOUSTON PUBLIC WORKS

BUT FIRST, SOME INFO FROM US DOE

This is what COMcheck looks like when someone is inputting the info from the plans

Envelope – COMcheck™ Exterior Wall Component Inputs

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Define Assembly, Construction Details, Gross Area and insulation R-value

Case Study.cck - COMcheck 3.8.0 Code: 2009 IECC

File Edit View Options Code Help

Project | Envelope | Interior Lighting | Exterior Lighting | Mechanical

Roof | Skylight | Ext. Wall | Window | Door | Basement | Floor

	Component	Assembly	Construction Details	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value
	Building						
1	Roof 1	Insulation Entirely Above...		11570	ft2		30.0
2	Front Exterior Wall	Steel-Framed, 16" o.c.		6075	ft2	21.0	0.0
3	Window 1	Metal Frame with Therma...	Glazing: Ti...	2185	ft2		
4	Storefront Window	Metal Frame:Double Pan...	Glazing: Ti...	46	ft2		
5	Entrance Door	Glass (> 50% glazing):M...	Type: Entr...	47	ft2		
6	Back Exterior Wall	Steel-Framed, 16" o.c.		6075	ft2	21.0	0.0
7	Window 1	Metal Frame with Therma...	Glazing: Ti...	2183	ft2		
8	Storefront Window	Metal Frame:Double Pan...	Glazing: Ti...	27	ft2		
9	Entrance Door	Glass (> 50% glazing):M...	Type: Entr...	47	ft2		

HOUSTON PUBLIC WORKS

REPORTS

This is the <u>first</u> of 5 COMcheck reports: Envelope Compliance

COMcheck Software Version 4.0.4.1

Envelope Compliance Certificate

It could be ASHRAE

Project Information

Energy Code:	2015 IECC
Project Title:	
Location:	Houston, Texas
Climate Zone:	2a
Project Type:	New Construction
Vertical Glazing / Wall Area:	
Permit Date:	
Permit No.	

***A Tenant Build-out may not have any envelope items.**

REPORTS

2nd of 5: Interior Lighting.

COMcheck Software Version 4.1.1.0

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type: New Construction

Construction Site: Owner/Agent: Designer/Contractor:

Additional Efficiency Package(s)

High efficiency HVAC. Systems that do not meet the performance requirement will be identified in the mechanical requirements checklist report.

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Dining: Cafeteria/Fast Food	2053	0.90	1848
		Total Allowed Watts =	1848

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Dining: Cafeteria/Fast Food				
LED 1: B1: 2 X 4 FLAT PANEL: LED Other Fixture Unit 46W:	1	13	45	585
LED 2: C1: RECESSED: LED Other Fixture Unit 13W:	1	26	14	364
LED 3: PENDANT: LED A Lamp 11W:	1	10	11	110
LED 4: WALL STRIP: LED Other Fixture Unit 95W:	1	1	96	96

HOUSTON PUBLIC WORKS

REPORTS

3rd of 5:
Exterior Lighting

COMcheck Software Version 4.1.1.0
Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type: New Construction
Exterior Lighting Zone 4 (High activity metropolitan commercial district)

Construction Site: Owner/Agent: Designer/Contractor:

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watt (B X C)
Parking Lot Lights (Parking area)	11 ft2	0.13	Yes	1
Main Entry Door (Main entry)	2 ft of door	30	Yes	60
Rear Egress(Employee) (Other door (not main entry))	1 ft of door	20	Yes	20
Drive-Thru Window (Drive-up windows/doors)	1 windows	400	No	400
Rear Wall Mounted Lts (Illuminated area of facade wall or surface)	5 ft2	0.2	No	1
Side Door (Customer) (Other door (not main entry))	1 ft of door	20	Yes	20
			Total Tradable Watts (a) =	101
			Total Allowed Watts =	502
			Total Allowed Supplemental Watts (b) =	1300

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 1300 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

HOUSTON PUBLIC WORKS

REPORTS

4th of 5: Mechanical.

COM*check* Software Version 4.0.2.6

Mechanical Compliance Certificate

Section 1: Project Information

Energy Code:
Project Title: S
Project Type:

Construction Site: Owner/Agent: Designer/Contractor:

Section 2: General Information

Building Location (for weather data):	Houston, Texas
Climate Zone:	2a

Section 3: Mechanical Systems List

Quantity	System Type & Description
54	HVAC System 1 (Single Zone) : Heating: 1 each - Central Furnace, Electric, Capacity = 7 kBtu/h No minimum efficiency requirement applies Cooling: 1 each - Packaged Terminal Unit, Capacity = 12 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 11.50 EER, Required Efficiency = 10.05 EER Fan System: None

HOUSTON PUBLIC WORKS

REPORTS

5th of 5:
Inspection Checklist

COM*check* Software Version 4.0.4.1

Inspection Checklist

Energy Code: 2015 IECC

Requirements: 0.0% were addressed directly in the COM*check* 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	
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	
C402.4.1 [PR11][1]	The skylight area <= 3 percent of the gross roof area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.2 [PR14][1]	In enclosed spaces > 2,500 ft2 directly under a roof with ceiling heights >15 ft. and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the following requirements apply: (a) the daylight zone under skylights is >= half the floor area; (b) the skylight area to daylight zone is >= 3 percent with a skylight VT >= 0.40; or a minimum skylight effective aperture >= 1 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

HOUSTON PUBLIC WORKS

NOTHING NEW WITH THE CODE, NOTHING NEW WITH COMCHECK

Plan Review will be reviewing them differently is what is NEW.

Let’s walk through some COMchecks. You’ll see what the report looks like, and what Plan Review will be looking for.

first of 4: Envelope Compliance

Check later

Building Area	Floor Area
1-Dining: Cafeteria/Fast Food : Nonresidential	2053

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

REJECTED

Check next

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Insulation Entirely Above Deck: High Albedo Roof Required, 3-Year-Aged Solar Reflectance Index = 64.00 (d), [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	2053	---	20.0	0.048	> 0.039
Floor 1: Slab-On-Grade:Unheated, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (c)	2053	---	---	0.730	< 0.730
NORTH					
North Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	391	19.0	3.8	0.052	< 0.064
EAST					
East Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	1150	19.0	3.8	0.052	< 0.064
Window 4: Metal Frame with Thermal Break:Fixed, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	140	---	---	0.290	< 0.500
Door 2: Glass (> 50% glazing):Metal Frame, Entrance Door, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	48	---	---	0.290	< 0.830
Door 3: Insulated Metal, Swinging, [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	28	---	---	0.600	< 0.610

HOUSTON PUBLIC WORKS

RIGHT OFF THE BAT

In the Envelope Compliance report -

COMcheck shows us a Roof R-value that does not comply.

Rejection number one.

ENVELOPE COMPLIANCE CERTIFICATE

Nothing here, so we check the checklist

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Insulation Entirely Above Deck: High Albedo Roof Required, 3-Year-Aged Solar Reflectance Index = 64.00 (d), [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	2053	---	20.0	0.048	> 0.039
Floor 1: Slab-On-Grade:Unheated, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (c)	2053	---	---	0.730	0.730
NORTH					
North Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	391	19.0	3.8	0.052	0.064
EAST					
East Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	1150	19.0	3.8	0.052	0.064
Window 4: Metal Frame with Thermal Break:Fixed, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	140	---	---	0.290	0.500
Door 2: Glass (> 50% glazing):Metal Frame, Entrance Door, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast Food] (b)	48	---	---	0.290	0.830

INSPECTION CHECKLIST

& Req.ID			
C303.1 [IN3][1]	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the roof slope is <=3 in 12.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.1 [IN10][2]	Building envelope insulation is labeled with R-value or insulation certificate providing R-value and other relevant data.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.2 [IN7][1]	Above-grade wall insulation installed per manufacturer's instructions.	☐Complies ☐Does Not ☐Not Observable	
C402.2.3 [IN6][1]	Above-grade wall insulation R-value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.2.5 [IN8][2]	Floor insulation R-value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.2.6 [IN18][3]	Radiant panels and associated components, designed for heat transfer from the panel surfaces to the occupants or indoor space are insulated with a minimum of R-3.5	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.3 [IN5][3]	High-albedo roofs satisfy one of the following: 3-year-aged solar reflectance >= 0.55 and thermal emittance >= 0.75 or 3-year-aged solar reflectance index >= 64.0.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.2.2 [IN2][1]	Roof R-value. For some ceiling systems, verification may need to occur during Framing Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.5.1.1 [IN1][1]	All sources of air leakage in the building thermal envelope are sealed, caulked, gasketed, weather stripped or wrapped with moisture vapor-permeable wrapping material to minimize air leakage.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

C402.3 [IN5][3]	High-albedo roofs satisfy one of the following: 3-year-aged solar reflectance >= 0.55 and thermal emittance >= 0.75 or 3-year-aged solar reflectance index >= 64.0.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

The user inputs the SRI and references the drawings here.

Above is where COMcheck mentions the code provision.

For Plan Review or Inspections.

HOUSTON PUBLIC WORKS

DRAWINGS

IECC C402.3

GREEN

21 "DURO-LAST" SINGLE PLY ROOF MEMBRANE OVER MINIMUM R-20 RIGID INSULATION BOARD OVER 5/8" APA RATED EXTERIOR GRADE PLYWOOD OVER TRUSSES. INSTALL PER MANUFACTURERS SPECIFICATIONS. **(SRI is MIA)**

Internet

Plans

DURO-LAST® THE WORLD'S BEST ROOF®

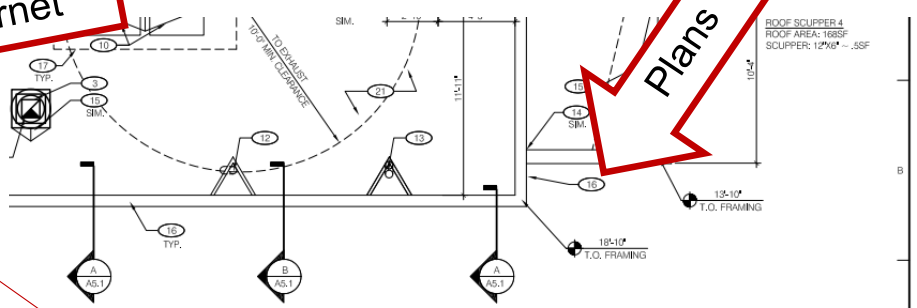
PRODUCT DATA

DURO-LAST® 40-MIL MEMBRANE

Advantages:
Duro-Last® 40-Mil (DL40) membrane is an excellent choice for projects requiring a long lasting, energy efficient roofing membrane. The membrane is available in custom-fabricated sections or as roll

Cool Roof Rating Council (CRRC)

	CRRC ID	Solar Reflectance		Thermal Emittance		Solar Reflective Index (SRI)	
		Initial	3-yr	Initial	3-yr	Initial	3-yr
White	0610-0001	0.88	0.68	0.87	0.84	111	82
Tan	0610-0005	0.39	0.33	0.89	0.89	43	35
Gray	0610-0004	0.47	0.40	0.89	0.89	54	45
Dark Gray	0610-0006	0.26	0.25	0.88	0.89	26	25



