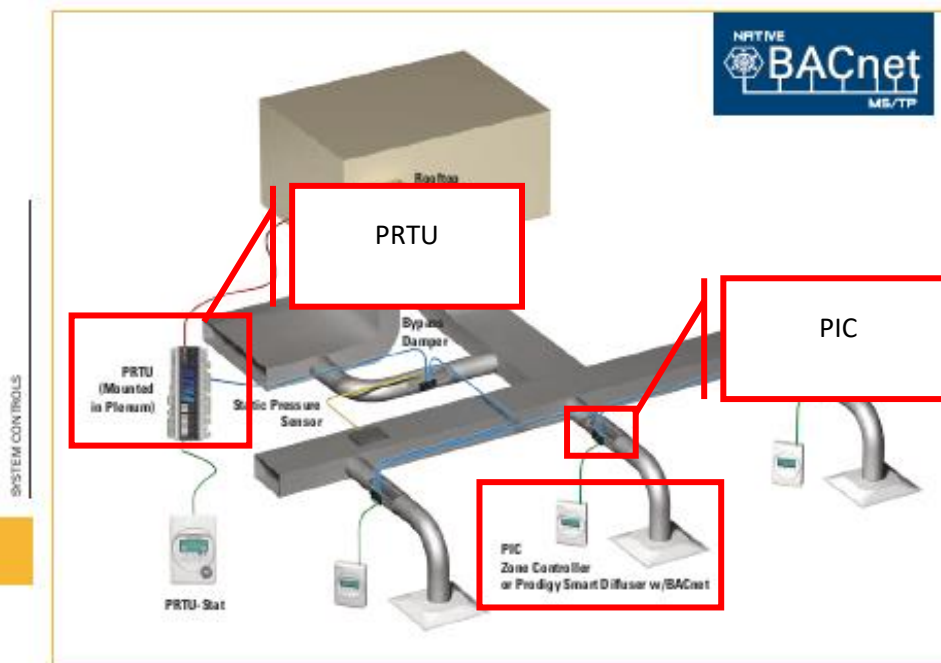


EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
A system for controlling the air quality within a room, the system comprising:	To the extent the preamble is limiting, the PIC, the Price CO ₂ Humidity Thermostat, and the PRTU are combined in a system for controlling air quality within a room.

EXHIBIT E**System Layout – PRTU**

BACnet MS/TP Networking with Zone Controllers (PIC and/or Prodigy)



*For specific wiring information see the PRTU Service & Installation Manual – Available at www.price-hvac.com

The illustration above shows a typical PRTU system.

- Here a series of zones are controlled using thermostats to regulate VAV dampers, and thus regulate the air flow to the corresponding zone. (Note: The can also support fan powered terminals with reheat).
- Each zone controller is daisy-chained together and then to the PRTU, allowing them all to appear on the BACnet network.
- Since they are all on the network the rooftop controller has the ability to take a poll, using one of the pre-programmed voting methods.
- The PRTU is then wired to the PRTU-Stat. The PRTU will send the controller signals to the rooftop units electrical enclosure where it will operate the rooftop unit by turning on and off the fan, cooling and heating coils, and any other options that are available to the rooftop.
- The PRTU must be mounted in the ceiling plenum and not in the rooftop unit itself. The PRTU is not rated for the temperature extremes that occur outdoors.

See <https://www.priceindustries.com/content/uploads/assets/literature/catalogs/catalog-pages/section%20g/prtu.pdf> at 10.

