

2018 IBC 717.6.1 THROUGH PENETRATIONS

IN OCCUPANCIES OTHER THAN GROUPS I-2 AND I-3, A DUCT CONSTRUCTED OF APPROVED MATERIALS IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE THAT PENETRATES A FIRE-RESISTANCE-RATED FLOOR/CEILING ASSEMBLY THAT CONNECTS NOT MORE THAN TWO STORIES IS PERMITTED WITHOUT SHAFT ENCLOSURE PROTECTION, PROVIDED THAT A LISTED FIRE DAMPER IS INSTALLED AT THE FLOOR LINE OR THE DUCT IS PROTECTED IN ACCORDANCE WITH SECTION 714.5. FOR AIR TRANSFER OPENINGS, SEE SECTION 712.1.9.

EXCEPTION: A DUCT IS PERMITTED TO PENETRATE THREE FLOORS OR LESS WITHOUT A FIRE DAMPER AT EACH FLOOR, PROVIDED THAT SUCH DUCT MEETS ALL OF THE FOLLOWING REQUIREMENTS:

- THE DUCT SHALL BE CONTAINED AND LOCATED WITHIN THE CAVITY OF A WALL AND SHALL BE CONSTRUCTED OF STEEL HAVING A MINIMUM WALL THICKNESS OF 0.0167 INCHES (0.4712 mm) (NO. 26 GAGE).
- THE DUCT SHALL OPEN INTO ONLY ONE DWELLING OR SLEEPING UNIT AND THE DUCT SYSTEM SHALL BE CONTINUOUS FROM THE UNIT TO THE EXTERIOR OF THE BUILDING.
- THE DUCT SHALL NOT EXCEED 4-INCH (102 mm) NOMINAL DIAMETER AND THE TOTAL AREA OF SUCH DUCTS SHALL NOT EXCEED 100 SQUARE INCHES (0.065 m²) IN ANY 100 SQUARE FEET (9.3 m²) OF FLOOR AREA.
- THE ANNULAR SPACE AROUND THE DUCT IS PROTECTED WITH MATERIALS THAT PREVENT THE PASSAGE OF FLAME AND HOT GASES SUFFICIENT TO IGNITE COTTON WASTE WHERE SUBJECTED TO ASTM E119 OR UL 263 TIME-TEMPERATURE CONDITIONS UNDER A MINIMUM POSITIVE PRESSURE DIFFERENTIAL OF 0.01 INCH (2.49 PA) OF WATER AT THE LOCATION OF THE PENETRATION FOR THE TIME PERIOD EQUIVALENT TO THE FIRE-RESISTANCE RATING OF THE CONSTRUCTION PENETRATED.
- GRILLE OPENINGS LOCATED IN A CEILING OF A FIRE-RESISTANCE-RATED FLOOR/CEILING OR ROOF/CEILING ASSEMBLY SHALL BE PROTECTED WITH A LISTED CEILING RADIATION DAMPER INSTALLED IN ACCORDANCE WITH SECTION 717.6.2.1.

OVERVIEW:

1-HOUR RATED CEILING IS NOT REQUIRED BY 2018 IBC ON THE UPPER FLOOR OF THE BUILDING AND IS BEING ADDED TO PROTECT THE DUCT CONNECTIONS THAT NEED TO OCCUR INSIDE THE BUILDING TO MEET THE AIR TIGHTNESS REQUIREMENTS FOR A HIGHLY EFFICIENT BUILDING CONSTRUCTION. THE ERV/HRV DUCTWORK NEEDS TO BE CONTAINED WITHIN THE BUILDING ENVELOPE (BELOW THE ROOF) TO REDUCE HEAT LOSS & GAIN TO VENTILATION AIR.