ROOF PLAN 1/4"=1'-0" A

ISSUE	DATE
Permit & Pricing	08.19.2019
Permit Revisions	10.03.2019
Permit Revisions	01.28.2020

TACO BELL
EXPLORER LITE
MEDIUM40

ROOF PLAN
A3.0A

SCUPPER FLASHING F

ROOF PLAN NOTES E

1 ROOFTOP UNIT. INSTALL PLUMB AND LEVEL.
2 KITCHEN HOOD EXHAUST FAN. SEE SHEETS M3.0 & DETAIL 19/A6.0.
3 RESTROOM EXHAUST FAN. SEE 18/A6.0.
4 CANOPY. SEE SCOPE OF WORK.
5 ROOF HATCH: SEE 7/A6.0.
6 ICE MACHINE CONDENSERS.
7 WALK-IN COOLER / FREEZER CONDENSERS. SEE SCOPE OF WORK SHEET.
8 EQUIPMENT PLATFORM. SEE DETAIL 15/A6.0.
9 PIPE HOOD FOR UTILITIES. SEE DETAIL 9/A6.0.
10 24x36 WALK MATS. SEE ROOF SPECS.
11 SCUPPER AND DOWNSPOUT. SEE DETAIL F/A3.0.
12 WATER HEATER INTAKE. SEE DETAIL 13/A6.0 FOR BRACING.
13 WATER HEATER EXHAUST FLUE SHALL BE MIN. 6" HIGHER THAN INTAKE-MAINTAIN MIN. 10'-0" FROM NEAREST POINT OF RTU INTAKE. SEE DETAIL 13/A6.0 FOR BRACING.
14 CHANGE IN PARAPET ELEVATION SEE DETAIL 14/A6.2.
15 ROOF CRICKET. SEE DETAIL 16/A6.0.
16 METAL PARAPET CAP. SEE DETAIL 2 & 5/A6.0
17 MAINTAIN MFRS ROOFTOP UNIT MAINTENANCE CLEARANCE.
18 OUTSIDE AIR INTAKE FOR ROOFTOP UNIT. MAINTAIN MIN 10'-0" SEPARATION FROM PLUMBING VENTS, FLUES AND BUILDING EXHAUST.
19 WASTE VENT THROUGH ROOF. THE TOP OF WASTE VENTS SHALL BE 12" HIGHER THAN THE CLOSEST PARAPET CAP U.N.O. OR NOT ALLOWED BY LOCAL JURISDICTION. SEE 12/A6.0 FOR FLASHING ASSEMBLY.
20 POWER / GAS / CONDENSATE ENTRY UNDER HVAC UNIT (PER HVAC MFR. SPECS.) REFER TO MECH. AND PLUMB DWGS. UTILITY ACCESS FROM WITHIN CURB - NO ROOF PENETRATIONS. DO NOT RUN ON ROOF SURFACE. SEE 13/P6.0
GREEN 21 "DURO-LAST" SINGLE PLY ROOF MEMBRANE OVER MINIMUM R-20 RIGID INSULATION BOARD OVER 5/8" APA RATED EXTERIOR GRADE PLYWOOD OVER TRUSSES. INSTALL PER MANUFACTURERS SPECIFICATIONS.
22 OVERFLOW SCUPPER. SEE DETAIL F/A3.0.
23 DUAL REMOTE CONDENSER. REFER ELECTRICAL AND PLUMBING.

KEY NOTES B

HOUSTON PUBLIC WORKS

ENVELOPE COMPLIANCE FAILURE

ComCheck asserts the roof complies with the code *but the plans don't show compliance.*

The plans call for a Durolast roof.

1. **Durolast has three types of roof membrane and 4 colors.**
2. **The roof color is not mentioned.**
3. **The SRI is not mentioned.**
4. **The SRI depends on the roof color.**
5. **Is it the plan reviewer's job to pull the manufacturer's cut sheet from the internet to determine code compliance?**
6. **No, it is the applicant's job to show compliance on the plans.**

INSPECTION CHECKLIST

COM*check* Software Version 4.0.4.1

Inspection Checklist

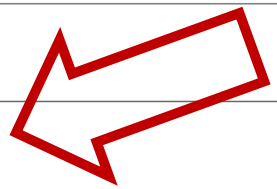
Energy Code: 2015 IECC

Requirements: 0.0% were addressed directly in the COM*check* 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	
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	
C402.4.1 [PR11][1]	The skylight area <= 3 percent of the gross roof area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.2 [PR14][1]	In enclosed spaces > 2,500 ft2 directly under a roof with ceiling heights >15 ft. and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the following requirements apply: (a) the	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

NO DOCUMENTATION



Requirements: 0.0% were addressed directly in the COM*check* 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.

BY THE WAY

COM*check* Software Version 4.1.1.0

Inspection Checklist

Energy Code: 2015 IECC

Requirements: 0.0% were addressed directly in the COM*check* 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 [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 engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observab ☐Not Applicabl	
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be	☐Complies ☐Does Not	

0% means NO comments were input into COMcheck, (a low effort task).

This will be an *automatic rejection* by the Permit Tech in Pre-screen.

COMCHECK INSPECTION CHECKLIST

These are the various code provision checklist items.

There are multiple pages –

1. **Envelope,**
2. **Mechanical,**
3. **Electrical,**
4. **Plumbing, and**
5. **Commissioning**

HOUSTON PUBLIC WORKS

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. **Location on plans/spec:** M1.0 MECHANICAL SPECS AND M2.0 SCHEDULES AND LAYOUT
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** M1.0 MECHANICAL SPECS AND M2.0 SCHEDULES AND LAYOUT
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

COMCHECK INSPECTION CHECKLIST

If you don't complete the Comments in the Inspection Checklist then prepare to see this REJECTION COMMENT:

A completed Inspection Checklist is a required component of the COMcheck submission which is required for a building permit.

For each inspection checklist item, the applicant explains how the requirement will be met with

1. how it is documented in the plans,

2. OR which exception is being claimed.

GENERAL

IECC C402.3

This is how we updated the Single-Family Residential Checklist to include the Energy Report Inspection Checklist. The Commercial Checklist is next.

IECC Chaps - 1-5	ENERGY CODE FORM – Information on form, plans & ResCheck report must match	
Can vary depending on compliance method: IE: Prescriptive, ResCheck, Performance, Energy Rating Index (ERI)	Building Thermal Envelope (Depiction)	☐
	Inclusion of all mandatory requirements	☐
	Energy Report Inspection Checklist	☐
	Insulated Attic Access (When provided or required.)	☐
	Square footage of floors and walls noted	☐
	Percent of glazing	☐
	Energy glazing factors	☐
	U factors and R-values	☐
	HVAC efficiency rating – min. 14 SEER	☐

HOUSTON PUBLIC WORKS

HOUSTON PUBLIC WORKS

BUILDING CODE ENFORCEMENT
SINGLE-FAMILY RESIDENCE
CHECKLIST – 2012 IRC

The following are some of the basic or frequently overlooked code requirements that must be detailed on plans for Single-family Dwellings and may be useful as a checklist for the designer. This list is not intended to be exhaustive of all possible requirements. The comprehensive list of requirements is contained in the Construction Code and City Code of Ordinances. Neither this list nor the code may be construed to allow deed restriction violations. Inconsistencies between details will be noted as needing to be corrected.

GENERAL REQUIREMENTS

CODE REFERENCE	REQUIREMENTS	✓
IRC R105.1	*RESIDENTIAL PERMIT APPLICATION*	
APPLICATION	Owner's Project Manager contact info	☐
IRC R108.3	Cost of construction (material and labor at industry costs, permanent equipment, and overhead) documentation required if below minimum cost per square foot	☐
IRC 106.3	Legal description	☐
IRC 101.2	Number of Stories	☐
ORD 10-551 to 10-556	Deed Restriction Unsworn Declaration	☐

CODE REFERENCE	REQUIREMENTS	✓
ORD 47-18.1	*WASTEWATER – TAPS & METERS*	
ORD 47-8, 47-18	Water meter account	☐
ORD. 47-316 – 47-326	Wastewater capacity application and fees or exemption form	☐
ORD 47-7, 47-11	Utility connection locations	☐
ORD 47-601 - 47-676	Water/Sewer – Storm Water	☐
ORD 47-11, 47-12	Wastewater - Sewer	☐
ORD 19	*FLOOD (Houston & Federal Requirements)*	☐
*ORD 40-82 - 40-99& IDM**	*TRAFFIC*	☐

SPECIFIC REQUIREMENTS

CODE REFERENCE	REQUIREMENTS	✓
IRC R105.3 & R106.2	*SITE PLAN W/ LEGAL DESCRIPTION*	
IRC R106.2	Dimension	☐
ORD 33-123-33-128	Landscape form for trees	☐
ORD 42-180 – 42-184	Replat for multiple dwellings on one lot	☐
ORD Storm Water, 47-601 – 47-676	Must be six (6) inches off property line if roof drains to one side (cannot drain onto neighbor's property) NOTE: Maintain minimum required 36-inch clearance for electrical service panel	☐
ORD 42-150 – 42-163	Building setbacks (building lines)	☐
ORD 10-32	Easements	☐
IBC Appendix E	Grading Worksheet - fill & excavation	☐
	Res. Site Improvement Permit w/common area agreement (shared utility or egress)	☐
IRC R106.1	*TEXAS ENGINEERS SEAL (When required)*	
IRC R106.1	Required on foundations	☐
IRC R106.1	Required on structural steel	☐
IRC R106.1	Required for prefab trusses, & beams	☐
IRC R106.1	Stairs & ramps	☐
IRC R106.1	Required for masonry >2-feet & fences >8-feet	☐
IRC R106.1	Windstorm designs other than App. L	☐
IBC 1704	Special inspections for welding, bolting, piers, and post-tension designs	☐
Engineering Practice Act	Sealed, signed and dated after latest revision, by engineer responsible for those revisions	☐
IRC R106.1.1	*FLOOR PLANS (Sufficient clarity)*	
IRC R106.1.1	Room labels "according to use"	☐
IRC R106.1.1	Dimensions	☐
IRC Chap. 4	*FOUNDATION PLAN*	
IRC R401	References on plans to specific details	☐
IRC R403.1	Beam sections	☐
IRC R404.1.2.3.7	Reinforcement details	☐
IBC 1705	Drilled pier details "special inspection"	☐
IRC Chaps. 5, 6 & 8	*FRAMING PLANS*	
Chap. 5-floors, 6-walls & 8 roof/ceil.	Wall Sections – Foundation to ridge	☐
	Floor, ceiling & roof framing details	☐
IRC R1101.1	Identify insulation R-values Ref. I.E.C.C.	☐
IRC R302.6 Table 702.3.5	Garage separation – ½-inch gypsum board except ceiling below habitable space must be 5/8-inch Type X gypsum board	☐
IRC Chaps. 5-floor, 6-walls & 8-roofs	Lumber size, grade, species, and spacing for studs, joists, rafters, trusses	☐
IRC R301, and Appendix L	Windstrapping from Appendix L, or provide Texas PE sealed engineered design	☐
R602.10.4 wall R802.11 roof	Wind bracing details-Ref Section R301.2.1 and Table R301.2(1) 110mph wind speed	☐
IRC R602.3.1	Nailing schedule	☐
IRC R807 M1305.1.3	Attic access 22"x30" if no equipment; otherwise large enough to allow removal of the largest appliance & 350lb load ladder, if equip.In attic	☐
IECC 303.2	Framing dimension must allow for required R-value insulation thickness	☐
IRC R106.1.1	Rafter layout and gutters at property line	☐
IRC & IBC	*RATED WALLS – PROTECTED OPENINGS*	
IBC Tables 721.1 (1-3), UL or Gypsum Manual	Fire-rating and design numbers UL, USG, IBC Ch 7 (keyed to wall assemblies on plan)	☐
IRC R302.1	Ext. wall <3-feet to property line must be 1hr fire-rated w/ protected overhang no closer than 2-feet to the property line.	☐
IBC 2110.1.1(.1)	45-minute fire-rated glass block masonry units, otherwise no openings	☐
IBC 721.1 (1) struct. IBC 721.1 (2) walls IBC 721.1 (3) roofs	Attach photocopies of fire-rated design data from approved testing agency (IE: UL, USG, or IBC Chap. 7)	☐
IRC R302.2.2	Townhouse roof parapets or class C roofing w/no penetrations within 4-feet of separation walls.	☐