EXHIBIT E

Claim 20	<p align="center">U.S. Patent No. 6,369,716</p> <p>Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).</p>
	<div> <p>System Controls CO₂/Humidity Thermostat</p> <p align="right">price</p> <p>Product Information</p> <p>The new Price CO₂/Humidity thermostat option offers the latest in sensor technologies. Using an on board non-dispersive infrared (NDIR) sensor, the thermostat can accurately measure CO₂ levels without the need for recalibration. (Chemical sensors on the other hand require constant replacement.) CO₂ levels displayed on the thermostat screen and are also available as a BACnet point when used with the Price Intelligent Controller (PIC).</p> <p>The on board surface mount technology humidity sensor is fully factory calibrated and has a wide operating range with high accuracy. The humidity reading is available on the LCD thermostat screen and as a BACnet point when used with the Price Intelligent Controller (PIC).</p> <p>Please note the CO₂/Humidity thermostat is intended to be used with the Price Intelligent Controller (PIC) as a single device solution. (Both the thermostat (temperature/set point) and monitoring (CO₂/Humidity) in one clean package.)</p> <p>Two pre-tested CO₂ control sequences are available for the PIC.</p> <p>1. Pure Space</p> <p>a. While space CO₂ is below the adjustable threshold, the VAV box is controlled normally based on room temperature load.</p> <p>b. If the space CO₂ level rises above the user-set threshold, the controller will command the VAV box to deliver the set maximum air volume into the space.</p> <p>c. Once the CO₂ level drops back below the threshold, the VAV box returns to its normal control mode based on room temperature load.</p> <p>2. CO₂ airflow control</p> <p>a. In this mode, the airflow through the VAV terminal is directly proportional to the CO₂ level in the occupied space.</p> <p>b. As the CO₂ level increases from a user-set minimum level, to a user-set maximum level, the airflow is increased proportionally between the pre-selected minimum and maximum airflow set points.</p> <p>c. This control mode is typically applied as a dedicated fresh-air terminal unit.</p> <p>Key CO₂ Features:</p> <ul style="list-style-type: none"> • Accurate NDIR sensor • No need for replacement/recalibration • Pre-loaded sequences for handling CO₂ available in the Price Intelligent Controller (PIC) for terminals • Monitoring for CO₂ available as a BACnet point for BMS integration <p>Key Humidity Features:</p> <ul style="list-style-type: none"> • Wide range humidity readings (5-100%) • High accuracy sensor with +3% at room temperatures • Long life, very low drift digital sensor • Monitoring for humidity available as a BACnet point for BMS integration <p>G-48</p> <p><small>©2013 Price Industries, Inc. All rights reserved. Digital drawings are schematic representations and not intended to be used for construction.</small></p> </div> <div style="border: 2px solid red; padding: 10px;"> <p>The on board surface mount technology humidity sensor is fully factory calibrated and has a wide operating range with high accuracy. The humidity reading is available on the LCD thermostat screen and as a BACnet point when used with the Price Intelligent Controller (PIC).</p> <p>Please note the CO₂/Humidity thermostat is intended to be used with the Price Intelligent Controller (PIC) as a single device solution. (Both the thermostat (temperature/set point) and monitoring (CO₂/Humidity) in one clean package.)</p> <p>Two pre-tested CO₂ control sequences are available for the PIC.</p> </div>

See https://web.archive.org/web/20130701181028/http://www.price-hvac.com/Catalog/Section_G/html/G_PDF/PIC.pdf (page 5); see also

<https://www.priceindustries.com/controls/products/thermostat> (“All Price thermostats measure room temperature and establish temperature set points to limit minimum and maximum set points - Optional thermostat features: Set point