EACH OF THE HOMERUNS ARE LOCATED IN CHASE WALL ASSEMBLIES AND ARE FIRE CAULKED AT THE TOP AND BOTTOM WHERE THEY PENETRATE THE RATED HORIZONTAL ASSEMBLIES. ADDITIONALLY, THE DUCTS WILL BE FIRE CAULKED WHEN THEY PENETRATE THE VERTICAL WALLS OF THE 1-HOUR RATED RESIDENTIAL CORRIDOR FIRE PARTITION WALLS ABOVE THE 1-HOUR RATED HORIZONTAL ASSEMBLY CEILING IN THE CORRIDOR. BASED ON THIS CONFIGURATION THE HORIZONTAL SUPPLY AND EXHAUST DUCT MAINS ABOVE THE CORRIDOR CEILING ARE SEPARATED FROM THE REST OF THE BUILDING.

IF DUCTS ARE REQUIRED TO BE ABOVE THE ROOF ASSEMBLY THIS ADDS SIGNIFICANT COST FOR OVER-FRAMING THE ROOF WHICH ALSO ADDS HEIGHT TO THE BUILDING WHICH IS NOT PREFERRED BY THE LAND USE CODE. ELIMINATING DUCTWORK ABOVE THE ROOF ALSO INCREASES THE AREA AVAILABLE FOR FUTURE PV SYSTEMS.

ALL OTHER REQUIREMENTS WILL BE MET FOR THE EXCEPTION TO 2018 SBC SECTION 717.6.1 IN REGARD TO FIRE CAULKING, DUCT SIZES, LOCATION OF DUCT RUNS, AND ALLOWABLE AREAS OF DUCT PENETRATIONS THROUGH FLOOR CEILING ASSEMBLY IN 100 SQ FT AREA OF FLOOR.

AS DISCUSSED ABOVE LEGALLY REQUIRED STANDBY POWER IS NOT REQUIRED FOR THIS IBC EXCEPTION BUT IS BEING VOLUNTARILY PROVIDED TO ENSURE A MORE RELIABLE POWER SOURCE TO THE ROOFTOP ERV/HRV TO PROVIDE CONTINUOUS SUPPLY & EXHAUST FROM THE OCCUPIED SPACES.

CODE ALTERNATE REQUEST:

ALLOW 4" ROUND SUPPLY AND EXHAUST DUCT RUNS FOR EACH RESIDENTIAL DWELLING UNIT TO CONNECT TO THE SUPPLY AND EXHAUST HORIZONTAL DUCT MAINS ABOVE A 1-HOUR RATED HORIZONTAL CEILING ASSEMBLY ABOVE THE CORRIDOR ON THE UPPER FLOOR OF THE BUILDING (LEVEL 5). SEE SHEET A10.02 FOR PROPOSED CEILING ASSEMBLY.

4" ROUND DUCT RUNS TO COMPLY WITH ALL OTHER REQUIREMENTS OF EXCEPTION TO 2018 IBC SECTION 717.6.1.

GENERAL DESCRIPTION:

THE PROJECT IS UTILIZING HIGH-EFFICIENCY CENTRAL ERV/HRV ROOFTOP UNITS THAT ARE MOUNTED OUTSIDE ON THE ROOF. SUPPLY AND EXHAUST/RETURN ERV/HRV DUCTWORK MUST BE INSTALLED TO BE WITHIN THE BUILDING ENVELOPE TO MEET ENERGY EFFICIENCY AND AIR BARRIER REQUIREMENTS.

PROJECT HAS 4-STORIES OF RESIDENTIAL GROUP R-2 DWELLING UNITS. THE RESIDENTIAL UNITS ARE ON THE UPPER FLOORS (LEVELS 2, 3, 4 & 5) OF THE BUILDING. BUILDING HAS (5) FLOORS OF TYPE VA WOOD FRAME CONSTRUCTION. THE FLOOR BELOW THE LEVEL 2 1-HOUR HORIZONTAL ASSEMBLY INCLUDES ALL NONRESIDENTIAL OCCUPANCIES THAT UTILIZE SEPARATE HEAT/ENERGY RECOVERY VENTILATION SYSTEMS FOR THE OFFICES, COMMON SPACE AND RESIDENTIAL ENTRY.

BASED ON THE BUILDING HAVING 4 STORIES OF RESIDENTIAL IT IS AN IDEAL APPLICATION FOR THE EXCEPTION TO 2018 IBC SECTION 717.6.1 TO UTILIZE THE 4" SUPPLY/EXHAUST DUCTWORK VIA THE HOMERUN RULE AND NOT REQUIRE RATED SHAFTS AND FIRE/SMOKE DAMPERS.