CODE REFERENCE	REQUIREMENTS	✓
IRC R314	*SMOKE DETECTORS*	
IRC R314.4	Must be hard wired and interconnected with battery backup.	☐
IRC R314.3	Located in all bedrooms	☐
IRC R314.3	Areas outside of bedrooms	☐
IRC R314.3	On each floor level	☐
IRC R1003.1	*FIREPLACE DETAILS (Need type)*	
Figure R1001.1 and IRC R1003.9	Chimney termination 2 feet higher than any portion of structure within 10 feet	☐
IRC R1003 Masonry R1001.9, 10 Hearth	If masonry, full details w / hearth dimension and floor material distinction	☐
IRC R310 & R311	*EXITS – EMERGENCY ESCAPE & RESCUE*	
IRC R310	Emergency egress windows from bedrooms	☐
IRC R310.1.1	5'-0" sq. ft. operable at grade and 5'-7" sq. ft. operable above grade	☐
IRC R310.1.2	Minimum 24-inch high opening	☐
IRC R310.1.3	Minimum 20-inch wide opening	☐
IRC R310.1.4	Operational constraints	☐
IRC R311.2	Exit Door (Minimum 32" x 78" clear)	☐
IRC R311	Exit discharge continuation	☐
IRC Chap. 3	*STAIRS – GUARDS & HANDRAILS*	
IRC 312.1.2 and 312.1.3	Guardrails – maximum 4-inch openings and 36-inch height	☐
IRC R311.7.8.1	Handrails – 34" to 38" height	☐
IRC R311.7.5	Maximum 7-3/4" rise, minimum 10-inch run	☐
IRC R302.7	Enclosed useable space below stair must have ½"-thick gypsum board protection	☐
R301.5 and Table 301.5	Live load design 200 lb/sq. ft. guardrails	☐
IRC R308	*SAFETY GLAZING (Required at..)*	
IRC R308.4.5	Shower and tub enclosures	☐
IRC R308.4.1	Side hinged doors	☐
IRC R308.4.6, 308.4.7	Adjacent to stairs and landings	☐
IRC R308.4.2	Panels adjacent & within 24 inches of door	☐
IRC R308.4.3	Panels with 9-square feet and bottom within 18-inches of floor and top 36-inches above the floor and within 36-inches of a walking surface	☐
IRC 308.6	Skylights and sloped glazing	☐
IBC 2407	Glass guardrails	☐
IECC Chaps - 1-5	*ENERGY CODE FORM – Information on form, plans & ResCheck report must match*	
Can vary depending on compliance method: IE: Prescriptive, ResCheck, Performance, Energy Rating Index (ERI)	Building Thermal Envelope (Depiction)	☐
	Inclusion of all mandatory requirements	☐
	Energy Report Inspection Checklist	☐
	Insulated Attic Access (When provided or required.)	☐
	Square footage of floors and walls noted	☐
	Percent of glazing	☐
	Energy glazing factors	☐
	U factors and R-values	☐
	HVAC efficiency rating – min. 14 SEER	☐
City Code & IBC 3112	*DRIVEWAYS & SIDEWALKS*	
Traffic Drawing No. 02754-01A/B and IDM* Table 15.08.01	Width, Radius	☐
IDM* Table 15.08.02	Driveway spacing criteria	☐
Handout drawing T&T	Distance to both property lines	☐
Traffic Guidelines	2nd approach must have traffic approval	☐
IBC 3112.4.4	Sidewalks	☐
2014 NEC	*ELECTRICAL CODE*	
NEC 110.26.A.1	Minimum 36-inch service panel clearance	☐

* IDM = Infrastructure Design Manual

For further information and to check plan status, visit www.houstonpermittingcenter.org

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BUILDING MECHANICAL SYSTEMS

IECC Commercial Provisions Chapter 4 Section 403

BUILDING MECHANICAL SYSTEMS

C403: Five Parts

- 403.1 & 2: General
- 403.3: Economizers
- 403.4: HVAC Hydronic & Multi-zone Equipment
- 403.5: Refrigeration Equipment

BUILDING MECHANICAL SYSTEMS

IECC C403.2

Pdogdwzu|

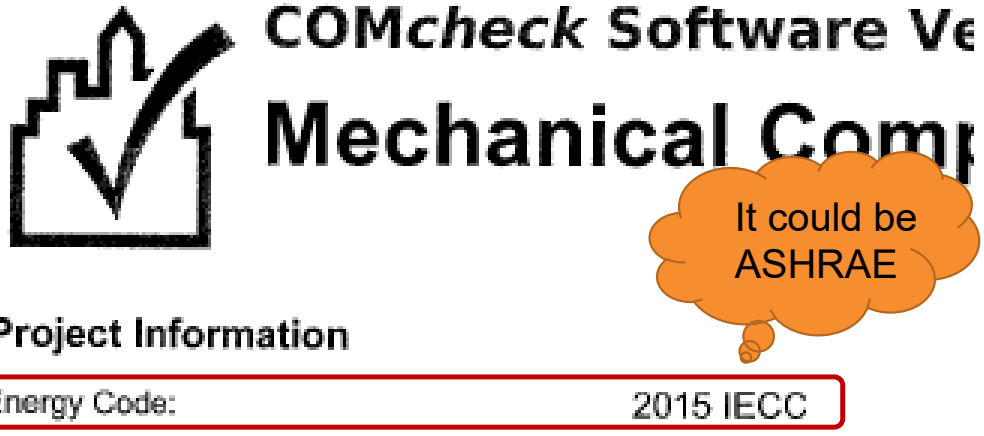
C403.2 Provisions applicable to all mechanical systems (Mandatory). Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.16.

Plan Review intensive

C403.2.1 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ANSI/ASHRAE/ACCA Standard 183 or by an *approved* equivalent computational procedure using the design parameters specified in Chapter 3. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE *HVAC Systems and Equipment Handbook* by an approved equivalent computational procedure.

HOUSTON PUBLIC WORKS

FROM THE CERTIFICATE



COMcheck Software Ve

Mechanical Comp

It could be ASHRAE

Project Information

Energy Code: 2015 IECC

COMcheck Software Version 4.1.1.0

Mechanical Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Location:
Climate Zone:
Project Type:

Designer/Contractor:

Additional Efficiency Package(s)

High efficiency HVAC. Systems that do not meet the performance requirement will be identified in the mechanical requirements checklist report.

Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone): Heating: 1 each - Duct Furnace, Gas, Capacity = 150 kBtu/h Proposed Efficiency = 88.00% Ec, Required Efficiency: 88.00 % Ec Cooling: 1 each - Single Package DX Unit, Capacity = 92 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.60 EER, Required Efficiency: 12.10 EER + 13.9 IEER Fan System: RTU-1 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 1 Supply, Constant Volume, 3000 CFM, 2.8 motor nameplate hp, 0.0 fan efficiency grade
1	RTU-2 (Single Zone): Heating: 1 each - Duct Furnace, Gas, Capacity = 200 kBtu/h Proposed Efficiency = 88.00% Ec, Required Efficiency: 88.00 % Ec Cooling: 1 each - Single Package DX Unit, Capacity = 118 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.10 EER, Required Efficiency: 12.10 EER + 13.9 IEER Fan System: RTU-2 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 2 Supply, Constant Volume, 4400 CFM, 2.8 motor nameplate hp, 0.0 fan efficiency grade
1	Water Heater 1: Gas Storage Water Heater, Capacity: 60 gallons, Input Rating: 120 kBtu/h Proposed Efficiency: 98.50 % Et, Required Efficiency: 80.00 % Et

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 2015 IECC requirements in COMcheck Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title

Date

STATE OF TEXAS REGISTERED PROFESSIONAL ENGINEER

Project Title: Taco Bell
Data filename: P:\RESTAURANTS\Taco Bell - Bark...co Bell Comcheck.cck

Report date: 08/19/19
Page 2 of 13

HOUSTON PUBLIC WORKS

FROM THE CERTIFICATE

Where are the Loads?

Additional Efficiency Package(s)

High efficiency HVAC. Systems that do not meet the performance requirement will be identified in the mechanical require report.

Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone): Heating: 1 each - Duct Furnace, Gas, Capacity = 150 kBtu/h Proposed Efficiency = 88.00% Ec, Required Efficiency: 88.00 % Ec Cooling: 1 each - Single Package DX Unit, Capacity = 92 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.60 EER, Required Efficiency: 12.10 EER + 13.9 IEER Fan System: RTU-1 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 1 Supply, Constant Volume, 3000 CFM, 2.8 motor nameplate hp, 0.0 fan efficiency grade
1	RTU-2 (Single Zone): Heating: 1 each - Duct Furnace, Gas, Capacity = 200 kBtu/h Proposed Efficiency = 88.00% Ec, Required Efficiency: 88.00 % Ec Cooling: 1 each - Single Package DX Unit, Capacity = 118 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.10 EER, Required Efficiency: 12.10 EER + 13.9 IEER Fan System: RTU-2 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 2 Supply, Constant Volume, 4400 CFM, 2.8 motor nameplate hp, 0.0 fan efficiency grade

HOUSTON PUBLIC WORKS

FROM THE CERTIFICATE TO THE INSPECTION CHECKLIST TO THE PLANS

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	
C403.2.2 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Page number where the load calcs are shown, or "following the COMcheck"**

CHAPTER 1 GENERAL

C103.2 Information on construction documents

THIS IS NOT THE LEAST BIT UNCLEAR.

12 items are required by law to be clearly delineated.

Delineation includes stating they do not apply due to an exception or exemption from the code provisions.

HOUSTON PUBLIC WORKS

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of *daylight* zones on floor plans.
12. Air sealing details.

ARE WE GOING TO DOUBLE CHECK YOUR LOADS?

We are expecting you to professionally establish the loads.