EXHIBIT E

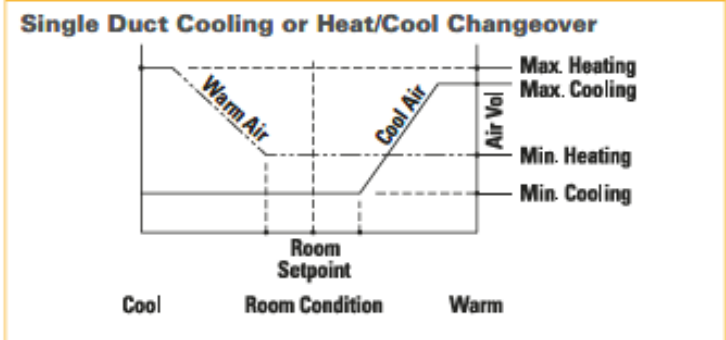
U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
	adjustment, LCD screen interface, motion sensing, C02 and humidity sensing , wireless functionality”) (emphasis added).
a first means for regulating an amount of air being added to the room;	<p>The PIC controls a damper, which is a means for regulating the amount of air being added to a room.</p> <p>Typical Applications</p> <p>Single Duct Cooling or Heat/Cool Changeover In this application, the damper is modulated based on the zone temperature and duct air temperature (with optional changeover probe) within the minimum and maximum airflow limits. Sequence diagrams: 2800 and 2850</p> <p>Single Duct Cooling/HCCO With 1-3 Stages of Electric Heat In electric heat applications, the damper is modulated based on the zone temperature within the minimum</p>  <p>See, e.g., https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/price-intelligent-controller-engineering-guide.pdf at 9.</p>
a second means for influencing the temperature of the air being added to	<p>The PIC and CO₂ Humidity Thermostat together communicate with the PRTU to influence the temperature of the air being added to the room via a polling strategy:</p> <p>The PRTU polls the various PICs networked with it to determine whether heating or cooling is necessary, and controls a rooftop heating/cooling unit as appropriate. The polling is based upon a room temperature setpoint and a value indicative of an air temperature within the room:</p>

EXHIBIT E

the room;
and

Networked Mode

In this mode the PRTU will poll up to 30 zone controllers (Price Intelligent Controller (PIC) or Prodigy Smart Diffusers). The number of zones polled must be set in the field. The PRTU will poll the requested zones every 3 minutes. Data polled is room temperature and room Setpoint.

Average Polling – (Recommend for most applications)

In average polling mode the majority demand wins and the RTU will be controlled using that information.

Example: Cooling – 50%, Heat – 40%, Neutral - 10% = Cooling Wins.

Each zone can be weighted. The default is 1. To add more weight to a zone (example: a large meeting room, or VIP room) increase the weight. Increasing the weight to 3 would give that zone 3 votes instead of 1.

To disable a zone set polling to 0. This is ideal for a zone which is poorly supplied and is influencing the system in a non-ideal way.

Networked Mode – Non-majority polling

Non majority favours one of the 3 modes.

Useful for:

- Heat/cool changeover systems WITH reheat at zones (favour cooling)
- Summer: Favour cooling
- Winter: Favour heating

PRTU can be set to switch strategies automatically on season change via the real time clock and calendar. This must be setup in the field.

EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
	<p>See https://www.priceindustries.com/content/uploads/assets/literature/manuals/section%20g/prtu-price-rooftop-unit-controller-manual.pdf at 2.</p> <p>In addition, the PIC includes means to directly influence the stages of heating/cooling, and to influence the temperature of the air added to the room:</p>

EXHIBIT E**Single Duct Cooling/HCCO****With 1-3 Stages of Electric Heat**

In electric heat applications, the damper is modulated based on the zone temperature within the minimum and maximum airflow limits. In this application, up to three outputs perform staged on/off control of the heat. Each stage is energized independently based on the heat requirement. Sequence diagrams: 2801, 2802, 2851, and 2852.

Single Duct Cooling/HCCO**With Tri-State Modulating Heat**

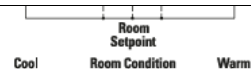
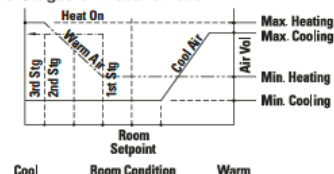
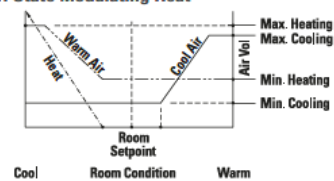
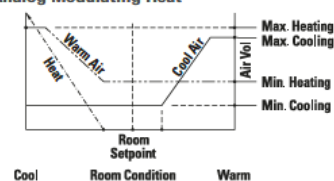
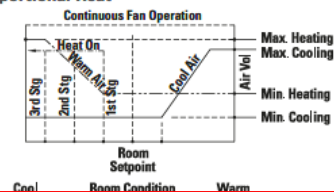
In tri-state modulating heat (usually hot water) applications, both the damper and the hot water valve are modulated based on zone temperature. PI control sends a corresponding clockwise (CW) or counter-clockwise (CCW) signal to a tri-state actuator positioning the valve. (One (1) stage of additional 24VAC binary heat can also be used.) Sequence diagrams: 2803, 2853.