DESCRIPTION OF CODE ALTERNATE:

ALLOW 4" ROUND SUPPLY AND EXHAUST DUCT RUNS FOR EACH RESIDENTIAL DWELLING UNIT TO CONNECT TO THE SUPPLY AND EXHAUST HORIZONTAL DUCT MAINS ABOVE A 1-HOUR RATED HORIZONTAL CEILING ASSEMBLY ABOVE THE CORRIDOR ON THE UPPER FLOOR OF THE BUILDING (LEVEL 5) INSTEAD OF BEING CONTINUOUS TO THE EXTERIOR OF THE BUILDING. SEE ATTACHED DRAWINGS FOR PROPOSED CEILING ASSEMBLY.

4" ROUND DUCT RUNS TO COMPLY WITH ALL OTHER REQUIREMENTS OF EXCEPTION TO 2018 IBC SECTION 717.6.1.

ADD ITIONALLY, LEGALLY REQUIRED STANDBY POWER (TAP AHEAD OF THE MAIN) WILL BE PROVIDED TO THE ERV/HRV TO PROVIDE A MORE RELIABLE POWER SOURCE AND MAINTAIN CONTINUOUS SUPPLY AND EXHAUST AIRFLOW TO THE ROOFTOP UNIT.

DESCRIPTION OF CODE REQUIREMENT:

ITEM #2 OF EXCEPTION TO 2018 IBC SECTION 717.6.1 STATES THE 4" DUCT RUNS NEED TO BE CONTINUOUS FROM THE RESIDENTIAL DWELLING UNIT TO THE EXTERIOR OF THE BUILDING.

EXCEPTION TO 2018 IBC SECTION 717.6.1 DOES NOT REQUIRE LEGALLY REQUIRED STANDBY POWER.

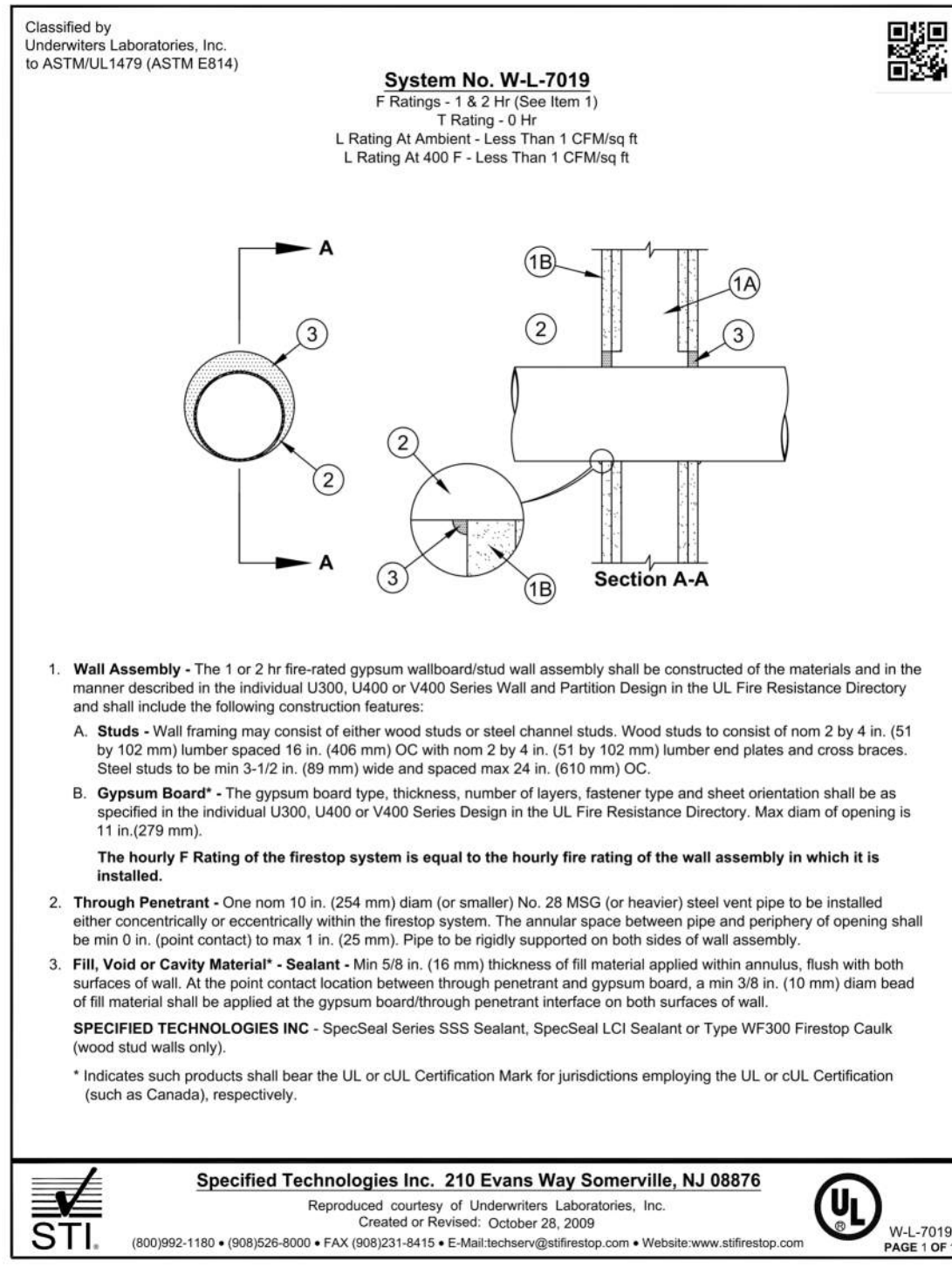
JUSTIFICATION:

EXCEPTION 2 REQUIRES THAT "THE DUCT SYSTEM SHALL BE CONTINUOUS FROM THE UNIT TO THE EXTERIOR OF THE BUILDING" TO LESSEN THE POTENTIAL FOR SPREADING FIRE AND SMOKE FROM ONE DWELLING UNIT TO ANOTHER.

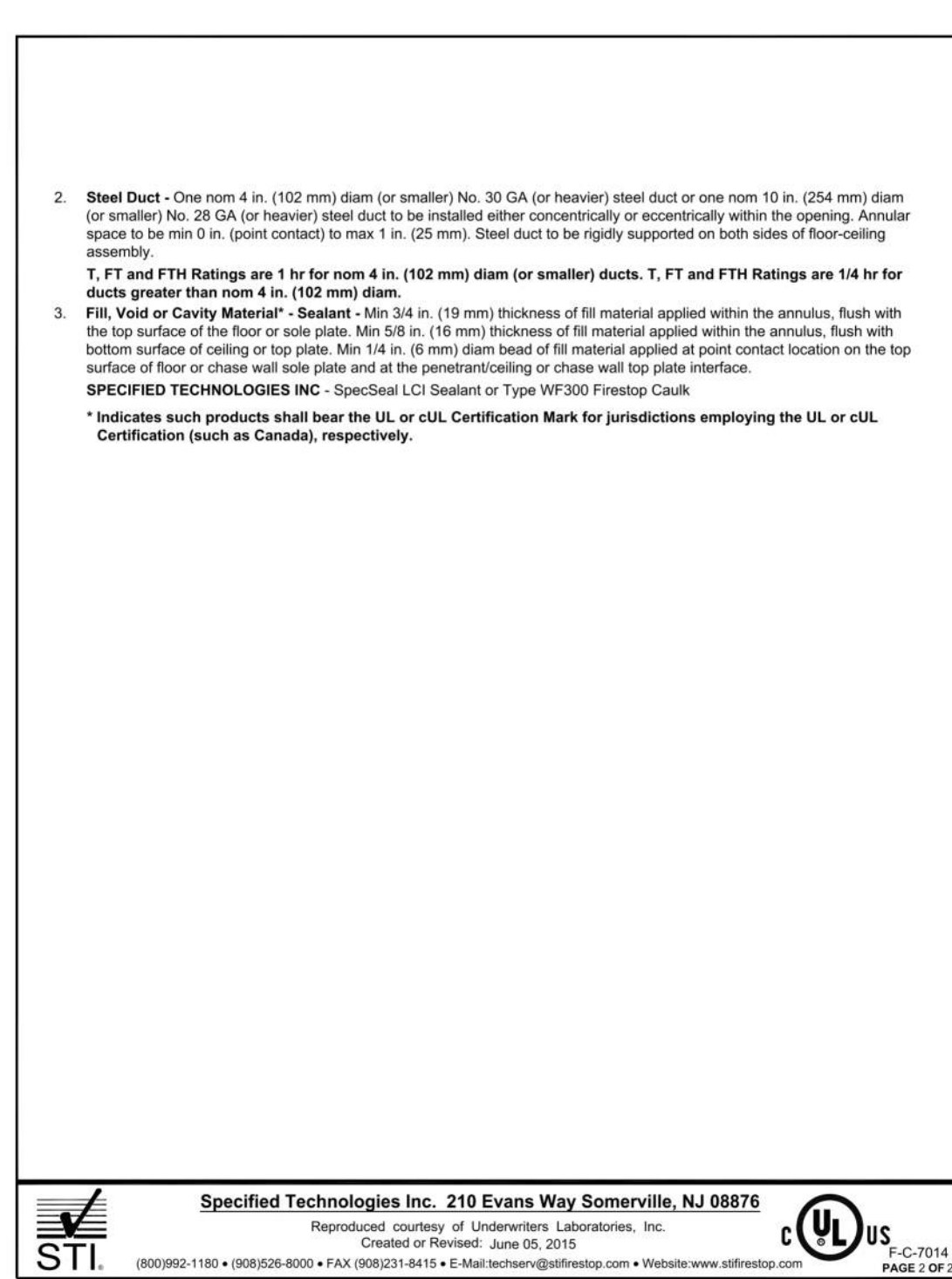
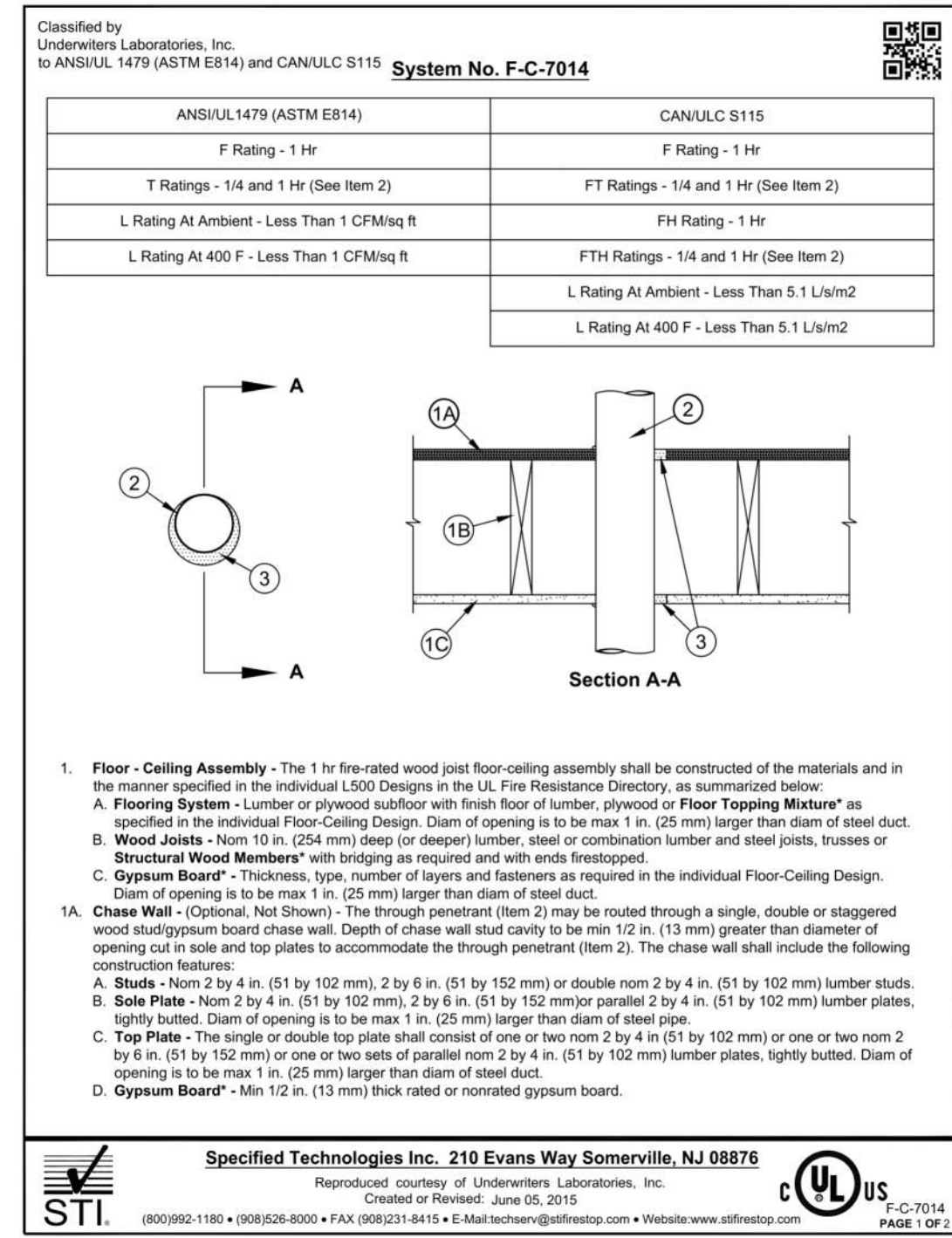
THE 1-HOUR HORIZONTAL CEILING ASSEMBLY IN THE CORRIDOR AND THE 1-HOUR VERTICAL CORRIDOR FIRE PARTITION WALLS PROVIDE A RATED BOUNDARY BETWEEN THE DWELLING UNITS AND THE SUPPLY/EXHAUST DUCT MAINS ABOVE THE CORRIDOR (SEE DETAIL 1 - SUPPLY/EXHAUST HOMERUN CROSS SECTION BELOW).

