RUGGED DEPENDABLE UNCOMPPLICATED

ACHIEVE UP TO 99% EFFICIENCY

THE MACH® SERIES

CAST ALUMINUM SECTIONAL CONDENSING HOT WATER BOILER

Patterson-Kelley
Harsco
MACH’s® basic building block is a cast sectional heat exchanger of revolutionary design. Unlike older cast iron sectional boilers, each section of the MACH® boiler is a fully independent heat exchanger. The sections are mounted in parallel, and water enters and exits each section through either internal or external headers. Because there is no section-to-section flow, MACH® doesn’t need push nipples or gaskets. Think of MACH® as a new-tech, cast-sectional boiler for the 21st century.
The descriptions and technical data included in this brochure are subject to change without notice. Always contact your local Patterson-Kelley representative for the most up-to-date information and product application support.

Capacities and Dimensions

MACH® 2000

MACH® 1500
The descriptions and technical data included in this brochure are subject to change without notice. Always contact your local Patterson-Kelley representative for the most up-to-date information and product application support.

Capacities and Dimensions

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT BTU/HR</th>
<th>OUTPUT BTU/HR</th>
<th>BOILER HP</th>
<th>VENT DIAMETER</th>
<th>OPERATING WEIGHT</th>
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<tbody>
<tr>
<td>C2000</td>
<td>2,000,000</td>
<td>1,920,000</td>
<td>57.4</td>
<td>10&quot;</td>
<td>1,600 lbs</td>
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<tr>
<td>C1500</td>
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<td>1,440,000</td>
<td>43.0</td>
<td>10&quot;</td>
<td>1,350 lbs</td>
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<tr>
<td>C1050</td>
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<td>987,000</td>
<td>29.5</td>
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<tr>
<td>C300</td>
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<td>276,000</td>
<td>8.2</td>
<td>4&quot;</td>
<td>375 lbs</td>
</tr>
</tbody>
</table>
There are three pillars supporting all we do.

**TRADITION**
Serving our customers since 1880, today we are one of the industry’s oldest, most respected and trusted suppliers.

**KNOWLEDGE**
We have earned our deep knowledge of heat transfer engineering from generations of experience. Today we use that knowledge to create practical, affordable solutions.

**INNOVATION**
We have been technology leaders through generations of technological change. In every generation we have found inventive new ways to solve our customers’ problems.

**Easy to operate**
Designed to be black-box simple, operating settings are adjusted using a digital touchpad interface. On-board functions include outdoor reset of water temperature and domestic hot water priority control. MACH® connects easily to building automation systems. With its light weight and small footprint, MACH® is perfect for replacement and retrofit projects. All MACH® boilers fit through standard doorways. The largest units, our C-2000 and C-1500 models, even come with wheels to simplify move-in. The requirements for today’s boilers may be challenging, but why can’t high performance be easy and uncomplicated?

**Even easier to install**
Capabilities and Features

- An all purpose boiler, suitable for condensing and non-condensing service
- Whisper quiet … less than 60 dbA even at high fire
- CSA certified at 92% to 96% efficiency
- Actual net thermal efficiencies to 99%+
- ASME CSD-1 is standard equipment
- Complies with GE-GAP (formerly IRI)
- Certified low NOX performance (pre-certified to SCAQMD 1146.2)
- PK “5-10-5” Extended Warranty
- Unique aluminum alloy effortlessly sheds corrosive condensate
- No low limit for return water temperature
- Low water-side pressure drop
- May be used in zero-flow applications when system is properly configured
- May be used with variable-flow circulator when system is properly configured
- Full modulation burner with 5:1 turndown
- Variable speed combustion air blower
- Extremely low electrical consumption
- Automatically compensates for changes in air temperature and pressure
- Requires lower altitude de-rate than conventional boilers
- Certified at 3.5”wc minimum gas pressure
- Small diameter positive pressure venting
- Combined vent and air supply duct pressure drop up to 0.44”wc
- All common venting arrangements including sealed combustion
- Optional outdoor & rooftop models
- Microprocessor-based combination PID temperature control and flame management
- On-board digital touch-pad user interface
- Total information access via laptop computer
- Multiple user access levels with password protection
- On-board outdoor temperature reset with total adjustability
- On-board outdoor temperature lockout and restart
- Accepts 0-10 vdc remote setpoint signal
- Accepts 0-10 vdc remote modulating signal
- On-board variable speed pump controller
- On-board DHW priority control
- Automatic freeze protection
- Automatically monitors and protects against excessive ΔT and temperature rate of change caused by unplanned loss of flow to prevent short cycling
The demand for green building solutions is greater than ever. Lower greenhouse gas emission requirements, LEED® certification programs, and rebate incentives have all contributed to this increased demand. Coupled with a need for smaller footprints and higher efficiencies for additional cost savings, it is no surprise why we are dedicated to innovation that provides Green Technology to our customers.

The MACH® C2500 & C3000 are no exceptions. Don’t let the large capacity deceive you. Despite the 2,500,000 and 3,000,000 BTU/hr input, respectively, the footprint remains relatively small making these boilers suitable for existing mechanical room retrofit projects as well as new construction.

The sectional cast aluminum heat exchanger can condense more than 20 gallons of water per hour. LEED® points for Water Efficiency may be accumulated. A CSA certified efficiency of 95% and a thermal efficiency up to 99%, allows for a significantly higher efficiency than the energy baseline of existing boiler plants. Therefore, LEED® points for Energy Atmosphere are also possible.

MACH® C2500 & C3000

- Low greenhouse gas emissions; less than 10 ppm NOx
- Helps accumulate LEED® points
- Qualifies for many federal, state and utility rebates
- Specifically designed with a small footprint
- Demonstrated life cycle cost savings
- CSA certified efficiency is 95%
MACH® C2500 & C3000
The All Purpose Green Boiler

MACH® C2500 & C3000 boilers simplify construction, improve comfort, minimize fuel consumption and enhance your system's technical and economic performance.

Multiple venting arrangements, including sealed combustion, are possible with small diameter Category IV venting.

Equipped with Harsco’s ENVI™ control, cascade sequence up to 24 boilers with boiler start rotation. Integrate with building management systems using MODBUS® protocol. An optional protocol converter for BACNet®, LonWorks® or Metasys® N2 communication is also available. The text-based display with individually annunciated limit switches and error descriptions in plain text makes programming and troubleshooting easier and quicker.

Pair the MACH® condensing boiler with a MODU-FIRE® Forced Draft boiler to create a high efficiency hybrid system at a fraction of the cost.

Additional Features
- Full-modulation burner with 5:1 turndown
- Low water-side pressure drop
- Low gas pressure requirements
- High combustion efficiency with low O₂ and CO levels
- No low limit for return water temperature

The descriptions and technical data in this brochure are subject to change without notice. Contact your local Harsco Industrial Patterson-Kelley representative for the most up-to-date information and product application support.
MEDIUM-DENSITY
POLYETHYLENE
YELLOW GAS
MEETS ASTM D2513
MEDIUM-DENSITY POLYETHYLENE YELLOW GAS
Meets ASTM D2513
# MEDIUM-DENSITY POLYETHYLENE YELLOW GAS

## CONTENTS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>PRODUCT DESCRIPTION</td>
<td>2</td>
</tr>
<tr>
<td>02</td>
<td>SHORT FORM SPECIFICATION</td>
<td>6</td>
</tr>
<tr>
<td>03</td>
<td>DIMENSIONS AND WEIGHTS</td>
<td>7</td>
</tr>
<tr>
<td>04</td>
<td>SHORT FORM INSTALLATION GUIDE/WARNING</td>
<td>9</td>
</tr>
<tr>
<td>05</td>
<td>WARRANTY</td>
<td>10</td>
</tr>
</tbody>
</table>
PRODUCT DESCRIPTION
MEDIUM-DENSITY POLYETHYLENE YELLOW GAS
FOR FUEL GAS USE IN MULTIPLE APPLICATIONS FOR GAS DISTRIBUTION

DESCRIPTION
Polyethylene gas pipes are the preferred natural gas distribution piping product of choice with over 90% usage in North America today. Polyethylene gas pipes are lightweight, non-corrosive, available in coil lengths, and easy to install by heat fusion or mechanical fittings. For these reasons, PE pipes have been proven reliable, durable, and have been in use since the 1960’s.

LONG LAYING LENGTHS
Standard coil lengths provide long, uninterrupted run capabilities. This means that more ground can be covered during installation while eliminating the cost of unnecessary joints. Longer lengths provide convenience in installation and allow for significant cost savings in labor and equipment.

APPLICATIONS
JM Eagle’s UAC 2000 MDPE yellow gas pipe is suitable for fuel gas use in multiple applications for gas distribution.