Single Duct Cooling/HCCO**With Analog Modulating Heat**

In modulating heat (usually hot water or SCR electric) applications, both the damper and the hot water valve are modulated based on zone temperature. PI control determines the desired valve position or SCR heat level and sends a corresponding 0-10V DC signal to the motorized actuator or SCR heater controller. Sequence diagrams: 2804, 2805, 2854, and 2855.

Series Fan Powered and Electric Coil or Proportional Heat

In constant volume applications, the fan operates continuously during occupied periods. The primary flow is modulated between the minimum and maximum cooling set points based on the thermostat demand. When the zone temperature falls below the zone set point the stages of heat will be energized. During unoccupied periods the primary air system is off and the fan runs intermittently to maintain the zone temperature between the night set points. If zone temperatures can not be maintained by the fan alone, heating coils will be energized.

**Single Duct Cooling/HCCO
With 1-3 Stages of Electric Heat****Single Duct Cooling/HCCO
With Tri-State Modulating Heat****Single Duct Cooling/HCCO
With Analog Modulating Heat****Series Fan Powered and Electric Coil or Proportional Heat**

See <https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/price-intelligent-controller-engineering-guide.pdf> at 9.

EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
a third means for controlling the operation of, and coupled to, the first and second means;	As discussed in the prior limitation, the PIC contains means to control the operation of, and is coupled to, the first and second means.

EXHIBIT E

Claim 20	<p align="center">U.S. Patent No. 6,369,716</p> <p>Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).</p>
<p>wherein the third means operates in at least a first control state and a second control state,</p> <p>wherein in the first control state the third means can control the first and second means so that both a temperature of the air within the room and a carbon dioxide level within the room</p>	<p>The PIC operates in at least two control states.</p> <p>In the first control state, when the CO₂ Humidity Thermostat detects that room CO₂ levels are above a certain desired threshold, it initiates a “purge mode” to return room CO₂ to below the predetermined threshold:</p> <div> <p>System Controls CO₂/Humidity Thermostat</p> <p>price</p> <p>Product Information</p> <p>The new Price CO₂/Humidity thermostat option offers the latest in sensor technologies. Using an on board non-dispersive infrared (NDIR) sensor, the thermostat can accurately measure CO₂ levels without the need for recalibration. (Chemical sensors on the other hand require constant replacement.) CO₂ levels are displayed on the thermostat's LCD screen and are also available as a BACnet point displaying CO₂ in parts per million (PPM).</p> <p>The on board surface mount technology humidity sensor is fully factory calibrated and has a wide operating range with high accuracy. The humidity reading is available on the LCD thermostat screen as a BACnet point when used with the Price Intelligent Controller.</p> <p>Please note the CO₂/Humidity thermostat is intended to be used with the Price Intelligent Controller. As a single device solution, the thermostat monitors Temperature, set point and monitoring CO₂/Humidity in</p> <p>Two pre-tested CO₂ control sequences are available for the PIC.</p> <ol style="list-style-type: none"> Purge mode <ol style="list-style-type: none"> While the space CO₂ is below the adjustable threshold, the VAV box is controlled normally based on room temperature load If the space CO₂ level rises above the user-set threshold, the controller will command the VAV box to deliver a pre-set maximum air volume into the space. Once the CO₂ level drops back below the threshold, the VAV box returns to its normal control mode based on room temperature load. CO₂ airflow control <ol style="list-style-type: none"> In this mode, the airflow through the VAV terminal is directly proportional to the CO₂ level in the occupied space. As the CO₂ level increases from a user-set minimum level, to a user-set maximum level, the airflow is increased proportionally between the pre-selected minimum and maximum airflow set points. This control mode is typically applied as a dedicated fresh-air terminal unit. <p>Key CO₂ Features:</p> <ul style="list-style-type: none"> • Accurate NDIR sensor • No need for replacement calibration • Pre-loaded sequences for handling CO₂ available in the Price Intelligent Controller (PIC) for terminals • Monitoring for CO₂ available as a BACnet point for BMS integration <p>Key Humidity Features:</p> <ul style="list-style-type: none"> • Wide range humidity readings (5-100%) • High accuracy sensor with +3% at room temperatures • Long life, very low drift digital sensor • Monitoring for Humidity available as a BACnet point for BMS integration <p>G-48</p> </div> <p>Two pre-tested CO₂ control sequences are available for the PIC.</p> <ol style="list-style-type: none"> Purge mode <ol style="list-style-type: none"> While the space CO₂ is below the adjustable threshold, the VAV box is controlled normally based on room temperature load If the space CO₂ level rises above the user-set threshold, the controller will command the VAV box to deliver a pre-set maximum air volume into the space. Once the CO₂ level drops back below the threshold, the VAV box returns to its normal control mode based on room temperature load. CO₂ airflow control <ol style="list-style-type: none"> In this mode, the airflow through the VAV terminal is directly proportional to the CO₂ level in the occupied space. As the CO₂ level increases from a user-set minimum level, to a user-set maximum level, the airflow is increased proportionally between the pre-selected minimum and maximum airflow set points. This control mode is typically applied as a dedicated fresh-air terminal unit.

EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO ₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
are within desired ranges, and	<p>See https://web.archive.org/web/20130701181028/http://www.price-hvac.com/Catalog/Section_G/html/G_PDF/PIC.pdf (page 5).</p> <p>These operational modes are also shown in the manual for the PIC:</p>

EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
	<p>Input Menu Continued</p> <p><i>(Supply air temperature and neutral mode)</i></p> <p>Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.</p> <p>Continued from previous page...</p> <pre> graph TD A[CO2 SENSOR DETECTED] --> B[CO2 TWEAK 0%] B --> C[CO2 OFFSET 0 PPM] C --> D[CO2 PURGEMODE ENABLED] D --> E[PURGE AIRFLOW 800 CFM] E --> F[MAX CO2 LEVEL 1000 PPM] F --> G[NOMINAL CO2 800 PPM] G --> H[HUMIDITY SENSOR DETECTED] H --> I[HUMIDITY TWEAK 0%] I --> J[HUMIDITY OFFSET 0%RH] J --> K[PRESS MENU TO EXIT] K -.-> A </pre> <p>The flowchart displays the following menu items and descriptions:</p> <ul style="list-style-type: none"> CO2 SENSOR DETECTED: Indicates that the CO2 sensor is connected CO2 TWEAK 0%: Percentage that the CO2 reading can be tweaked if required. Default is 0% CO2 OFFSET 0 PPM: Value to offset CO2 reading if required. Default is 0 PPM CO2 PURGEMODE ENABLED: This feature is only active when the CO2 and humidity thermostat is connected to the PIC controller. Purge mode is enabled here PURGE AIRFLOW 800 CFM: Set purge Airflow to desired cfm - 800 cfm is default MAX CO2 LEVEL 1000 PPM: PIC controller will initiate purge ode above this value. Default CO2 setting is 1000 ppm NOMINAL CO2 800 PPM: PIC controller will purge until Nominal CO2 level is met. Default is 800 ppm. Nominal CO2 is your target CO2 HUMIDITY SENSOR DETECTED: Indicates that the Humidity (RH) sensor is connected HUMIDITY TWEAK 0%: Percentage that the RH reading can be tweaked if required. Default is 0% HUMIDITY OFFSET 0%RH: Value to offset RH reading if required. Default is 0%RH PRESS MENU TO EXIT: Exit the menu <p>A red box highlights the CO2 PURGEMODE ENABLED, PURGE AIRFLOW, MAX CO2 LEVEL, and NOMINAL CO2 settings.</p>