ADDITIONALLY, BY PROVIDING LEGALLY REQUIRED STANDBY POWER (SIMILAR TO WHAT IS REQUIRED FOR SUBDUCT EXHAUST FANS SYSTEMS AT SHAFT PENETRATIONS WITHOUT FIRE/SMOKE DAMPERS) THIS PROVIDES A MORE RELIABLE POWER SOURCE TO MAINTAIN CONTINUOUS SUPPLY AIR AND EXHAUST AIRFLOW FOR THE DUCT SYSTEMS WHICH WILL HELP TO REMOVE ANY SMOKE FROM THE OCCUPIED SPACES.

IN OUR PROFESSIONAL OPINION, THE LEGALLY REQUIRED STANDBY POWER AT THE UNIT AND THE 1-HOUR FIRE-RATED HORIZONTAL CEILING ASSEMBLY (NOT REQUIRED BY OTHER PROVISIONS OF THE IBC) SEPARATION PROVIDES AN EQUIVALENT LEVEL OF PROTECTION TO THE 1-HOUR RATED HORIZONTAL ROOF/CEILING ASSEMBLY REQUIRED FOR TYPE VA CONSTRUCTION TO SEPARATE THE OUTDOOR DUCTS AND THE UPPER FLOOR AND OUTDOORS.