Note: Gas Pipe products (previously produced by US Poly) are currently manufactured by JM Eagle™.

QUALITY CONTROL
JM Eagle™ takes great pride in the quality and workmanship of all of our products. JM Eagle™ quality control programs encompass three critical aspects of the manufacturing process: the incoming raw material, pipe production, and the finished goods. Incoming material is visually inspected and tested to ensure the material meets all applicable requirements before its release for production. During production, the pipe will be visually examined for any cosmetic defect and pipe samples will be collected for physical verification and testing for compliance. The finished product is subjected to further visual inspection to ensure it has met all the appropriate specifications and packaging requirements. Without exception, our pipes are constantly monitored throughout the entire manufacturing process to validate that they are in accordance with all applicable specifications. JM Eagle’s Quality Management System is ISO 9001:2000 registered.* Copies of the registration certificates are available on our website at www.jmeagle.com.

CORROSION RESISTANCE
JM Eagle’s UAC 2000 MDPE yellow gas pipe has good resistance to most solvents and chemicals which it is likely to encounter in natural and manufactured gas distribution services. UAC 2000 pipe meets the chemical resistance specifications outlined in ASTM D2513.

Note: Gas Pipe products (previously produced by US Poly) are currently manufactured by JM Eagle™.
WEATHER RESISTANCE
UAC 2000 pipe has a stabilizer system to protect it from ultraviolet (UV) degradation when exposed to direct sunlight. The recommended outdoor storage is generally limited to three to five years from the date of manufacture. In general, JM Eagle™ recommends the use of a first-in, first-out inventory procedure.

SLOW CRACK GROWTH RESISTANCE
Another benefit of JM Eagle’s UAC 2000 MDPE yellow gas pipe is its high slow crack growth resistance. Slow crack growth resistance is a valuable characteristic, which provides long lasting performance under long-term stress.

SAVE IN HANDLING COSTS
JM Eagle’s UAC 2000 MDPE yellow gas pipes are lightweight and can reduce manpower required for installation.

FIELD CUTTING
UAC 2000 pipe should be cut with pipe and tubing cutters designed for plastic pipe. These tools easily provide the square cut ends which are necessary to provide satisfactory fusion joints. If carpenter or hack saws are used to cut the pipe, special care must be taken to ensure square cut ends and to clean the resultant sawdust from inside the pipe.

LIGHT WEIGHT
A 500 foot length of 2” SDR 11 UAC 2000 MDPE yellow gas pipe weighs approximately 315 pounds. That makes it easy to load, easy to transport, and easy to handle. Installers prefer it because it goes into the ground quickly—thus saving on installation cost.

SERVICE LIFE
Since polyethylene does not corrode and is resistant to most chemicals, this pipe does not lose strength due to either gas corrosion or external galvanic soil conditions. The design characteristics of flexible polyethylene pipe allows for long-term resistance to earth loading and soil movement.

Installer training for the proper use and installation of polyethylene pipe is a critical factor in its long-term performance. The UAC 2000 system has ample safety factors included in its design for providing reliable long-term performance in gas distribution service, if the system is properly installed and operated at design pressures.
PRODUCT DESCRIPTION
MEDIUM-DENSITY POLYETHYLENE YELLOW GAS

(CONTINUED)

INSTALLATION
This product should be installed in accordance with JM Eagle™ Publication JME-12B, "Polyethylene Yellow Gas Distribution Installation Guide."

LONG-TERM STRENGTH
The industry standard for establishing the design basis for polyethylene gas distribution systems is ASTM D2837, "Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials." This standard assigns the long-term strength of the pipe based on hydrostatically tested samples at a range of pressures which result in creep rupture failures over a period of 10,000 hours or more. A regression analysis of these burst data is made to project the failure curve to 100,000 hours establishing the Long-Term Hydrostatic Strength (LTHS). Based on this, a Hydrostatic Design Basis (HDB) is assigned for each standard temperature tested.

The pressure rating and associated ASTM D2513 designation for two temperatures are summarized in Table 1

TABLE 1
These are typical properties for basic characterization of

<table>
<thead>
<tr>
<th>TEMPERATURE, °F</th>
<th>HYDROSTATIC DESIGN, BASIC CATEGORY, psi</th>
<th>ASTM D2513</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>1250</td>
<td>PE2406/PE2708</td>
</tr>
<tr>
<td>140</td>
<td>1000</td>
<td>CE</td>
</tr>
</tbody>
</table>

The material and do not represent specific determinations or specifications.

PHYSICAL PROPERTIES
Table 2 lists general physical properties of UAC 2000.
# PHYSICAL PROPERTY DATA FOR UAC 2000 POLYETHYLENE PIPE

## TABLE 2

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>TEST METHOD</th>
<th>UNIT</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>ASTM D1505</td>
<td>grams/cm³</td>
<td>0.943</td>
</tr>
<tr>
<td>Melt Index</td>
<td>ASTM D1238 (190°C / 2.16kg load)</td>
<td>grams/10 min.</td>
<td>0.2</td>
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<tr>
<td>Environmental Stress Cracking Resistance Condition C (molded specimen)</td>
<td>ASTM D1693</td>
<td>hrs</td>
<td>&gt; 5000</td>
</tr>
<tr>
<td>PENT</td>
<td>ASTM F1473</td>
<td>hrs</td>
<td>&gt; 1000</td>
</tr>
<tr>
<td>Tensile Strength, Ultimate Type IV Specimen</td>
<td>ASTM D638 (2&quot; / min.)</td>
<td>psi</td>
<td>4500</td>
</tr>
<tr>
<td>Tensile Strength, Yield Type IV Specimen</td>
<td>ASTM D638 (2&quot; / min.)</td>
<td>psi</td>
<td>2800</td>
</tr>
<tr>
<td>Elongation at Break Type IV Specimen</td>
<td>ASTM D638 (2&quot; / min.)</td>
<td>%</td>
<td>&gt; 500</td>
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<td>Vicat Softening Temperature</td>
<td>ASTM D1525</td>
<td>°F</td>
<td>248</td>
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<tr>
<td>Britteness Temperature</td>
<td>ASTM D746</td>
<td>°F</td>
<td>&lt; -180</td>
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<tr>
<td>Flexural Modulus</td>
<td>ASTM D790</td>
<td>psi</td>
<td>100,000</td>
</tr>
<tr>
<td>Hardness</td>
<td>ASTM D2240</td>
<td>Shore D</td>
<td>63</td>
</tr>
<tr>
<td>Coefficient of Linear Thermal Expansion</td>
<td>ASTM D696</td>
<td>in / in / °F</td>
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<td>Hydrostatic Design Basic (HDB) @ 73°F</td>
<td>ASTM D2837</td>
<td>psi</td>
<td>1250</td>
</tr>
<tr>
<td>Hydrostatic Design Basic (HDB) @ 140°F</td>
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<td>psi</td>
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<tr>
<td>Material Designation</td>
<td>PPI Recommendation</td>
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<td>PE2406/2708</td>
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</table>
SHORT SPECIFICATION
MEDIUM-DENSITY POLYETHYLENE YELLOW GAS

SCOPE
This specification designates general requirements for ½” through 12” UAC 2000 MDPE yellow gas pipe for the conveyance of fuel gas distribution.

MATERIALS
JM Eagle™ polyethylene gas pipes and fittings are manufactured using the highest-grade materials available. All materials provide physical and mechanical properties as classified in accordance to ASTM D3350 and have a cell classification of 234373E. These materials are listed with Plastics Pipe Institute (PPI) as PE 2406/2708 medium-density polyethylene.

PIPE
UAC 2000 polyethylene gas pipes are manufactured in accordance with all applicable specifications including ASTM D2513, the standard specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings, and by reference meet the Department of Transportation Title 49, Part 192 “Transportation of Natural and Other Gas by Pipe Line Minimum Safety Standards”.

JOINING METHODS
JM Eagle’s UAC 2000 system can easily be joined by socket fusion, butt fusion, saddle fusion, mechanical fittings or electrofusion. All methods are reliable means of joining the UAC 2000 piping system. Generally, the choice of which joining method to use is at the discretion of the individual gas company.

INSTALLATION
UAC 2000 pipe can be joined by heat fusion, electrofusion, or mechanical fittings. JM Eagle™ offers a full-line of socket, butt, and saddle fittings, in addition to the proven MetFit® mechanical fittings product line. With proper installation, our gas pipes provide a leak free product providing unconditional assurance for our customers.