We expect to see information on the plans to comply with the LAW.

Is that enough of an answer?

COMCHECK INSPECTION CHECKLIST

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6]³	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. **Location on plans/spec:** M1.0 MECHANICAL SPECS AND M2.0 SCHEDULES AND LAYOUT
C404.5, C404.5.1, C404.5.2 [PL6]³	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.3 [PL7]³	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7]³	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7	Water distribution system that pumps	☐Complies	Requirement will be met.

No exceptions in this code provision!

There's a heater and a storage tank in the plans!

REJECTED

Additio /Assumptions:

HOUSTON PUBLIC WORKS

COMCHECK INSPECTION CHECKLIST

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	ments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. **Location on plans/spec:** M1.0 MECHANICAL SPECS AND M2.0 SCHEDULES AND LAYOUT
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

COMcheck does this, it is not sufficient

This is a good comment.

COMcheck does this

COMcheck does this, it is not sufficient

This might get you past Pre-Screen

COMcheck Software Version 4.1.2.2

Inspection Checklist

Energy Code: 2015 IECC

Requirements 100.0% 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 [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 engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
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	Requirement will be met.
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

COMcheck does this, it is not sufficient

COMcheck does this, it is not sufficient

COMcheck does this, it is not sufficient

HOUSTON PUBLIC WORKS

“REQUIREMENT WILL BE MET”

IS **NOT** SUFFICIENT.

You need to type something else in.

ANATOMY OF A FAILURE

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 engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

NOTHING ELSE?

Suggestion: note which sheet has the load calcs or note their location after the COMcheck in the Energy Forms folder

HOUSTON PUBLIC WORKS

ANATOMY OF A FAILURE

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	Requirement will be met.

NOTHING ELSE?

Suggestion: note which sheets have the electrical info.

ANATOMY OF A FAILURE

C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	Requirement will be met.

NOTHING ELSE?

Suggestion: note which sheets have this info.

ANATOMY OF A FAILURE

C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

NOTHING ELSE?

State the specific exception or exemption in your comment.

THIS IS NOW ABOUT PLAN REVIEW, NOT INSPECTION

Section # & Req.ID	Plumbing ~~Rough-In Inspection~~	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	Requirement will be met.

REJECTED

Have you ever had to explain this before? We need to see that you have complied with the provision. How can you succinctly indicate that?

Suggestion: note which sheets have this info.

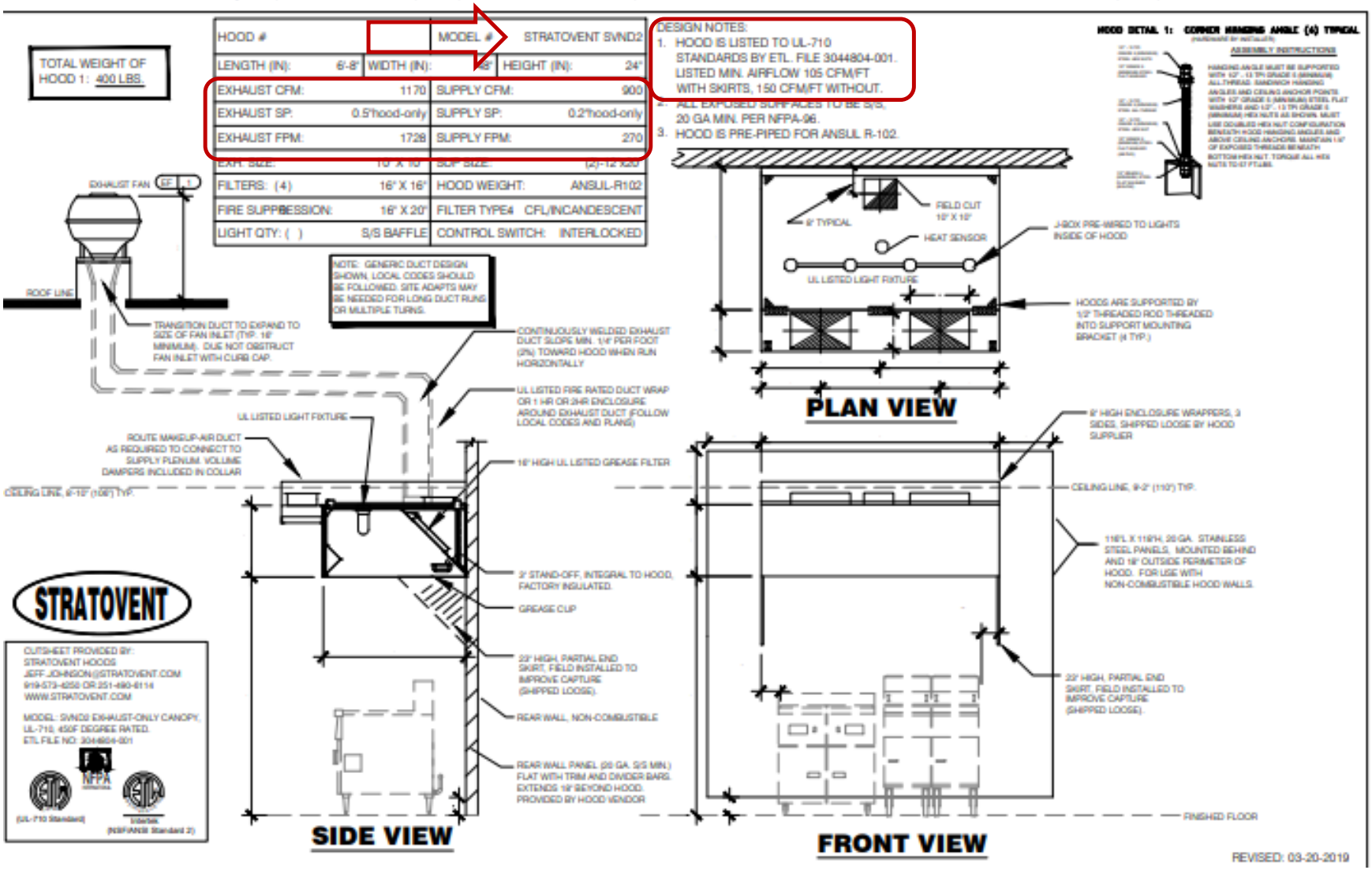
TO BE CLEAR

Our inspectors have been and will continue to inspect the project to compare with the APPROVED PLANS.

The completed COMcheck, which is based on the plans, will be part of the APPROVED PLANS.

An incomplete COMcheck will not be approved, nor will the plans until the COMcheck is approved.

KITCHEN EXHAUST HOOD FROM THE DRAWINGS



HOUSTON PUBLIC WORKS

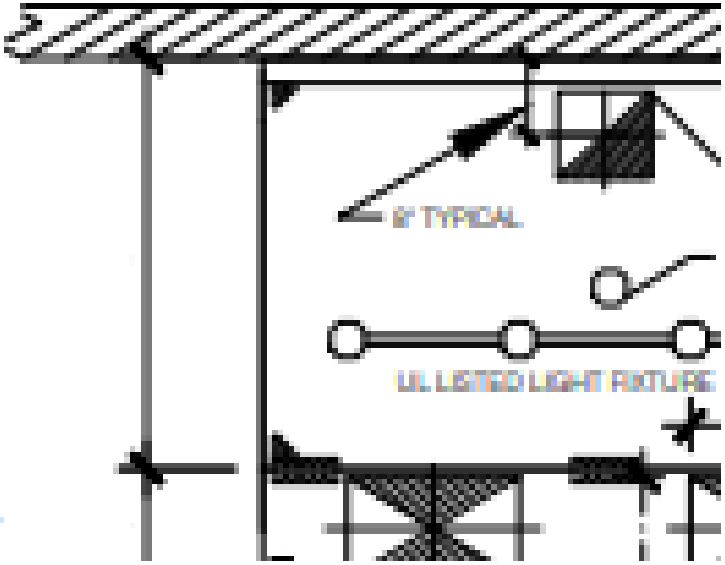
FROM THE HOOD DRAWING

IECC C403.2.8

HOOD #			MODEL #	STRATOVENT SWND2	
LENGTH (IN):	6'-8"	WIDTH (IN):	48"	HEIGHT (IN):	24"
EXHAUST CFM:	1170		SUPPLY CFM:	900	
EXHAUST SP:	0.5"hood-only		SUPPLY SP:	0.2"hood-only	
EXHAUST FPM:	1728		SUPPLY FPM:	270	
EXH. SIZE:	10" X 10"		SUP SIZE:	(2)-12"x20"	
FILTERS: (4)	16" X 16"		HOOD WEIGHT:	ANSUL-R102	
FIRE SUPPRESSION:	16" X 20"		FILTER TYPE:	CFL/INCANDESCENT	
LIGHT QTY: ( )	S/S BAFFLE		CONTROL SWITCH:	INTERLOCKED	

DESIGN NOTES:

1. HOOD IS LISTED TO UL-710 STANDARDS BY ETL. FILE 3044804-001. LISTED MIN. AIRFLOW 105 CFM/FT WITH SKIRTS, 150 CFM/FT WITHOUT.
2. ALL EXPOSED SURFACES TO BE S/S, 20 GA MIN. PER NFPA-96.
3. HOOD IS PRE-PIPED FOR ANSUL R-102.



NOTE: GENERIC DUCT DESIGN SHOWN, LOCAL CODES SHOULD BE FOLLOWED. SITE ADAPTS MAY BE NEEDED FOR LONG DUCT RUNS OR MULTIPLE TURNS.

UCT TO EXPAND TO
LET (TYP. 16"

CONTINUOUSLY WELDED EXHAUST

CODE PROVISION

IECC C403.2.8

C403.2.8 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.
2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

From the Plans
Exhaust CFM = 1170
Supply CFM = 900
Supply looks to be 77% of Exhaust

Model SVND2 shown is exhaust ONLY.

From the Internet

KITCHEN EXHAUST

IECC C403.2.8

REJECTED

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41]³	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	
C403.2.13 [ME71]²	Unenclosed spaces that are heated use only radiant heat.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	
C403.2.3 [ME55]²	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☒Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.4.7 [ME113]²	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐Complies ☐Does Not ☒Not Observable ☐Not Applicable	
C403.2.4.7 [ME113]²	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.6.1 [ME59]¹	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and	☐Complies ☐Does Not	
C403.2.8 [ME116]³	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
[ME57]¹	systems meeting Table C403.2.7(1) and C403.2.7(2)	☐Does Not ☐Not Observable ☒Not Applicable	
C403.2.8 [ME116]³	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.9 [ME60]²	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.9 [ME10]²	Ducts and plenums sealed based on static pressure and location.	☐Complies ☒Does Not ☐Not Observable ☐Not Applicable	
C403.2.9.1.3 [ME11]³	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	

Rejection Comment:

Provide commentary clearly articulating compliance with code section, as the unit is labeled ‘exhaust only’ and drawings indicate excessive supply.