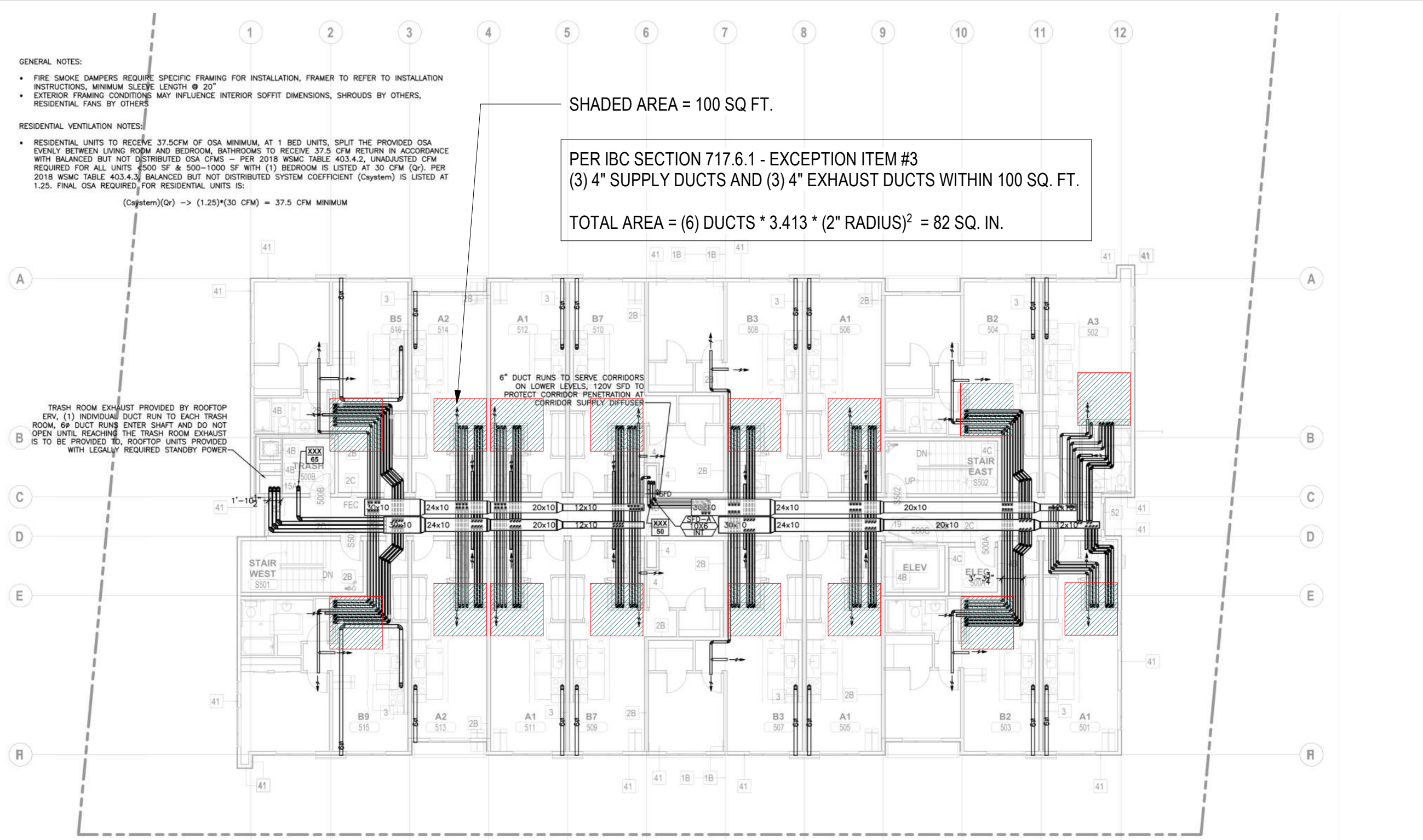
THROUGH-PENETRATION FIRESTOP SYSTEM - WALL



THROUGH-PENETRATION FIRESTOP SYSTEM - FLOOR

Additional Exhibit to accompany the HDC Exemplary Buildings Balanced Ventilation with Heat Recovery Guidelines

Many thanks to Encore Architects and Low Income Housing Institute (LIHI) for their willingness to share this example code alteration/modification request used for the Martin Way - Phase 2 project. Encore and LIHI wish to acknowledge and thank the Hobson Place Design team for the inspiration and thoughtful details they shared to influence this subsequent code alternate request. This document is provided as reference information only, and is not to be used for any other purpose. Code references, interpretations, and design criteria are all subject to your own design team and authority having jurisdiction (AHJ) interpretations.



HVAC PLAN - LEVEL 5