For these reasons, UAC 2000 PE gas pipes are the natural choice pipe product for use in the gas market. For installation procedures and more information, request a copy of the UAC 2000 Technical & Installation Guide.
### Dimensions and Weights

**Submittal and Data Sheet**

<table>
<thead>
<tr>
<th>Coils</th>
<th>SDR*</th>
<th>Pipe Data</th>
<th>Packaging Data</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Silo Packs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Min. Wall</td>
<td>Aver. O.D.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(lb/100 ft)</td>
<td>(in)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Feet/Coil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>½” CTS (¾” OD)</td>
<td>7.0</td>
<td>6.4</td>
<td>0.090</td>
</tr>
<tr>
<td>½” CTS (¾” OD)</td>
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<td>6.4</td>
<td>0.090</td>
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<td>1” CTS (1¼” OD)</td>
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<td>14</td>
<td>0.090</td>
</tr>
<tr>
<td>1” CTS (1¼” OD)</td>
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<td>0.090</td>
</tr>
<tr>
<td>¼”</td>
<td>9.3</td>
<td>9</td>
<td>0.090</td>
</tr>
<tr>
<td>¼”</td>
<td>9.3</td>
<td>9</td>
<td>0.090</td>
</tr>
<tr>
<td>¾”</td>
<td>11.0</td>
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<td>0.095</td>
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<tr>
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<td>0.216</td>
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<tr>
<td>2”</td>
<td>11.0</td>
<td>63</td>
<td>0.216</td>
</tr>
<tr>
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<tr>
<td>3”</td>
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</tr>
<tr>
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### Large Diameter Coils

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<th>SDR*</th>
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<td>1000</td>
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<tr>
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<td>450</td>
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Note: Gas Pipe products (previously produced by US Poly) are currently manufactured by JM Eagle™.
**DIMENSIONS AND WEIGHTS**

**SUBMITTAL AND DATA SHEET**

### 40’ STRAIGHT LENGTHS

<table>
<thead>
<tr>
<th>NOMINAL SIZE</th>
<th>SDR*</th>
<th>WEIGHT LB/100 (FT)</th>
<th>MIN. WALL (IN)</th>
<th>PACKAGING DATA</th>
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<tr>
<td></td>
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<td></td>
<td>BULK PACKS</td>
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<tr>
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<td></td>
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<td></td>
<td>AVER. O.D. (IN)</td>
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<tr>
<td><strong>2”</strong> **</td>
<td>11.0</td>
<td>63</td>
<td>0.216</td>
<td>2.375</td>
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<td>11.5</td>
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<tr>
<td><strong>4”</strong></td>
<td>13.5</td>
<td>188</td>
<td>0.333</td>
<td>4.500</td>
</tr>
<tr>
<td><strong>6”</strong></td>
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<td>472</td>
<td>0.576</td>
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</tr>
<tr>
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<td>408</td>
<td>0.491</td>
<td>6.625</td>
</tr>
<tr>
<td><strong>6”</strong></td>
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<td>0.316</td>
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<tr>
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<td>833</td>
<td>0.785</td>
<td>8.625</td>
</tr>
<tr>
<td><strong>8”</strong></td>
<td>13.5</td>
<td>692</td>
<td>0.639</td>
<td>8.625</td>
</tr>
<tr>
<td><strong>8”</strong></td>
<td>21.0</td>
<td>457</td>
<td>0.410</td>
<td>8.625</td>
</tr>
<tr>
<td><strong>10”</strong></td>
<td>13.5</td>
<td>1075</td>
<td>0.797</td>
<td>10.750</td>
</tr>
<tr>
<td><strong>12”</strong></td>
<td>13.5</td>
<td>1511</td>
<td>0.945</td>
<td>12.750</td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

SDR 11.0 is available for 3”, 4” and 6” IPS sizes.
IPS is used in this Submittal and Data Sheet unless CTS is specifically designated.
Pipe is sold in package quantities only.
Other pipe and tubing sizes may be available.

**Note:** Gas Pipe products (previously produced by US Poly) are currently manufactured by JM Eagle™.
SHORT FORM INSTALLATION GUIDE/
WARNING

This information is furnished in order to provide a brief review of the installation requirements for JM Eagle’s black/yellow-striped HDPE fuel gas piping system. It is not intended to serve as or replace the FULL VERSION of the complete product installation guide available upon request.

1. When inserting polyethylene pipe, avoid damage to the pipe both during installation and from shear forces caused by earth loading after the system is installed.
2. A starter ditch of sufficient length must be opened to allow the pipe to be inserted without buckling or excessive bending.
3. The casing pipe should be prepared to the extent necessary to prevent any sharp edges, projections or abrasive material from damaging the plastic pipe during or after insertion.
4. The edge of the casing opening should be shielded to prevent shaving or gouging of the pipe being inserted.
5. If polyethylene pipe is to be pulled through the casing pipe, the tensile loading should not exceed ½ the tensile strength of the inserted pipe.
6. The federal regulation requires that the leading end of the plastic be closed before insertion. Fabricated nose cones of wood, metal or PE pipe end caps can be used for this purpose. A straight length on the lead end of a coiled pipe will often aid insertion, especially in cold weather.
7. A newly inserted main or service line must be allowed to contract while cooling to ground temperature prior to tie-in. Tie-in or coupling of inserted mains or services can be accomplished using standard heat fusion, electrofusion or compression type fittings.

WARNING: INSTALLATION SAFETY AND FIELD PRECAUTIONS

THE IMPORTANCE OF PROPER TRAINING AND RETRAINING IN THE INSTALLATION AND OPERATION OF PLASTIC PIPING SYSTEMS CANNOT BE OVEREMPHASIZED. KNOWLEDGE OF PROPER INSTALLATION RECOMMENDATIONS AND REQUIREMENTS WILL MINIMIZE THE POTENTIAL FOR FAILURE RESULTING FROM IMPROPER INSTALLATION PRACTICES, ACCIDENTS AND INJURIES.

BEFORE AND DURING INSTALLATION, ALWAYS:

- Consult and follow the FULL VERSION of the product installation guide
- Consult The Code of Federal Regulations (CFR) Title 49, Subchapter D-Pipe-line Safety for specific guidance on installation requirements
- Closely follow the specifications of the individual gas company
- Use protective gear and equipment

BEFORE AND DURING PERFORMING JOINING METHODS, ALWAYS:

- Treat electrical tools as potential sources of ignition and follow standard safety procedures for working in explosive atmospheres
- Wear suitable gloves and eye protection
- Temperature of fusion tools should be checked to be sure that they conform to the recommended operating temperature range
- Before cutting coiled pipe, restrain both sides of cut
- Understand and follow all equipment manufacturer’s recommendations and guidelines

Please contact JM Eagle™ Product Assurance at (800) 621-4404 to obtain FULL VERSION of the appropriate installation guide or for further assistance.
J-M Manufacturing Co., Inc. (JM Eagle™) warrants that its standard polyvinyl chloride (PVC), polyethylene (PE), conduit/plumbing/solvent weld and Acrylonitrile-Butadiene-Styrene (ABS) pipe Products (“Products”) are manufactured in accordance with applicable industry specifications referenced on the Product and are free from defects in workmanship and materials. Every claim under this warranty shall be void unless in writing and received by JM Eagle™ within thirty (30) days of the date the defect was discovered, and within one (1) year of the date of shipment from the JM Eagle™ plant. Claims for Product appearance defects, such as sun-bleached pipe etc., however, must be made within thirty (30) days of the date of the shipment from the JM Eagle™ plant. This warranty specifically excludes any Products allowed to become sun-bleached after shipment from the JM Eagle™ plant. Proof of purchase with the date thereof must be presented to the satisfaction of JM Eagle™, with any claim made pursuant to this warranty. JM Eagle™ must first be given an opportunity to inspect the alleged defective Products in order to determine if it meets applicable industry standards, if the handling and installation have been satisfactorily performed in accordance with JM Eagle™ recommended practices and if operating conditions are within standards. Written permission and/or a Return Goods Authorization (RGA) must be obtained along with instructions for return shipment to JM Eagle™ of any Products claimed to be defective.

The limited and exclusive remedy for breach of this Limited Warranty shall be, at JM Eagle’s sole discretion, the replacement of the same type, size and like quantity of non-defective Product, or credits, offsets, or combination of thereof, for the wholesale purchase price of the defective unit.

This Limited Warranty does not apply for any Product failures caused by user’s flawed designs or specifications, unsatisfactory applications, improper installations, use in conjunction with incompatible materials, contact with aggressive chemical agents, freezing or overheating of liquids in the product and any other misuse causes not listed here. This Limited Warranty also excludes failure or damage caused by fire stopping materials, thread sealants, plasticized vinyl Products or damage caused by the fault or negligence of anyone other than JM Eagle™, or any other act or event beyond the control of JM Eagle™.