HOUSTON PUBLIC WORKS

BUILDING MECHANICAL SYSTEMS

IECC C403.2.9

C403.2.9 Duct and plenum insulation and sealing. Supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and where located outside the building with a minimum of R-8 insulation in *Climate Zones* 1 through 4 and a minimum of R-12 insulation in *Climate Zones* 5 through 8. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation in *Climate Zones* 1 through 4 and a minimum of R-12 insulation in *Climate Zones* 5 through 8.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum is not greater than 15°F (8°C).

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

BUILDING MECHANICAL SYSTEMS

IECC C403.2.8

REJECTED

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.9 [ME60]²	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Duct insulation levels are not mentioned here or in the plans

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41]³	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	
C403.2.13 [ME71]²	Unenclosed spaces that are heated use only radiant heat.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	
C403.2.3 [ME55]²	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☒Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.4.7 [ME113]²	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐Complies ☐Does Not ☒Not Observable ☐Not Applicable	
C403.2.4.7 [ME113]²	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.6.1 [ME59]¹¹	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and	☐Complies ☐Does Not	
		☐Not Observable ☒Not Applicable	
C403.2.8 [ME116]³	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.9 [ME60]²	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.9 [ME10]²	Ducts and plenums sealed based on static pressure and location.	☐Complies ☒Does Not ☐Not Observable ☐Not Applicable	
C403.2.9.1.3 [ME11]³	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	

HOUSTON PUBLIC WORKS

CHAPTER 1 GENERAL

C103.2 Information on construction documents

THIS IS NOT THE LEAST BIT UNCLEAR.

12 items are required by law to be clearly delineated.

Delineation includes stating they do not apply due to an exception or exemption from the code provisions.

HOUSTON PUBLIC WORKS

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of *daylight* zones on floor plans.
12. Air sealing details.

BUILDING MECHANICAL SYSTEMS

IECC C403.2.12

Nothing ambiguous about including in the drawings.

C403.2.12.2 Motor nameplate horsepower. For each fan, the fan brake horsepower shall be indicated on the construction documents and the selected motor shall be not larger than the first available motor size greater than the following:

1. For fans less than 6 bhp (4413 W), 1.5 times the fan brake horsepower.
2. For fans 6 bhp (4413 W) and larger, 1.3 times the fan brake horsepower.
3. Systems complying with Section C403.2.12.1 *fan system motor nameplate hp* (Option 1).

GENERAL

IECC C403.2

Pdqgdwru

Plan Review and Inspection intensive

The total fan system motor nameplate horsepower requirement ensures that the fan motor is not oversized for the design air flow (cfm) to meet the building heating and cooling loads. Fan motors that are larger than required will draw more power and use more energy than those that are properly sized. Two options are provided to demonstrate compliance with the IECC. Option one uses the fan nameplate horsepower and has criteria for constant volume and variable volume systems. Option two is based on the fan brake horsepower with similar approaches as with option one. The fan efficiency grade (FEG) requirement ensures that the design of the fan blade itself is efficient at moving air.

For a 10,000 cfm load served by a constant volume system, the maximum horsepower allowed would be 11.0 (10,000 cfm times 0.0011). Additional horsepower is available by using the pressure drop adjustments in Table 403.2.10(2) and calculating the maximum brake horsepower. These calculations are typically completed by the mechanical engineer of record and should be verified during the plan review. The equation is a simplified way for a plans examiner to check the calculations of the engineer.

BUILDING MECHANICAL SYSTEMS

IECC C403.2.14

C403.2.14 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.14(1) and C403.2.14(2) when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.

TABLE C403.2.14(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

EQUIPMENT TYPE	APPLICATION	ENERGY USE LIMITS (kWh per day)[a]	TEST PROCEDURE
Refrigerator with solid doors	Holding Temperature	0.10 · V + 2.04	AHRI 1200
Refrigerator with transparent doors		0.12 · V + 3.34	
Freezers with solid doors		0.40 · V + 1.38	
Freezers with transparent doors		0.75 · V + 4.10	
Refrigerators/freezers with solid doors		the greater of 0.12 · V + 3.34 or 0.70	
Commercial refrigerators	Pulldown	0.126 · V + 3.51	

a. V = volume of the chiller or frozen compartment as defined in AHAM-HRF-1.

REFRIGERATION INFO SHEET

IECC C403.2.14

The following further complies with energy code:

- Doors will have closers designed to firmly close walk-in doors that have been closed to within 1 of full closure.
- Doors will have strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.
- Lights will have an efficacy of not less than 40 lumens per watt.
- Viewports will be triple-pane glass, either filled with inert gas or with heat-reflective treated glass.
- Transparent reach-in doors without anti-sweat heater controls will have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and coolers, respectively. When supplied with anti-sweat heater controls, the heater power draw will either have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and coolers, respectively, or the anti-sweat heater controls will reduce the energy use of the heater in a quantity corresponding to the relative humidity of the air outside the door or to the condensation on the inner glass pane.
- Evaporator fan motors that are less than 1 HP and less than 460 volts are electronically commutated motors.
- Condenser fan motors that are less than 1 HP are permanent split-capacitor motors.

Manitowoc Foodservice

Kolpak
2915 Tennessee Avenue North
Parsons, TN 38363

To Whom It May Concern:

Kolpak and Harford brands of Manitowoc Foodservice comply with regulatory requirements including National Sanitation Foundation (NSF7), Underwriters Laboratory (UL), International Building Code (IBC), Energy Independence and Security Act (EISA), International Energy Conservation Code, Department of Energy, California Code of Regulations Title 20, City of Houston, State of Oregon, and are accepted by the United States Department of Agriculture. Units requiring Factory Mutual 4880, City of Los Angeles, and Miami Dade County are available.

The foam plastic used in this product is CFC and HCFC free and complies with IBC Chapter 26. The requirements of section 2603.4.1.2 are satisfied when used with an automatic sprinkler by others and will not require a thermal barrier. The requirements of section 2603.4.1.3 are satisfied without a sprinkler as long as no panel is over 4" thick, the aggregate walk-in floor area does not exceed 400 square feet, and a thermal barrier by others is present.

The foam has been tested to ASTM E-84 as follows: flame spread rating: 20; smoke developed rating: 450; minimum flash-ignition temperature rating: 833°f; minimum spontaneous ignition temperature rating: 806°f. Also, the foam will have a covering of not less than 0.032-inch aluminum or corrosion-resistant steel having a base metal thickness not less than 0.0160 inch at any point.

Energy code requires the following minimum R-values: R-25 for coolers, R-32 for freezers, and R-28 for freezer floors. Kolpak foam is tested in accordance with ASTM C518-2004 and has the following results.

For coolers (reported at 55 F mean temperature)
- 4" thick: R-29
- 5" thick: R-36
- 6" thick R-44

For freezers (reported at 20 F mean temperature)
- 4" thick: R-32
- 5" thick: R-40
- 6" thick: R-48
- 4" floor: R-29

Completely absent

C403.2.14 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.14(1) and C403.2.14(2) when tested and rated in accordance with AHRI Standard 1200. The energy use

code:
firmly close walk-in doors that have been closed to within 1 of
, spring-hinged doors or other method of minimizing
ss than 40 lumens per watt.
either filled with inert gas or with heat-reflective treated glass.
nti-sweat heater controls will have a heater power draw of no
foot of door opening for freezers and coolers, respectively.
r controls, the heater power draw will either have a heater
.0 watts per square foot of door opening for freezers and

HOUSTON PUBLIC WORKS

FROM THE PLANS

IECC C403.2.14

REFRIGERATION SYSTEM[S] INFORMATION

	VOLUME -CUBIC FEET -	COMPRESSOR HP	REFRIGERANT TYPE	REFRIGERANT ACTUAL LBS CHARGE	REFRIGERANT LBS. ALLOWED	MAX REFRIGERANT LBS. PER 1000 CUBIC FOOT
COOLER	919.7	2.0	R-404A	5.5	28.5	31
FREEZER	320.8	3.0	R-404A	5.5	9.95	31

REFRIGERATION SYSTEM COMPONENTS AS MANUFACTURED BY THERMALRITE BY EVERIDGE. FREON LEAK DETECTION SYSTEM/ ALARM – NOT REQUIRED.

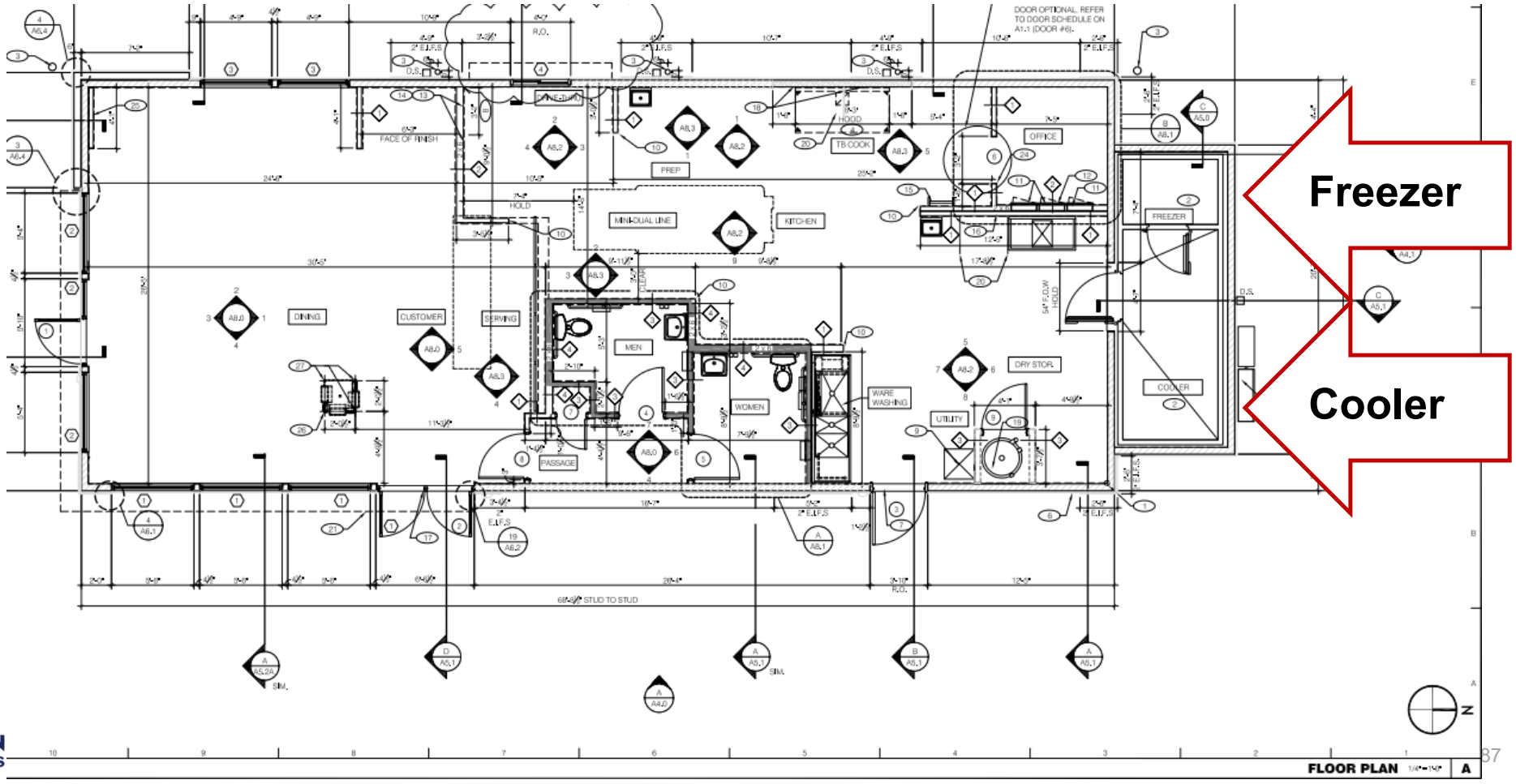
REJECTED

C403.2.14 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.14(1) and C403.2.14(2) when tested and rated in accordance with AHRI Standard 1200. The energy use

Completely absent

FROM THE PLANS

IECC C403.2.14



BUILDING MECHANICAL SYSTEMS

IECC C403.2.15

C403.2.15 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. *Refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with this section. *Walk-in coolers* and *walk-in freezers* that are not either site assembled or site constructed shall comply with the following:

1. Be equipped with automatic door-closers that firmly close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.

   Exception: Automatic closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.