EXHIBIT E

U.S. Patent No. 6,369,716	
Claim 20	Accused Price Intelligent Controller (“PIC”), the Price CO₂ Humidity Thermostat, and the Price Rooftop Controller Unit (“PRTU”).
	<p>https://www.priceindustries.com/content/uploads/assets/literature/manuals/section%20g/pic-price-intelligent-controller-manual.pdf at 28.</p> <p>During said control, the PIC will also influence the stages of heating/cooling and overall temperature of the air being added to the room via the polling strategy in order to ensure that the temperature of the air within the room is within a desired range.</p>
wherein in the second control state the third means can control the first means so that at least the temperature of the air within the room is within a desired range.	The PIC is capable of operating in a second control state in which heating/cooling and airflow delivery is performed based solely upon the room temperature setpoint and not upon the CO ₂ level.

EXHIBIT E**Single Duct Cooling/HCCO****With 1-3 Stages of Electric Heat**

In electric heat applications, the damper is modulated based on the zone temperature within the minimum and maximum airflow limits. In this application, up to three outputs perform staged on/off control of the heat. Each stage is energized independently based on the heat requirement. Sequence diagrams: 2801, 2802, 2851, and 2852.

Single Duct Cooling/HCCO**With Tri-State Modulating Heat**

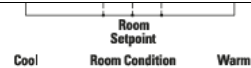
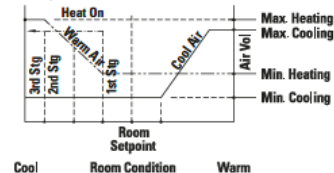
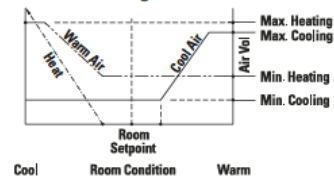
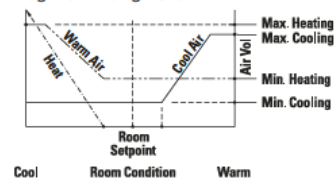
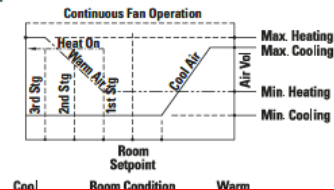
In tri-state modulating heat (usually hot water) applications, both the damper and the hot water valve are modulated based on zone temperature. PI control sends a corresponding clockwise (CW) or counter-clockwise (CCW) signal to a tri-state actuator positioning the valve. (One (1) stage of additional 24VAC binary heat can also be used.) Sequence diagrams: 2803, 2853.

Single Duct Cooling/HCCO**With Analog Modulating Heat**

In modulating heat (usually hot water or SCR electric) applications, both the damper and the hot water valve are modulated based on zone temperature. PI control determines the desired valve position or SCR heat level and sends a corresponding 0-10V DC signal to the motorized actuator or SCR heater controller. Sequence diagrams: 2804, 2805, 2854, and 2855.

Series Fan Powered and Electric Coil or Proportional Heat

In constant volume applications, the fan operates continuously during occupied periods. The primary flow is modulated between the minimum and maximum cooling set points based on the thermostat demand. When the zone temperature falls below the zone set point the stages of heat will be energized. During unoccupied periods the primary air system is off and the fan runs intermittently to maintain the zone temperature between the night set points. If zone temperatures can not be maintained by the fan alone, heating coils will be energized.

**Single Duct Cooling/HCCO
With 1-3 Stages of Electric Heat****Single Duct Cooling/HCCO
With Tri-State Modulating Heat****Single Duct Cooling/HCCO
With Analog Modulating Heat****Series Fan Powered and Electric Coil or Proportional Heat**

See <https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/price-intelligent-controller-engineering-guide.pdf> at 9.

EXHIBIT E