JM Eagle’s liability shall not, at any time, exceed the actual wholesale purchase price of the Product. The warranties in this document are the only warranties applicable to the Product and there are no other warranties, expressed or implied. This Limited Warranty specifically excludes any liability for general damages, consequential or incidental damages, including without limitation, costs incurred from removal, reinstallation, or other expenses resulting from any defect. IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED AND JM EAGLE™ SHALL NOT BE LIABLE IN THIS RESPECT NOTWITHSTANDING JM EAGLE’S ACTUAL KNOWLEDGE THE PRODUCT’S INTENDED USE.

JM Eagle’s Products should be used in accordance with standards set forth by local plumbing and building laws, codes, or regulations and the applicable standards. Failure to adhere to these standards shall void this Limited Warranty. Products sold by JM Eagle™ that are manufactured by others are warranted only to the extent and limits of the warranty of the manufacturer. No statement, conduct or description by JM Eagle™ or its representative, in addition to or beyond this Limited Warranty, shall constitute a warranty. This Limited Warranty may only be modified in writing signed by an officer of JM Eagle™.
## PLANT LOCATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Address Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADEL</td>
<td>2101 J-M Drive, Adel, Georgia 31620</td>
</tr>
<tr>
<td>BATCHELOR</td>
<td>2894 Marion Monk Road, Batchelor, Louisiana 70715</td>
</tr>
<tr>
<td>BUCKHANNON</td>
<td>Old Drop 33, Mudlick Road, Buckhannon, West Virginia 26201</td>
</tr>
<tr>
<td>BUTNER</td>
<td>2602 West Lyon Station Road, Creedmoor, North Carolina 27522</td>
</tr>
<tr>
<td>CAMERON PARK</td>
<td>3500 Robin Lane, Cameron Park, California 95682</td>
</tr>
<tr>
<td>COLUMBIA</td>
<td>6500 North Brown Station Road, Columbia, Missouri 65202</td>
</tr>
<tr>
<td>CONROE</td>
<td>101 East Avenue M, Conroe, Texas 77301</td>
</tr>
<tr>
<td>FONTANA</td>
<td>10990 Hemlock Avenue, Fontana, California 92337</td>
</tr>
<tr>
<td>HASTINGS</td>
<td>146 North Maple Avenue, Hastings, Nebraska 68901</td>
</tr>
<tr>
<td>KINGMAN</td>
<td>4620 Olympic Way, Kingman, Arizona 86401</td>
</tr>
<tr>
<td>MAGNOLIA</td>
<td>2220 Duracrete Drive, Magnolia, Arkansas 71753</td>
</tr>
<tr>
<td>MCNARY</td>
<td>31240 Roxbury Road, Umatilla, Oregon 97882</td>
</tr>
<tr>
<td>MEADVILLE</td>
<td>15661 Delano Road, Cochranton, Pennsylvania 16314</td>
</tr>
<tr>
<td>PERRIS</td>
<td>23711 Rider Street, Perris, California 92570</td>
</tr>
<tr>
<td>PUEBLO</td>
<td>1742 E. Platteville Boulevard, Pueblo West, Colorado 81007</td>
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<tr>
<td>STOCKTON</td>
<td>1051 Sperry Road, Stockton, California 95206</td>
</tr>
<tr>
<td>SUNNYSIDE</td>
<td>1820 South First Street, Sunnyside, Washington 98944</td>
</tr>
<tr>
<td>TACOMA</td>
<td>2330 Port of Tacoma Road, Tacoma, Washington 98421</td>
</tr>
<tr>
<td>TULSA</td>
<td>4501 West 49th Street, Tulsa, Oklahoma 74107</td>
</tr>
<tr>
<td>VISALIA</td>
<td>8875 Avenue 304, Visalia, California 93291</td>
</tr>
<tr>
<td>WHARTON</td>
<td>10807 US 59 RD, Wharton, Texas 77488</td>
</tr>
<tr>
<td>WILTON</td>
<td>1314 W. Third Street, Wilton, Iowa 52778</td>
</tr>
<tr>
<td>MEXICO</td>
<td>DE MÉXICO S DE R.L. DE S.A. Av. Montes Urales No. 8 y 10 Parque Industrial Opción, Carretera 57 Qro. -S.L.P. Km. 57.8 C.P. 37980 San José Iturbide, Guanajuato México</td>
</tr>
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*Our Mexico location is a joint venture between JM Eagle™ and Plastics Technology.*

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<td>5200 West Century Boulevard, Los Angeles, California 90045</td>
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<table>
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<th>Address Details</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Nine Peach Tree Hill Road, Livingston, New Jersey 07039</td>
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</table>

J-M Manufacturing Co., Inc. and PW Eagle, Inc. are doing business as JM Eagle™.
DriscoPlex® 6500 Pipe and Fittings meet or exceed:

- ASTM D2513, D2683, D3261
- CAN/CSA-B137.4
- UPC
- ASTM D3350, cell classification PE234373E and PE234375E
- PPI TR-4 designations PE2708 (PE2406) and PE80
- PPI TN-30

DriscoPlex® 6500 Yellow MDPE Pipe and Fittings for:

- Natural Gas Distribution, LPG and Propane Gas Distribution, Yard Gas
- Iron Pipe Size OD (IPS) ½" to 24”, Copper Tube Size OD (CTS) ½" to 1 ¼"
- Coils available up through 6”

Outdoor Storage up to Three (3) Years per ASTM D2513

### NOMINAL PIPE PROPERTIES (1)

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>gms / cm³</td>
<td>ASTM D1505</td>
<td>0.939 (yellow)</td>
</tr>
<tr>
<td>Melt Index (MI)</td>
<td>gms / 10 min</td>
<td>ASTM D1238</td>
<td>0.18</td>
</tr>
<tr>
<td>Hydrostatic Design Basis 73°F (23°C)</td>
<td>psi</td>
<td>ASTM D2837</td>
<td>1250</td>
</tr>
<tr>
<td>Hydrostatic Design Basis 140°F (60°C)</td>
<td>psi</td>
<td>ASTM D2837</td>
<td>1000</td>
</tr>
<tr>
<td>Minimum Required Strength</td>
<td>MPa (psi)</td>
<td>ISO 9080</td>
<td>8.0 (116)</td>
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<tr>
<td>Rapid Crack Propagation (Pc) 0°C (32°F)</td>
<td>Bar (psi)</td>
<td>ISO 13478</td>
<td>8.5 (123)</td>
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<tr>
<td>Color; UV Stabilizer [E]</td>
<td>--</td>
<td>ASTM D3350</td>
<td>Yellow; UV stabilized</td>
</tr>
<tr>
<td>Pipe Test Category</td>
<td>--</td>
<td>ASTM D2513</td>
<td>CEE</td>
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### NOMINAL MATERIAL PROPERTIES (1)(4)

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<tr>
<td>Flexural Modulus at 2% secant</td>
<td>psi</td>
<td>ASTM D790</td>
<td>&gt;90,000</td>
</tr>
<tr>
<td>Tensile Strength at Yield</td>
<td>psi</td>
<td>ASTM D638 Type IV</td>
<td>2,800</td>
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<tr>
<td>Elongation at Break 2 in / min., Type IV bar</td>
<td>%</td>
<td>ASTM D638</td>
<td>&gt;800</td>
</tr>
<tr>
<td>Hardness</td>
<td>Shore D</td>
<td>ASTM D2240</td>
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</tr>
<tr>
<td>PENT</td>
<td>hrs</td>
<td>ASTM F1473</td>
<td>&gt;2,000</td>
</tr>
<tr>
<td>Vicat Softening Temperature</td>
<td>°F</td>
<td>ASTM D1525</td>
<td>227</td>
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<tr>
<td>Brittleness Temperature</td>
<td>°F</td>
<td>ASTM D746</td>
<td>&lt; -103</td>
</tr>
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1. This is not a product specification and does not guarantee or establish specific minimum or maximum values or manufacturing tolerances for material or piping products to be supplied.
2. Values obtained from tests of specimens taken from piping product may vary from these typical values.
3. Determination made on 8” DR-11 pipes for Full Scale test. Pc calculated in accordance with ISO 13478.
### CTS = Copper Tube Size