2. Doorways shall have strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.

BUILDING MECHANICAL SYSTEMS

IECC C403.2.15

3. *Walk-in coolers* and *refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of not less than R-25 and *walk-in freezers* and *refrigerated warehouse freezers* shall contain wall, ceiling and door insulation of not less than R-32.

Exception: Glazed portions of doors or structural members need not be insulated.

4. *Walk-in freezers* shall contain floor insulation of not less than R-28.

5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

REFRIGERATION INFO SHEET

IECC C403.2.14

Energy code requires the following minimum R-values: R-25 for coolers, R-32 for freezers, and R-28 for freezer floors. Kolpak foam is tested in accordance with ASTM C518-2004 and has the following results.

For coolers (reported at 55 F mean temperature)

4" thick:	R-29
5" thick:	R-36
6" thick	R-44

For freezers (reported at 20 F mean temperature)

4" thick:	R-32
5" thick:	R-40
6" thick:	R-48
4" floor:	R-29

3. *Walk-in coolers* and *refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of not less than R-25 and *walk-in freezers* and *refrigerated warehouse freezers* shall contain wall, ceiling and door insulation of not less than R-32.

Manitowoc Foodservice

Kolpak
2915 Tennessee Avenue North
Parsons, TN 38363

To Whom It May Concern:

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The foam plastic used in this product is CFC and HCFC free and complies with IBC Chapter 26. The requirements of section 2603.4.1.2 are satisfied when used with an automatic sprinkler by others and will not require a thermal barrier. The requirements of section 2603.4.1.3 are satisfied without a sprinkler as long as no panel is over 4" thick, the aggregate walk-in floor area does not exceed 400 square feet, and a thermal barrier by others is present.

The foam has been tested to ASTM E-84 as follows: flame spread rating: 20; smoke developed rating: 450; minimum flash-ignition temperature rating: 833°f; minimum spontaneous ignition temperature rating: 806°f. Also, the foam will have a covering of not less than 0.032-inch aluminum or corrosion-resistant steel having a base metal thickness not less than 0.0160 inch at any point.

Energy code requires the following minimum R-values: R-25 for coolers, R-32 for freezers, and R-28 for freezer floors. Kolpak foam is tested in accordance with ASTM C518-2004 and has the following results.

For coolers (reported at 55 F mean temperature)

4" thick:	R-29
5" thick:	R-36
6" thick	R-44

For freezers (reported at 20 F mean temperature)

4" thick:	R-32
5" thick:	R-40
6" thick:	R-48
4" floor:	R-29

The following further complies with energy code:

- Doors will have closers designed to firmly close walk-in doors that have been closed to within 1 of full closure.
- Doors will have strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.
- Lights will have an efficacy of not less than 40 lumens per watt.
- Viewports will be triple-pane glass, either filled with inert gas or with heat-reflective treated glass.
- Transparent reach-in doors without anti-sweat heater controls will have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and coolers, respectively. When supplied with anti-sweat heater controls, the heater power draw will either have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and

BUILDING MECHANICAL SYSTEMS

Pdqdjhphqw

6. Windows and transparent reach-in doors for *walk-in coolers* doors shall be of double-pane or triple-pane, inert gas-filled, heat-reflective treated glass.

7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall use electronically commutated motors, brushless direct-current motors, or 3-phase motors.

8. Condenser fan motors that are less than 1 hp (0.746 kW) shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.

9. Where antisweat heaters without antisweat heater controls are provided, they shall have a total door rail, glass and frame heater power draw of not more than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers* and 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.

REFRIGERATION INFO SHEET

IECC C403.2.14

- Transparent reach-in doors without anti-sweat heater conti
  more than 7.1 or 3.0 watts per square foot of door opening
  When supplied with anti-sweat heater controls, the heater
  power draw of no more than 7.1 or 3.0 watts per square fo

9. Where antisweat heaters without antisweat heater controls are provided, they shall have a total door rail, glass and frame heater power draw of not more than 7.1 W/ft^2 (76 W/m^2) of door opening for *walk-in freezers* and 3.0 W/ft^2 (32 W/m^2) of door opening for *walk-in coolers*.

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The foam plastic used in this product is CFC and HCFC free and complies with IBC Chapter 26. The requirements of section 2603.4.1.2 are satisfied when used with an automatic sprinkler by others and will not require a thermal barrier. The requirements of section 2603.4.1.3 are satisfied without a sprinkler as long as no panel is over 4" thick, the aggregate walk-in floor area does not exceed 400 square feet, and a thermal barrier by others is present.

The foam has been tested to ASTM E-84 as follows: flame spread rating: 20; smoke developed rating: 450; minimum flash-ignition temperature rating: 833°f; minimum spontaneous ignition temperature rating: 806°f. Also, the foam will have a covering of not less than 0.032-inch aluminum or corrosion-resistant steel having a base metal thickness not less than 0.0160 inch at any point.

Energy code requires the following minimum R-values: R-25 for coolers, R-32 for freezers, and R-28 for freezer floors. Kolpak foam is tested in accordance with ASTM C518-2004 and has the following results.

For coolers (reported at 55 F mean temperature)
- 4" thick: R-29
- 5" thick: R-36
- 6" thick R-44

For freezers (reported at 20 F mean temperature)
- 4" thick: R-32
- 5" thick: R-40
- 6" thick: R-48
- 4" floor: R-29

The following further complies with energy code:

- Doors will have closers designed to firmly close walk-in doors that have been closed to within 1 of full closure.
- Doors will have strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when doors are open.
- Lights will have an efficacy of not less than 40 lumens per watt.
- Viewports will be triple-pane glass, either filled with inert gas or with heat-reflective treated glass.
- Transparent reach-in doors without anti-sweat heater controls will have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and coolers, respectively. When supplied with anti-sweat heater controls, the heater power draw will either have a heater power draw of no more than 7.1 or 3.0 watts per square foot of door opening for freezers and

BUILDING MECHANICAL SYSTEMS

Pdogpdwrq

10. Where antisweat heater controls are provided, they shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

11. Lights in *walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall either use light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, or shall use light sources

The 'health submittal' sheet addressed 3 out of the 11 requirements. Is that sufficient to indicate compliance?

INSPECTION CHECKLIST

Inspection Report skips from C403.2.9 to C403.3, skipping over 2.10 through 2.17.

The project has a cooler and a freezer.

“Provide indication of compliance with sections C403.2.10 through C403.2.17”

Section # & Req'ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.9.1.3 [ME11]³	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.3 [ME62]¹	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.3 [ME62]¹	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.4.4.6 [ME110]³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☒Not Applicable	*See the Mechanical Systems list for values.*
C403.4.4.6 [ME110]³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C404.2.1 [ME111]²	Gas-fired water-heating equipment installed in new buildings: where a singular piece of water-heating equipment >= 1,000 kBtu/h serves the entire building, thermal efficiency >= 90 Et. Where multiple pieces of water-heating equipment serve the building with combined rating >= 1,000 kBtu/h, the combined input-capacity-weighted-average thermal efficiency >= 90 Et. Exclude input rating of equipment in individual dwelling units and equipment <= 100 kBtu/h.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.2.1 [ME53]³	Air outlets and zone terminal devices have means for air balancing.	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.5, C403.5.1, C403.5.2 [ME123]³	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2..	☒Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

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BAD NEWS

COMcheck doesn't seem to have an inspection checklist item for the **coolers and freezers**.

UNFORTUNATELY, YOU (OR SOMEONE) WILL HAVE TO MAKE UP FOR THAT.

They must be shown to comply with the law. If the Mechanical "person" somehow "doesn't do" coolers or freezers, the project will not be approved until someone does.

BACK TO: ANATOMY OF A FAILURE

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 engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Suggestion: refer to **the refrigeration equipment** compliance info here.

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BUILDING MECHANICAL SYSTEMS

IECC C403.2.17

Refrigeration equipment works in much the same way as an air conditioner; however, instead of depositing the heat gain during condensation outside the building, the heat is deposited inside the building. This excess heat has a multiplication effect because the building's mechanical system has to again deal with the heat gain by moving it outside the building thermal envelope. Provisions regulating commercial refrigeration and freezing equipment were added in the 2015 code.

The daily energy use of commercial refrigerators and freezers is limited based on Tables C403.2.14(1) and (2). Equipment must have its energy use certified under an approved certification program, or where a certification program does not exist, the energy use must be supported by data furnished by the equipment manufacturer.

BUILDING MECHANICAL SYSTEMS

IECC C403.4 Hydronic & MZ Controls

C403.4 Hydronic and multiple-zone HVAC systems controls and equipment. (Prescriptive). Hydronic and multiple-zone HVAC system controls and equipment shall comply with this section.

C403.4.1 Fan control. Controls shall be provided for fans in accordance with Sections C403.4.1.1 through C403.4.1.3.

C403.4.1.1 Fan airflow control. Each cooling system listed in Table C403.4.1.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum

BUILDING MECHANICAL SYSTEMS

IECC C403.4 Hydronic & MZ Controls

- Fans generally are the largest energy-using components of HVAC systems. Most HVAC systems spend most of their operating hours at part loads, where little or no cooling is required. Few systems require full cooling capacity at all operating hours. For cooling systems, multiple stages of cooling at part-load conditions allows lower fan speed and higher efficiency for DX cooling. Significant energy savings can be realized. This section sets limits for multiple-stage cooling that align with requirements found in ASHRAE 90.1.

CHAPTER 1 GENERAL

C103.2 Information on construction documents

THIS IS NOT THE LEAST BIT UNCLEAR.

12 ITEMS ARE REQUIRED TO BE ON THE PLANS.

Anybody sick of this slide yet?

HOUSTON PUBLIC WORKS

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of *daylight* zones on floor plans.
12. Air sealing details.