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Nominal Size (Inches)</th>
<th>Nominal Outside Diameter (Inches)</th>
<th>Minimum Wall (Inches)</th>
<th>Weight per 100 ft.</th>
<th>MAOP (psig per CFR Part 192 @ 73.4°F or less)</th>
<th>Coil/ Joint (feet)</th>
<th>Nominal Packing Dimensions ID/OD/Width</th>
<th>Number Coils/ Joints Per Pallet or Bundle</th>
<th>Pallet / Bundle Footage</th>
<th>Number Pallet / Bundles Per Truck</th>
<th>48 ft. Truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>1002425</td>
<td>1/2&quot;</td>
<td>0.090</td>
<td>0.625</td>
<td>7.0</td>
<td>100</td>
<td>6.5</td>
<td>1,000'</td>
<td>30” / 44” / 6”</td>
<td>12</td>
<td>12,000'</td>
<td>26</td>
</tr>
<tr>
<td>1002445</td>
<td>1&quot;</td>
<td>0.099</td>
<td>1.125</td>
<td>11.5</td>
<td>76</td>
<td>14.0</td>
<td>500’</td>
<td>30” / 42” / 11”</td>
<td>8</td>
<td>4,000’</td>
<td>26</td>
</tr>
</tbody>
</table>

### IPS = Iron Pipe Size

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Nominal Size (Inches)</th>
<th>Nominal Outside Diameter (Inches)</th>
<th>Minimum Wall (Inches)</th>
<th>Weight per 100 ft.</th>
<th>MAOP (psig per CFR Part 192 @ 73.4°F or less)</th>
<th>Coil/ Joint (feet)</th>
<th>Nominal Packing Dimensions ID/OD/Width</th>
<th>Number Coils/ Joints Per Pallet or Bundle</th>
<th>Pallet / Bundle Footage</th>
<th>Number Pallet / Bundles Per Truck</th>
<th>48 ft. Truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>1002239</td>
<td>3/4&quot;</td>
<td>0.095</td>
<td>1.050</td>
<td>11</td>
<td>80</td>
<td>12</td>
<td>500’</td>
<td>30” / 44” / 10”</td>
<td>7</td>
<td>3,500’</td>
<td>26</td>
</tr>
<tr>
<td>1002249</td>
<td>1&quot;</td>
<td>0.120</td>
<td>1.315</td>
<td>11</td>
<td>80</td>
<td>19</td>
<td>500’</td>
<td>30” / 44” / 12”</td>
<td>6</td>
<td>3,000’</td>
<td>26</td>
</tr>
<tr>
<td>1002263</td>
<td>1 1/4&quot;</td>
<td>0.166</td>
<td>1.660</td>
<td>10</td>
<td>89</td>
<td>33</td>
<td>500’</td>
<td>48” / 72” / 7 1/2”</td>
<td>12</td>
<td>6,000’</td>
<td>7</td>
</tr>
<tr>
<td>1002284</td>
<td>2&quot;</td>
<td>0.216</td>
<td>2.375</td>
<td>11</td>
<td>80</td>
<td>63</td>
<td>500’</td>
<td>52” / 78” / 13”</td>
<td>7</td>
<td>3,500’</td>
<td>7</td>
</tr>
<tr>
<td>1002323</td>
<td>3&quot;</td>
<td>0.304</td>
<td>3.500</td>
<td>11.5</td>
<td>76</td>
<td>131</td>
<td>40’</td>
<td>soft bundles</td>
<td>50</td>
<td>2,000’</td>
<td>14</td>
</tr>
<tr>
<td>1002318</td>
<td>4&quot;</td>
<td>0.391</td>
<td>4.500</td>
<td>11.5</td>
<td>76</td>
<td>217</td>
<td>600’</td>
<td>70” / 93” / 49/ 8”</td>
<td>4</td>
<td>2,000’</td>
<td>6</td>
</tr>
<tr>
<td>1002349</td>
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<td>0.576</td>
<td>6.625</td>
<td>11.5</td>
<td>76</td>
<td>471</td>
<td>40’</td>
<td>soft bundles</td>
<td>13</td>
<td>520’</td>
<td>14</td>
</tr>
<tr>
<td>1002363</td>
<td>8&quot;</td>
<td>0.750</td>
<td>8.625</td>
<td>11.5</td>
<td>76</td>
<td>798</td>
<td>500’</td>
<td>84” / 120” / 50”</td>
<td>8 coils</td>
<td>4,000’</td>
<td></td>
</tr>
<tr>
<td>1002373</td>
<td></td>
<td>0.639</td>
<td>13.5</td>
<td>64</td>
<td>690</td>
<td>407</td>
<td>40’</td>
<td>soft bundles</td>
<td>9</td>
<td>360’</td>
<td>10</td>
</tr>
<tr>
<td>1007003</td>
<td>12&quot;</td>
<td>0.944</td>
<td>12.750</td>
<td>13.5</td>
<td>64</td>
<td>1507</td>
<td>40’</td>
<td>bulk packs</td>
<td>8 jts/layer</td>
<td>320’</td>
<td>6</td>
</tr>
</tbody>
</table>

**NOTE:** The August revision was strictly for ease in reading columns for minimum wall and DR. No specific data was changed.
Series 80
In-Line Mounted Centrifugal Pumps

Applications
• Hydronic Heating & Cooling Systems
• Industrial Process
• General Service
• Pressure Boosting

Advantages
• Close Coupled
• Space Saving
• Long Life
• Low Maintenance
• Horizontal or Vertical Installation
• Several Seal Options
A. STANDARD MECHANICAL SEAL

D. 80-PF STUFFING BOX CONSTRUCTION
(with four rings of packing plus a flush RING)
The Series 80 is an efficient, heavy-duty, close coupled pump designed for horizontal and vertical in-line mounting. Available in sizes 1½" through 8". 1/4 to 50 HP at 1750 RPM and 5 to 60 HP at 3500 RPM. Available in bronze fitted and all cast iron construction. Flows to 2500 GPM, heads to 380 ft. Available in 175#, 250# and 300# working pressure designs.

**CONVENIENT TO INSTALL**
In-line mounting eliminates the need for special pads or foundations in most cases. Standard piping supports on both sides of pump are required at all the times. The support ring located on the underside of pump volute is designed to provide ground support when necessary.

**HORIZONTAL MOUNTING**
Pump may be mounted horizontally in vertical piping if desired.

**CONVENIENT TO SERVICE**
Back pullout design allows servicing without disturbing the piping. Repairs can be made quickly and easily. Thus down-time is kept to a minimum.

**IMPELLER BALANCED TO ANSI/HI GRADE G6.3**
Quiet, vibration free operation results from this efficient balancing method. Factory selected diameters ensure that required performance will be attained.

**SEAL SELECTION GUIDE**

A. STANDARD SEALS
Buna-PH Limitations: 7-9; Temperature Range -20˚F to +225°F
EPR-PH Limitations: 7-11; Temperature Range -20 to +250°F
For use on open or closed clear water systems.
Maximum working pressure 175 psi.

B. FLUSHED SINGLE SEALS (Stuffing Box Design)
PH Limitations: 7-11; Temperature Range -20 to +300°F**
For use on open or closed clear water systems which may contain a high concentration of abrasives. An external flush is required. Maximum working pressure 175 psi.

C. FLUSHED DOUBLE SEALS (Stuffing Box Design)
PH Limitations: 7-9; Temperature Range 0 to +250°F
For use on open or closed low pressure systems which may contain a high concentration of abrasives. An external flush is required. Maximum working pressure 175 psi.

D. PACKING (Stuffing Box Design)
PH Limitations: 7-9; Temperature Range 0 to +190°F
For use on open or closed systems which require a large amount of make-up water, as well as systems which are subjected to widely varying chemical conditions and solids buildup. Maximum working pressure 175 psi.

**For operating temperatures above 250°F, a cooled flush is required – and is recommended for temperatures above 225°F for optimum seal life. On closed systems, cooling is accomplished by inserting a small heat exchanger in the flush line to cool the fluid. Flush-line Filters and Sediment Separators are available on special request.

**INTERNALLY FLUSHED MECHANICAL SEAL**
The B&G built-in mechanical seal with anti-vortex baffles in the seal chamber provide five times the flow around the seal face versus an externally flushed seal. Costly and inefficient external flush lines are not needed.

---

**CONSTRUCTION MATERIALS**
(For parts in contact with fluid pumped)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>BRONZE FITTED PUMP</th>
<th>ALL IRON PUMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shaft</td>
<td>Alloy Steel</td>
<td>Alloy Steel</td>
</tr>
<tr>
<td>2. Volute</td>
<td>Cast Iron ASTM #1A159</td>
<td>Cast Iron AST #1A159</td>
</tr>
<tr>
<td>3. Impeller</td>
<td>Cast Bronze ASTM #856/4</td>
<td>Cast Iron ASTM #856/4</td>
</tr>
<tr>
<td>4. Shaft Sleeve</td>
<td>Aluminum Bronze</td>
<td>Stainless Steel</td>
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<td>6. Impeller Washer</td>
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<td>8. Impeller Capscrew</td>
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<td>A. Standard Seal</td>
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<td>Buna N</td>
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<td>B. Flushed Single Seal</td>
<td>EPR</td>
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<td>C. Flushed Double Seal</td>
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<td>Impregnated Braided Yarn</td>
<td>Impregnated Braided Yarn</td>
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<tr>
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<td>Bronze</td>
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SERIES 80 - STANDARD SIZE PUMP

PERFORMANCE CURVES

Dimensions subject to change without notice. Do not use for construction purposes.
### Dimensions

Dimensions subject to change without notice. Do not use for construction purposes.

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<tr>
<th>MOTOR FRAME</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>MAX. E</th>
<th>STD. SEAL - F</th>
<th>STUFF. BOX - F</th>
<th>MAX. STD. - F H</th>
<th>MAX. STUFF. BOX - H</th>
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<td>7/16 (11)</td>
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<td>1 &amp; 1/2</td>
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<td>1 &amp; 1/2</td>
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<td>7/16 (11)</td>
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<td>1 &amp; 1/2</td>
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<td>1 &amp; 1/2</td>
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### Pump Flanges in Inches (mm)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>OUTER DIAMETER</th>
<th>THICKNESS</th>
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<tbody>
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<td>1 1/4</td>
<td>6 (152)</td>
<td>1/16 (20)</td>
</tr>
<tr>
<td>2</td>
<td>6 1/4 (159)</td>
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<td>2 1/2</td>
<td>7 1/8 (187)</td>
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<td>3</td>
<td>8 (203)</td>
<td>1/16 (30)</td>
</tr>
<tr>
<td>4</td>
<td>9 1/4 (241)</td>
<td>1/16 (32)</td>
</tr>
<tr>
<td>5</td>
<td>10 1/4 (273)</td>
<td>1/16 (35)</td>
</tr>
<tr>
<td>6</td>
<td>12 1/4 (308)</td>
<td>1/16 (37)</td>
</tr>
<tr>
<td>8</td>
<td>14 1/4 (375)</td>
<td>1/16 (41)</td>
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</table>

*For 1 phase motors add 1” maximum to dimensions E & H.
<table>
<thead>
<tr>
<th>MOTOR FRAME</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>MAX. E*</th>
<th>STD.-SEAL.-F</th>
<th>STUFF. BOX F</th>
<th>G</th>
<th>MAX.-STUFF.-F</th>
<th>MAX.-STUFF. BOX H*</th>
<th>125 #ANSI</th>
<th>250 #ANSI</th>
<th>MAX. R</th>
<th>T</th>
<th>MIN. V</th>
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<td>½ (22)</td>
<td>10½ (270)</td>
<td>12 (305)</td>
<td>¾ (22)</td>
</tr>
<tr>
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<td>19 ½ (489)</td>
<td>24½ (613)</td>
<td>32½ (830)</td>
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<td>41½ x (1095)</td>
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<td>½ (22)</td>
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<td>12 (305)</td>
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<tr>
<td>213</td>
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<td>41½ x (1095)</td>
<td>9½ (241)</td>
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<td>11½ (298)</td>
<td>14 (356)</td>
<td>15 (381)</td>
<td>5¼ (133)</td>
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*For 1 phase motors add 1" maximum to dimensions E & H.

**Dimensions subject to change without notice. Do not use for construction purposes.
Furnished and installed with capacities as shown on plans. Pumps shall be in-line type, close-coupled single stage design, for installation in vertical or horizontal position, and capable of being serviced without disturbing piping connections.

Pump casing shall be of Class 30 cast iron. The impeller shall be of cast bronze, closed type, balanced to ANSI/HI Grade G6.3, keyed to the shaft and secured by locking capscrew.

The liquid cavity shall be sealed off at the motor shaft by an internally-flushed mechanical seal with ceramic seal seat and carbon seal ring, suitable for continuous operation at 225°F.

A bronze shaft sleeve shall completely cover the wetted area under the seal.

Pumps shall be rated for minimum of 175 psi working pressure (optional 250 psi and 300 psi working pressure). The pump case shall have gauge tappings at the suction and discharge nozzles and will include drain ports.

Motor shall meet NEMA specifications and shall be the size, voltage and enclosure called for on the plans. It shall have heavy-duty, grease lubricated ball bearings, completely adequate for the maximum load for which the pump is designed.

Each pump shall be factory tested per Hydraulic Institute standards. It shall then be thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.

Pumps shall be Series 80 as manufactured by ITT Bell & Gossett or equal.

### TYPICAL SPECIFICATIONS FOR BELL & GOSSETT SERIES 80 IN-LINE PUMPS

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### DIMENSIONS IN INCHES (mm)

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*For 1 phase motors add 1” maximum to dimensions E & H.

**For TEFC Motors add S dimensions to dimensions E & H.

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Modulating Pressure Control

EBC 30

Use
The EBC 30 is a draft or pressure control device that can monitor and maintain a constant draft or pressure by varying the speed of a fan(s) or the position of an actuator. It can be used with models RSV, IPvB, BESB and MDF. Typical uses are: 1) Controlling draft in a mechanical draft system serving boilers and water heaters, 2) Controlling position of an over-draft damper serving boilers and water heaters, 3) Controlling duct pressure in a dryer venting system or a ventilation system, or 4) Controlling the supply of combustion air to a mechanical room.

Description
The EBC 30 features “Plug-n-Play” to automatically detect connections, setting requirements and accessories during initial start-up. A rotation check feature makes it easy to determine the rotation of a 3-phase fan motor. The control can provide a 0-10V signal to a Variable Frequency Drive (VFD) or actuator. An add-on board can supply 0-120VAC power directly to the mechanical draft fan or air supply ventilator. It can interlock with up to 6 heating appliances, and an unlimited number of additional heating appliances can be handled by using one or more ES12, Relay Box. An integrated Proven Draft Switch function assures that if sufficient draft cannot be maintained, the control will lock out the appliance(s) within an adjustable time period. Automatic reset avoids nuisance lockouts and the need for manual reset.

The EBC 30 can be set up for intermittent operation so it pre-purges the stack prior to the boiler(s) start and post-purges up to 30 minutes after boiler stop. Alternatively, it can be set up for continuous operation where the fan runs continuously but modulates and runs at idle speed, if no appliances are operating.

The programmable processor allows manual overrides, manual operation; low and high limit fan speeds. An Operating Priority set up option allows one or more appliance to operate during electrical or mechanical failure of the fan(s) provided the draft requirement can be met and safe operation assured. It automatically checks for fan operation every two hours and goes back to normal operation, if appropriate. A bearing cycle activation rotates the fan motor(s) once every 24 hours if the fan(s) has not operated within the last 24 hours.

Required draft and pressures can be maintained and shown via a LCD-panel. A self-diagnostics panel with LED-diodes verifies proper operation. The control maintains an error log including the last 10 fault codes.

The pressure sensors has dual pressure transducers for monitoring of safe sensor operation. Sensor failure (average differential input difference of more than 5 Pa in 10 seconds) generates an alarm and locks out appliance operation.

Material
The housing is made in steel and is NEMA 1 rated.

Standard Equipment
Control box and XTP150G-Sensor with 6’ silicone tubing and a stack probe.

Listings
ETL listed to UL508 and CSA C22.2 No. 14-95 – Standard for Industrial Control Equipment (ETL Report 3028824A)
Component in ETL listed CASV System
(ETL Report 045099A)
Component in ETL listed MCAS System
(ETL Report J99*18091-003)
Component in ETL listed MDVS System
(ETL Report J99*18091-004)
CE Compliant
Manufactured at ISO 9001 certified plant.

Warranty
2-Year Factory Warranty

Specifications are subject to change without notice.
Specifications

### EBC 30 Control

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Power Supply V</td>
<td>1x120VAC</td>
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<tr>
<td>Amperage A</td>
<td>6.3</td>
</tr>
<tr>
<td>Operating Temperature °F/°C</td>
<td>-4 to 122/-20 to 50</td>
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<tr>
<td>Range of Operation inWC/Pa</td>
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<tr>
<td>Tolerance inWC/Pa</td>
<td>0.01/3 +/-10%</td>
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<td>Control Signal mA</td>
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<td>Control Relay</td>
<td>Max. 120 VAC/8A</td>
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<td>VDC</td>
<td>0-10</td>
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<td>B in/mm</td>
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<td>C in/mm</td>
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### XTP Sensor

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<tr>
<td>E in/mm</td>
<td>4.50/115</td>
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<tr>
<td>F in/mm</td>
<td>2.9/55</td>
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<tr>
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### Stack Probe

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<td>4.25/108</td>
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<tr>
<td>I in/mm</td>
<td>3.50/89</td>
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Programmable features:

1. Rotation check
2. Exhaust (draft) setting
3. Exhaust mode
4. Exhaust pre-purge time and speed mode
5. Exhaust post-purge time and speed mode
6. Exhaust sensor range
7. Exhaust alarm limit
8. Exhaust alarm delay
9. Exhaust speed min and max
10. Intake set
11. Intake mode
12. Intake pre-purge time and speed mode
13. Intake post-purge time and speed mode
14. Intake sensor range
15. Intake alarm limit
16. Intake alarm delay
17. Intake speed min and max
18. Language
19. Display units
20. Display light
21. Alarm reset
22. Service triac board
23. Service override exhaust
24. Service override intake
25. Service override alarm mode
26. Option priority mode
27. Option bearing cycle
28. Manual exhaust/intake
Use
The IPVB Power Venter is intended for use as a true in-line draft inducer. It can be installed in-line in the vertical or horizontal section of a chimney or stack. It is specifically designed for applications where reliable and efficient operation, low noise level, low energy consumption, variable speed and compact design are of utmost importance.