ELECTRICAL POWER & LIGHTING

IECC Commercial Provisions Chapter 4 Section 405

ELECTRIC POWER & LIGHTING SYSTEMS

IECC C405.5 Exterior Lighting

Typical

TABLE C405.5.2(2)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

		LIGHTING ZONES			
		Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)		500 W	600 W	750 W	1300 W
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	**Uncovered Parking Areas**				
	Parking areas and drives	0.04 W/ft²	0.06 W/ft²	0.10 W/ft²	0.13 W/ft²
	Building Grounds				
	Walkways less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 feet wide or greater, plaza areas special feature areas	0.14 W/ft²	0.14 W/ft²	0.16 W/ft²	0.2 W/ft²
	Stairways	0.75 W/ft²	1.0 W/ft²	1.0 W/ft²	1.0 W/ft²
	Pedestrian tunnels	0.15 W/ft²	0.15 W/ft²	0.2 W/ft²	0.3 W/ft²
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft²	0.25 W/ft²	0.4 W/ft²	0.4 W/ft²

ELECTRIC POWER & LIGHTING SYSTEMS

IECC C405.5 Exterior Lighting

Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	Pedestrian tunnels	0.15 W/ft²	0.15 W/ft²	0.2 W/ft²	0.3 W/ft²
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft²	0.25 W/ft²	0.4 W/ft²	0.4 W/ft²
	Sales Canopies				
	Free-standing and attached	0.6 W/ft²	0.6 W/ft²	0.8 W/ft²	1.0 W/ft²
	Outdoor Sales				
	Open areas (including vehicle sales lots)	0.25 W/ft²	0.25 W/ft²	0.5 W/ft²	0.7 W/ft²
	Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded	Building facades	No allowance	0.075 W/ft² of gross above-grade wall area	0.113 W/ft² of gross above-grade wall area	0.15 W/ft² of gross above-grade wall area
	Automated teller machines (ATM) and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area

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ELECTRIC POWER & LIGHTING SYSTEMS

User view of COMcheck screen

Building Envelope Area Types | Interior Lighting Method and Areas | Exterior Lighting Areas

Exterior Lighting Zone: Neighborhood business district

Add | Delete | Duplicate | Help...

	Exterior Lighting Area	Area Description	Quantity	Units	W/Unit	Tradable
1	Illuminated area of facade wall ...		500	ft2	0.1	No
2	Entry canopy		500	ft2	0.25	Yes
3	Other door (not main entry)		3	ft of doo...	20	Yes
4	Other door (not main entry)		3	ft of doo...	20	Yes
5	Parking area		10000	ft2	0.06	Yes

- Lighting applications entered similar to interior lighting
- Pay attention to tradable versus non-tradable criteria.

Comcheck Feed Store case study.cck - COMcheck 4.0.2.8 Code: 90.1 (2010) Standard

File Edit View Options Code Help

Project | Envelope | Interior Lighting | Exterior Lighting | Mechanical | Requirements

Add Fixture | Fixture Library

	Component	Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage	Track Lighting Wattage	Exemption
	Exterior Lighting Areas:	Tradable Wattage: Allowed = 845 Proposed = 1086 Supplemental wattage: 600 (see Help for details)								
1	Illuminated area of facade wall or surface (5	Non-tradable Wattage: Allowed = 50 Proposed = 1640								
2	LED 2			LED Roadway-Pa...		1	20	32		None
3	Entry canopy (500 ft2)	Tradable Wattage: Allowed = 125 Proposed = 16								
4	LED 1			LED Linear 20W		1	4	4		None
5	Other door (not main entry) (3 ft of door width	Tradable Wattage: Allowed = 60 Proposed = 35								
6	HID 2			High-Pressure So...	Standard	1	1	35.0		None

ELECTRICAL POWER & LIGHTING SYSTEMS

IECC C405 Lighting Power

COMcheck Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type:
Exterior Lighting Zone: 4 (High activity metropolitan commercial district)

Construction Site: Owner/Agent: Designer/Contractor:

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity		D dable ttage	E Allowed Watts (B X C)
Parking Lot Lights (Parking area)	11 ft2	0.13	Yes	1
Main Entry Door (Main entry)	2 ft of door	30	Yes	60
Rear Egress(Employee) (Other door (not main entry))	1 ft of door	20	Yes	20
Drive-Thru Window (Drive-up windows/doors)	1 windows	400	No	400
Rear Wall Mounted Lts (Illuminated area of facade wall or surface)	5 ft2	0.2	No	1
Side Door (Customer) (Other door (not main entry))	1 ft of door	20	Yes	20
			Total Tradable Watts (a) =	101
			Total Allowed Watts =	502
			Total Allowed Supplemental Watts (b) =	1300

Rear Wall Mounted Lts (Illuminated area of facade wall or surface 5 ft2): Non-tradable Wattage
LED 7: LED A Lamp 12W: 1 1 12 12

Side Door (Customer) (Other door (not main entry) 1 ft of door width): Tradable Wattage
LED 8: LED PAR 12W: 1 1 12 12

Total Tradable Proposed Watts = 1032

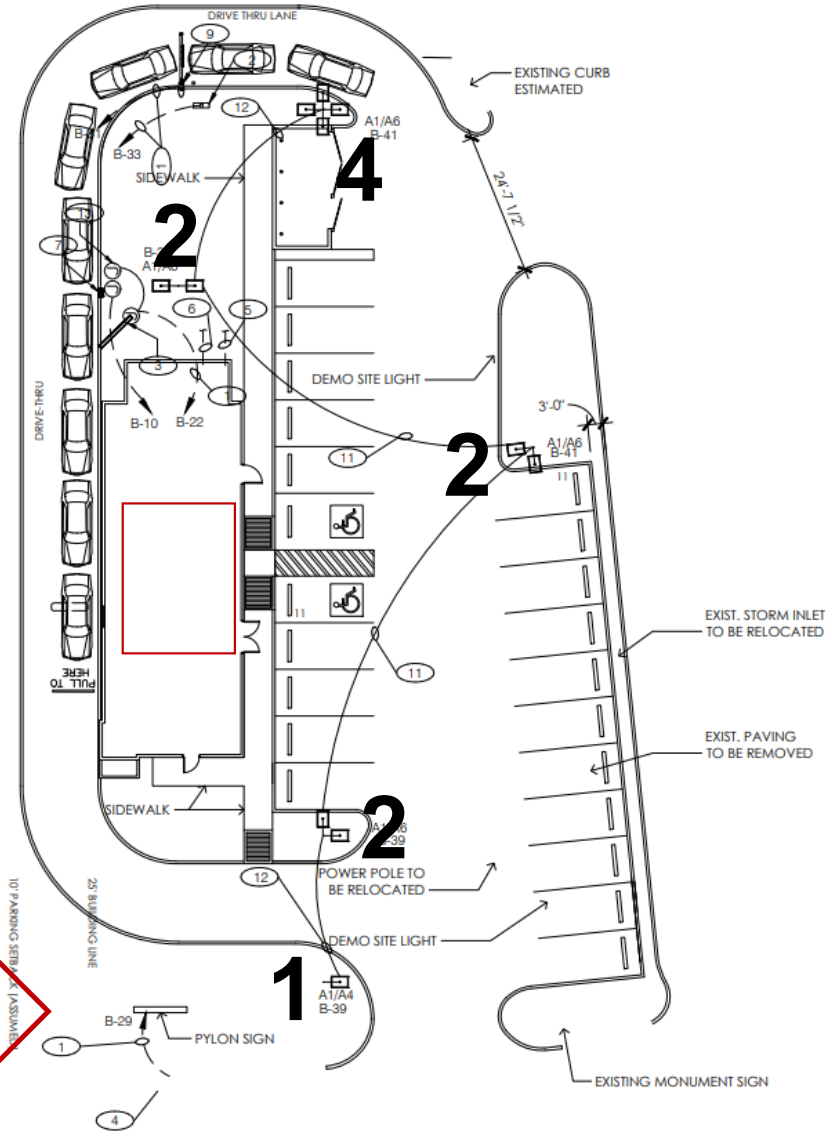
ELECTRICAL POWER & LIGHTING SYSTEMS

IECC C405 Lighting Power

Here's the site plan, does this look like 11 sf of parking to you?

One single lamp fixture,
Three 2-lamp fixtures,
One 4-lamp fixture.

EXEMPT



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WHAT SHOULD HAVE BEEN SUBMITTED

IECC C405 Lighting Power

COMcheck Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type:
Exterior Lighting Zone

Allowed Exterior Lighting Power

REJECTED

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)	
Parking Lot Lights (Parking area)	13,503 sf 11 ft2	0.13	Yes	1	1,755 W
Main Entry Door (Main entry)	6 2 ft of door	30 /ft	Yes	60	180 W
Rear Egress(Employee) (Other door (not main entry))	4 1 ft of door	20	Yes	20	80 W
Drive-Thru Window (Drive-up windows/doors)	1 windows	400	No	400	400 W
Rear Wall Mounted Lts (Illuminated area of facade wall or surface)	3204 sf 5 ft2	.15 /sf	No	1	480 W
Side Door (Customer) (Other door (not main entry))	3 1 ft of door	20	Yes	20	80 W
			Total Tradable Watts (a) =	101	2095 W
			Total Allowed Watts =	502	
			Total Allowed Supplemental Watts (b) =	1300	

2095 + 1300 = 3395 W Budget

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 1300 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

LED 8: LED PAR 12W: 1 1 12 12
Total Tradable Proposed Watts = 1032

HOUSTON PUBLIC WORKS

ELECTRICAL POWER & LIGHTING SYSTEMS

COMcheck Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Parking Lot Lights (Parking area 11 ft2): Tradable Wattage				
A1: LSI IND XALM-FT-LED-HO-40-UE-BR: LED Roadway-Parking Unit 220W:	1	1	120	120
A1: LSI IND XALM-FT-LED-HO-40-UE-BR: LED Roadway-Parking Unit 220W:	2	3	120	360
A1: LSI IND XALM-FT-LED-HO-40-UE-BR: LED Roadway-Parking Unit 220W:	1	4	120	480
Main Entry Door (Main entry 2 ft of door width): Tradable Wattage				
LED 4: LED A Lamp 12W:	1	1	12	12
Rear Egress(Employee) (Other door (not main entry) 1 ft of door width): Tradable Wattage				
LED 5: LED PAR 12W:	1	4	12	48
Drive-Thru Window (Drive-up windows/doors 1 windows or doors): Non-tradable Wattag				
LED 6: LED PAR 12W:		1	12	12
Rear Wall Mounted Lts (Illuminated area of facade wall or surface 5 ft2): Non-tradable W				
LED 7: LED A Lamp 12W:	1			12
Side Door (Customer) (Other door (not main entry) 1 ft of door width): Tradable Wattage				
LED 8: LED PAR 12W:	1	1		12
			Total Tradable Proposed W tts =	1032

Actually complies

2095 + 1300 = 3395 Wattage Budget

ELECTRIC POWER & LIGHTING SYSTEMS

IECC C405.5 Exterior Lighting

The COMcheck was incorrectly computed for the Allowed Exterior Lighting Power component. Please correct and resubmit.