The IPVB is for use with condensing and non-condensing appliances at flue gas temperatures of 575°F (302°C).

Typical uses are: mechanical venting of gas-fired or oil-fired boilers and water heaters. For indoor or outdoor installation.

Description
The IPVB Power Venter is an efficient, high-temperature ventilator with backward-inclined impeller. The ventilator housing is made of stainless steel and equipped with an energy-efficient, totally enclosed, variable speed motor, which is mounted outside the air stream. The design is a Type B, Spark Resistant Construction. The motor and impeller is a complete assembly (drive unit) that can be removed from the fan housing without removing the fan from the stack system. The stack connections are of the flanged connection type and fit most commercial pre-fabricated chimney systems. Slip connection fittings are available. The fan is typically installed hung from ceiling mounting brackets to support the weight. The IPVB is a component in the ENERVEX CASI, Chimney Automation System.

Material
The housing is made of 316L stainless steel. The impeller is of the backward inclined type made of cast aluminum.

Motor
Commercial grade, totally enclosed (TEFC), variable speed, Class A insulated motor with sealed and permanently lubricated bearings. Thermal overload protection.

Accessories
EBC 30 or EBC 12 Modulating Fan Control, Variable Frequency Drive (VFD), PDS, ECO Economizer (integrated)

Listings
ETL Listed to UL378-Standard for Draft Equipment and CSA B255-Standard for Mechanical Flue Gas Exhausters
CE compliant
Manufactured at ISO9001 certified plant
Complies with and meets Type B, Spark Resistant Construction per AMCA standard 99-0401 classifications of Spark Resistant Construction.

Warranty
2 year factory warranty
10 year warranty against corrosion perforation
## Specifications

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<td>Centrifugal Impeller (B-wheel)</td>
<td>Centrifugal Impeller (B-wheel)</td>
<td>Centrifugal Impeller (B-wheel)</td>
</tr>
<tr>
<td>Motor Type</td>
<td>TEFC</td>
<td>TEFC</td>
<td>TEFC</td>
<td>TEFC</td>
</tr>
<tr>
<td>Voltage</td>
<td>1 x 120</td>
<td>3 x 200-480 / 3 x 440-480</td>
<td>5.8</td>
<td>2.6 / 1.5</td>
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<tr>
<td>Amperage</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>500</td>
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<tr>
<td>Motor Output HP kW</td>
<td>0.5</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Max. RPM</td>
<td>1600</td>
<td>1740</td>
<td>1740</td>
<td>1740</td>
</tr>
<tr>
<td>Duct Connection (Nominal) in</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>20</td>
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<tr>
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<td>22.4</td>
<td>26.4</td>
<td>29.5</td>
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<tr>
<td>Dimensions B</td>
<td>13.0</td>
<td>14.6</td>
<td>17.0</td>
<td>21.3</td>
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<tr>
<td>Dimensions C</td>
<td>13.9</td>
<td>15.5</td>
<td>17.8</td>
<td>22.1</td>
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<tr>
<td>Dimensions D</td>
<td>12.1</td>
<td>14.0</td>
<td>16.0</td>
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<tr>
<td>Dimensions E</td>
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<td>12.7</td>
<td>14.6</td>
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<td>15.8</td>
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<td>16.2</td>
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<td>Dimensions H</td>
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<tr>
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<td>75</td>
<td>94</td>
<td>128</td>
<td>182</td>
</tr>
<tr>
<td>Weight kg</td>
<td>34</td>
<td>42.5</td>
<td>58</td>
<td>82.5</td>
</tr>
</tbody>
</table>

### Capacity:

**NOTE:**
The capacity data above is tested in accordance with ISO Standard 5801-Industrial Fans Performance Testing Using Standardized Airways.

---

**Removal of drive unit**

**Fan without drive unit**
I. BAS MANUFACTURER’S DATA
“A ‘smart‘ building readily adapts to changes while continuing to run efficiently, and most importantly, invisibly to its occupants. The Andover Continuum system allows me the flexibility to modify operational parameters to ensure that our buildings stay comfortable, safe, and secure for our occupants.”

— Robert McRae
Direct Digital Control Technician Dormitory Authority of the state of New York

Expect more from building automation and security systems

Today’s buildings demand more from building automation and security systems. Buildings must adapt to many rapid changes, and be smarter, more comfortable, more efficient and safer than facilities designed just a few years ago. The controls system is the critical component to meeting these new demands, and the Andover Continuum system from TAC® is ready for today’s needs while helping prepare for the future.

DESIGNED FOR CHANGES
TAC’s Andover Continuum is designed for change. We’ve placed an emphasis on scalability, flexibility, versatility and programmability throughout the entire product line. We are constantly asking our engineers to solve the “what if the customer wants to...” problems, so our products have the widest range of practical uses, from HVAC control to basic monitoring, from electronic access control to surveillance.

THE INTEGRATED APPROACH
Andover Continuum is built from the ground up as both a climate control system and a security system. This unique approach reduces the overall system cost while providing a solution for the growing requirement for tight integration using coordinated control strategies. It is further complemented by TAC’s commitment to open standards, allowing the system to interoperate with third-party systems for total building and system integration.

SCALABLE AND EXPANDABLE
From a single site to global enterprise, the system installed today provides as solid a foundation as the building it serves. TAC stands behind Andover Continuum and the investment in building technology by making new products backward compatible. This, along with the scalability and expandability of the Andover Continuum system, provides a seamless path for integrating past, present, and future facility management needs.

ANDOVER CONTINUUM’S HISTORY OF INNOVATIONS

First controller with an embedded webserver
First to integrate HVAC and Electronic Access Control into one controller
First system to integrate HVAC and access control
First to provide complete, integrated solutions based on Open Systems for Building IT
First to extend standards-based technology to all facility and security controls
First to provide web-based dashboard control over enterprise facilities management
First wireless-mesh/field bus (which is compatible with the full line of Andover Continuum In/Inet and BACnet/field controllers)
First system to integrate access control and digital video recording
Andover Continuum, introduced in 1998, is the third-generation system in the product line, but its history goes back to 1980 when Andover first started to develop a low-cost energy management system as an alternative to large mainframe-based systems. Andover Continuum extends this rich heritage with its own character and successes.

Andover Continuum was the first to integrate HVAC and Electronic Access Control into one controller, having the first controller with onboard Ethernet communications, the first controller with an embedded web server, the first system to integrate access control and digital video recording, and the first native BACnet™ system to also handle full security management tasks.

Andover Continuum expands the possibilities again with the world’s first wireless-mesh field bus, compatible with the full line of Andover Continuum Infinet™ and BACnet field controllers.

We build Andover Continuum product at our state-of-the-art facilities in North Andover, Massachusetts, meeting TAC’s precise specifications and demanding quality control standards.

Our parent company, Schneider Electric, is the world’s leading specialist in power and control. With their acquisition of Andover Controls in August 2004, TAC and Andover have combined to create the foundation for Schneider Electric’s growth platform in the building automation industry. Coupled with Schneider Electric’s complementary products such as variable frequency speed drives, UPS systems, lighting controls, and power monitoring devices, TAC offers customers a complete power, security, and automation solution for all facilities.

“A Track Record of Innovation, Reliability and Quality

Andover Continuum, introduced in 1998, is the third-generation system in the product line, but its history goes back to 1980 when Andover first started to develop a low-cost energy management system as an alternative to large mainframe-based systems. Andover Continuum extends this rich heritage with its own character and successes.

Andover Continuum was the first to integrate HVAC and Electronic Access Control into one controller, having the first controller with onboard Ethernet communications, the first controller with an embedded web server, the first system to integrate access control and digital video recording, and the first native BACnet™ system to also handle full security management tasks.