COMMERCIAL ENERGY EFFICIENCY ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC Commercial Provisions Chapter 4 Section 406

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

SECTION C406
ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

Architect's version since he did the envelope

COMcheck Software Version 4.0.4.1

Envelope Compliance Certificate

Project Information

Energy Code:	2015 IECC
Project Title:	
Location:	Houston, Texas
Climate Zone:	2a
Project Type:	New Construction
Vertical Glazing / Wall Area:	12%
Permit Date:	
Permit No.	

Construction Site: Owner/Agent: Designer/Contractor:

Building Area	Floor Area
1-Dining: Cafeteria/Fast Food : Nonresidential	2053

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Envelope Assemblies

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within

East Wall: Wood-Framed, 16" o.c., [Bldg. Use 1 - Dining: Cafeteria/Fast Food]	1150	19.0	3.8	0.052	0.0
Window 4: Metal Frame with Thermal Break:Fixed, Perf. Specs.: Product ID 1000, SHGC 0.23, [Bldg. Use 1 - Dining: Cafeteria/Fast	140	---	---	0.290	0.5

HOUSTON PUBLIC WORKS

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

Engineer's version of same project

COMcheck Software Version 4.1.1.0

Mechanical Compliance Certificate

Project Information

Energy Code:
Project Title:
Location:
Climate Zone: 2a
Project Type: New Construction

Construction Site: Houston, TX 77084
Owner/Agent:
Designer/Contractor:

Additional Efficiency Package(s)
High efficiency HVAC. Systems that do not meet the performance requirement will be identified in the mechanical requirements checklist report.

Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone):
	Heating: 1 each - Duct Furnace, Gas, Capacity = 150 kBtu/h
	Proposed Efficiency = 88.00% Ec, Required Efficiency: 88.00 % Ec
	Cooling: 1 each - Single Package DX Unit, Capacity = 92 kBtu/h, Air-Cooled Condenser, Air Economizer
	Proposed Efficiency = 12.60 EER, Required Efficiency: 12.10 EER + 13.9 IEER
	Fan System: RTU-1 -- Compliance (Motor nameplate HP method) : Passes
	Fans:

Additional Efficiency Package(s)

High efficiency HVAC. Systems that do not meet the performance requirement will report.

Proposed Efficiency: 98.50 % Et, Required Efficiency: 80.00 % Et

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 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406 compliance cannot be verified as submitted.

COMcheck Software Version 4.1.1.0

Inspection Checklist

Energy Code: 2015 IECC

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 [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	
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☒ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	

Additional Comments/Assumptions:

C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☒ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	REJECTED

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

C406.1.1 Tenant spaces. Tenant spaces shall comply with Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively, tenant spaces shall comply with Section C406.5 where the entire building is in compliance.

- Separately permitted tenant spaces are allowed to choose any of the paths that are applicable to the space being improved, but are able to choose the on-site renewable energy path only if the entire building meets the minimum renewable energy capacity requirements described in Section 406.5.

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

LET'S LOOK AT A TENANT SPACE BUILDOUT COMcheck #1…

Since it's an Alteration, no:

COMcheck Software Version 4.0.4.1

Envelope Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title: Taco Bell
Location: Houston, Texas

COMcheck Software Version 4.1.1.0

Interior Lighting Compliance Certificate

1

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type: Alteration

Construction Site: Owner/Agent: Designer/Contractor:

Missing Additional Efficiency Package…

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-School/University	8360	0.87	7273
		Total Allowed Watts =	7273

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
School/University (8360 sq.ft.)				
LED 1: A1: 2'X4' LED: Other:	1	75	51	3825
LED 2: A2: 2'X4' LED: Other:	1	30	51	1530
LED 3: B1: 1'X4' LED: Other:	1	1	33	33
LED 4: C1: LED DOWNLIGHT: Other:	1	12	30	360
			Total Proposed Watts =	5748

Interior Lighting PASSES

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting alteration project represented in this document is consistent with the

HOUSTON PUBLIC WORKS

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

LET'S LOOK AT A TENANT SPACE BUILDOUT COMcheck #2….

COMcheck Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

2

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type: Alteration
Exterior Lighting Zone 2 (Neighborhood business district)

Construction Site: Owner/Agent: Designer/Contractor:

Missing Additional Efficiency Package…

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Illuminated area of facade wall or surface	2372 ft2	0.1	No	237
			Total Tradable Watts (a) =	0
			Total Allowed Watts =	237
			Total Allowed Supplemental Watts (b) =	600

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 600 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 Fixtures	D Fixture Watt.	E (C X D)
Illuminated area of facade wall or surface (2372 ft2): Non-tradable Wattage				
LED 1: WP1: LED WALL PACK: Other:	1	10	47	470
			Total Tradable Proposed Watts =	0

Exterior Lighting PASSES

HOUSTON PUBLIC WORKS

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

3 out of 4 forms and NO Additional Efficiency Package mentioned!

COMcheck Software Version 4.1.1.0

Mechanical Compliance Certificate

3

Project Information

Energy Code:	2015 IECC
Project Title:	
Location:	Houston, Texas
Climate Zone:	2a
Project Type:	Alteration

Construction Site: Owner/Agent:

Missing Additional Efficiency Package...

Mechanical Systems List

Quantity	System Type & Description
1	HVAC System 1 (RTU-1) (Multiple-Zone): Cooling: 1 each - Single Package DX Unit, Capacity = 95 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.10 EER, Required Efficiency: 11.20 EER + 12.8 IEER Fan System: None
1	HVAC System 2 (Multiple-Zone): Cooling: 1 each - Single Package DX Unit, Capacity = 77 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.40 EER, Required Efficiency: 11.20 EER + 12.8 IEER Fan System: None
1	HVAC System 3 (RTU-3) (Single Zone): Heating: 1 each - Other, Electric, Capacity = 9 kBtu/h No minimum efficiency requirement applies Cooling: 1 each - Single Package DX Unit, Capacity = 93 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.70 EER, Required Efficiency: 11.20 EER + 12.8 IEER Fan System: None

Mechanical Compliance Statement

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ADDITIONAL EFFICIENCY PACKAGE OPTIONS

IECC C406 Additional Efficiency Package Options

And the Inspection Checklist has no comments.

C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	

Additional Comments/Assumptions:

COMMERCIAL ENERGY EFFICIENCY SYSTEM COMMISSIONING

IECC Commercial Provisions Chapter 4 Section 408

SYSTEM COMMISSIONING

SECTION C408
SYSTEM COMMISSIONING

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403 and electrical power and lighting systems in Section C405.

Basically, smaller buildings than a Walgreens, for example, would be exempt.

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C408.2 Mechanical systems and service water-heating systems commissioning and completion requirements. Prior to the final mechanical and plumbing inspections, the *registered design professional* or *approved agency* shall provide evidence of mechanical systems *commissioning* and completion in accordance with the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exceptions: The following systems are exempt:

1. Mechanical systems and service water heater systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3 that serve individual *dwelling units* and *sleeping units*.

SYSTEM COMMISSIONING

C408.2.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professional* or *approved agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of *commissioning*, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested including, but not limited to, calibrations and economizer controls.
4. Conditions under which the test will be performed. Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

SYSTEM COMMISSIONING

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers used for air-system balancing are prohibited on constant-volume fans and variable-volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.746 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less are not required to be provided with a means

SYSTEM COMMISSIONING

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exceptions: The following equipment is not required to be equipped with a means for balancing or measuring flow:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than 5 percent of the nameplate horsepower draw above that required if the impeller were trimmed.

SYSTEM COMMISSIONING

C408.2.4 Preliminary commissioning report. A preliminary report of *commissioning* test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

SYSTEM COMMISSIONING

Is there something unclear about this?

C408.2.4.1 Acceptance of report. Buildings, or portions thereof, shall not be considered acceptable for a final inspection pursuant to Section C104.3 until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner or owner's authorized agent has received the Preliminary Commissioning Report.

C408.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary Commissioning Report be made available for review by the *code official*.

C408.2.5 Documentation requirements. The *construction documents* shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the *certificate of occupancy*.

SYSTEM COMMISSIONING

This means we should see notes in the permit set about this.

If we don't, the set is rejected.

C408.2.5 Documentation requirements. The *construction documents* shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the *certificate of occupancy*.

C408.2.5.1 Drawings. *Construction documents* shall include the location and performance data on each piece of equipment.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment

SYSTEM COMMISSIONING

COMcheck covers commissioning, this engineer ignored it. The size exception is probably met, but no exception comment was input.

	proposed watts are less than or equal to allowed watts.	☐Not Observable ☐Not Applicable
C408.2.1 [FI28][1]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable
C408.2.3.1 [FI31][1]	HVAC equipment has been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable
C408.2.3.2 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable
C408.2.4 [FI29][1]	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable
C408.2.5.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable
C408.2.5.1 [FI16][3]	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable

C408.2.1 [FI28][1]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable

Blank?

C408.3 [FI33][1]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable

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COMcheck Desktop 4.1.2

What's new:
Version 4.1.2.0 addresses the following:

- 90.1-2013/2016 projects having window U-factors greater than 1.23 were incorrectly getting reset to U-.015 by a third-party library called OpenStudio. This error in OpenStudio gives a notable benefit to these windows. This U-factor reassignment has been corrected and projects that were benefiting in this way will now likely be less compliant.
- Two bugs were found and fixed when applying 90.1-2013/2016 and the project includes multiple types of fenestration products or when window-wall-ratio is greater than 40%.
- HVAC systems specified under 90.1-2016 that are evaluated for economizer requirements may have incorrectly been reporting an economizer requirements when cooling capacity is less than 54 kBtu/hr applies. This error has been correctly in this release.
- British Columbia projects can now select locations within their jurisdiction while using 90.1-2013/2016.
- Fenestration performance data sourced from NFRC have been updated.
- Various report formatting enhancements are included in this release.
- Support for 2012 North Carolina has been removed.
- Printing of inspection requirements reports for Massachusetts projects was repaired.
- Java runtime engine has been upgraded to satisfy changes in download security policy associated with 90.1-2013/2016 weather file downloads.

Version:
4.1.2

Build:
4.1.2.2

Release date:
Wednesday, April 1, 2020

Upload:
COMcheck_4_1_2_0_setup.exe
COMcheck_4_1_2_1_setup.exe
COMcheck_4_1_2_2_setup.exe

Platform:
Windows

Logo:

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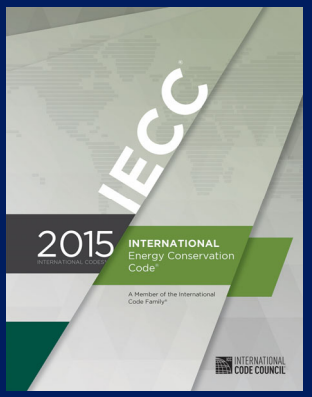
IN SUMMARY

- Beginning **January 1, 2021**, plans submitted with incomplete COMcheck reports will be rejected at pre-screen.
- If you have enough quantity, then plan reviewers will judge the quality of the comments in the reports.
  a) "Requirement will be met" is not acceptable.
  b) Exemptions and exceptions must be specific.
  c) Comments must locate the info in the plans.

QUESTIONS?



2015 IECC
COMMERCIAL ENERGY CODE
COMCHECK WORKSHOP

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