Andover Continuum expands the possibilities again with the world’s first wireless-mesh field bus, compatible with the full line of Andover Continuum Infinet™ and BACnet field controllers.

With Andover Continuum, the integration between systems is truly what makes the product effective for us. Plus, we have people here at Moffitt willing to ‘push the envelope,’ so to speak. With Andover Continuum, we are limited only by our imaginations.”

— Dean Head
Director of Facilities
Moffitt Cancer Center
“The Andover Continuum system allows me to tie in multiple building functions and reduce my costs. In the past, I worked with multiple systems, all with different front-ends. Now, integrating all our systems together and using only one front-end is not only more convenient, it allows me to have a small facilities staff.”

— Bill Lacava
Vice President of Enterprise Networks
Genpass, Inc.

Open and Integrated

When a control system is at its best, it goes unnoticed by the building occupants. To achieve this, a lot must happen behind the scenes. When a system is working at peak efficiency, people are safe, comfortable, and more productive. The system provides added value through lower operating costs.

Safety is achieved by controlling building access, by early enunciation of fire alarms, through video monitoring and recording, and by control of smoke evacuation systems.

Comfort is more than just achieving the right temperature. It is also maintaining humidity, pressure, and the proper air exchange.

A building’s ability to be efficient is enhanced through demand control that is triggered through communications with the utilities. When these systems can work together, the results are much more impressive. The challenge is to link these systems efficiently.

A SINGLE SOLUTION FOR HVAC AND SECURITY
Andover Continuum achieves tight integration cost-effectively. It is both an HVAC system and a security management system at the same time, with several products offering both access control and HVAC control. There’s no duplication of hardware and wiring as with separate systems, thanks to the efficiency of Andover Continuum design.

The same programming language is used for both HVAC and security applications, so coordinated system strategies are simple to implement. Andover Continuum is natively loaded with open protocol support, enabling it to work with many other vendors’ products and information systems.

Andover Continuum also allows use of the same hardware and software for small or large systems. Buy only what is needed now, and expand later.

INTEROPERABILITY
Building managers are challenged to integrate multiple systems from different companies. A comprehensive integrated solution must work in tandem with the latest open protocol standards, yet work with any installed base of legacy systems, which use a wide variety of proprietary protocols.
Through interfaces with other manufacturers’ systems, Andover Continuum can talk to the entire building and share information among systems including chillers, fire alarm panels, air handlers, CCTV systems, lighting controllers, and more.

If a facility uses a product without an open standard to communicate, Andover Continuum has a list of over 200 third-party communication drivers, which include many propriety protocols.

TAC embraces BACnet, an open ASHRAE/ANSI/ISO standard providing the opportunity for building automation systems to interoperate with one another. The Andover Continuum system takes full advantage of BACnet’s data sharing, trending, scheduling, alarming, and device management services. From the BACnet operator’s workstation to the building controller to the simplest terminal controller, Andover Continuum provides the highest level of interoperability at every level.

Andover Continuum is IT-friendly, supporting major communication, desktop IT, and building automation standards such as email, SNMP, HTML, Active-X, and XML through TCP/IP, OPC, LONWORKS®, BACnet, and Ethernet.

A single interface to your building

Andover Continuum ties your building together across systems, communication standards and vendors.
Andover Continuum is a full system of controllers and user interface software products, which can be combined in many different ways to customize the system to site requirements. Whether the site is a single building or across multiple locations, Andover Continuum is scalable and adaptable. It can even be tailored for specialized environments. For example, in the highly regulated life-sciences industry, the system can be installed and validated to support compliance with FDA regulations.

**FULL POWERED NETWORK CONTROLLERS**
Andover Continuum’s Ethernet-based network controllers are the most powerful in the industry and go far beyond basic routing to field buses. They also act as programmable controllers, web servers, open and proprietary protocol gateways, and alarm and event distribution engines, as well as SNMP, OPC, and email servers.

**INTELLIGENT AND RELIABLE FIELD CONTROLLERS**
A facility is affected by the reliability of the control system. That’s why TAC has distributed intelligence down to the local device level of every controller. These peer-to-peer devices provide stand-alone control, running their own programs, schedules, and trends, and issuing their own alarms and events. When connected to an Andover Continuum system via a field bus network, they can globally share data with any
Andover Continuum delivers more

Through Andover Continuum’s robust arsenal of interfaces, users are empowered to:
- View a graphic
- View and acknowledge alarms
- Modify schedules
- Run a report
- Change a setpoint
- View a trend graph
- View video
- Edit personnel records
- Create badges
- Edit programs

With Andover Continuum more can be expected from a building automation and security system. It is modular, adapts easily to rapid changes and allows building systems to cooperate with each other. It sets the standard for comfort and occupant’s safety and bridges past, present, and future with backward compatibility and compliance with open standards.
Altivar® 61
Variable speed AC drives
Power over the elements!

For 3-phase asynchronous motors from 1 to 900 HP.
Altivar® 61 Drives

Manage and monitor your building

The Altivar® 61 drive defines ease of use for variable speed drives used in centrifugal pump and fan applications offering the highest level of features, functions and flexibility. Its evolutionary design will reduce installation and start-up time while offering reliable operation, simple diagnostics and energy efficiency.

The Altivar 61 drive enables you to:

- Reduce energy costs by reducing motor speed
- Reduce installation costs by eliminating throttling valves or inlet guide vanes typically used to control flow, offering internal connection to major building networks and with quick and simple installation
- Improve up-time by providing superior voltage dip ride through
- Reduce life cycle costs of the installation by eliminating mechanical shock to belts and motors
- Improve indoor air quality and occupant comfort through accurate flow control

Supply fans for heating and air conditioning:

- Adjustment of flow rates on the basis of actual need
- Enhance comfort by reducing noise pollution caused by the motor with unique random switching frequency modulation
- Detection of broken fan belt
- Automatic restart after most faults

Ventilation fans exhaust/smoke extraction

- Forced start function with fault inhibition and fireman’s override
- For high inertia applications, braking possible using resistors
- Run permissive damper input
- Catch on the fly by speed search regardless of the direction of rotation to start wind milling fans

Cooling tower fans

- Suppression of mechanical resonance using skip/jump frequencies
- Loss of follower with alarm management
- External fault input
- Adjustments to eliminate gear box backlash and cogging
Multipump: water distribution

- With the multipump option card, the Altivar 61 drive provides flexibility, user-friendliness and adaptability for the management of multiple pump installations.
- The multipump option card contains a variety of pre-programmed function and features to manage multipump installations, such as monitor and fully control the installation by switching and managing the wear and tear between pumps.

Municipal water pumps

- Safety and protection of pump: Detection of current threshold
- Limitation of operating time at low speed
- PTC probe management
- Auto-restart function with configurable response
- Underload and overload detection

Hot water and chilled water pumps

- Underload and overload detection with alarm
- Low flow detection
- Sleep/wake function
- Power used, power on time, motor run time

The Altivar 61 drive offers the following values:

- For OEMs, it offers customizable capability that allows the OEM to add value and provide a unique solution.
- For System Integrators, it offers flexibility, functionality and wide product range to adapt to a wide variety of job requirements.
- For End User installations, it offers quick installation, simple start-up, and on-board diagnostics for uncomplicated maintenance.
Altivar® 61 Drives

The leading edge!

This new generation of AC drives demonstrates the expertise and know-how of Schneider Electric with respect to AC drives. Exceptional flexibility, advanced functions and a high level of customization...while always keeping the emphasis on simplicity. Open to many communication networks, the Altivar 61 drive provides ingenious solutions for all your HVAC fan and pump requirements.

A powerful fleet

- 1 to 900 HP
  3-phase 380 to 480V
- 1 to 125 HP
  3-phase 200 to 240V
- Integrated EMC level A filters
- Worldwide offer:
  UL, CSA, CE, C-Tick, GOST,
  UL1995 Plenum rated, SEMI-F47

Remarkable performance for fan and pump applications

- Under voltage ride-thru qualified to SEMI-F47 standard
- Catch on the fly restart
- Up to 110% overcurrent
- Energy economizer motor algorithm to maximize energy savings, or select two point or five point Volts/Hz profile
- Three skip frequency bands
- Bump-less transfer from automatic to hand control

Expandable capabilities

The drive is equipped with a wealth of features, application functions, inputs/outputs and communication capabilities. These can be further extended by:

- input/output extension cards
- communication cards
- a Controller Inside programmable card
- a Multipump application card

Simply Smart!
Leverage ingenuity and intelligence for ease of use
**Protection** at all levels

- **Of the Motor:**
  Thermal protection by PTC probe or integrated electronic thermal overload, voltage and current surge limitation

- **Of the Machine:**
  Power removal safety function (no unintended motor operation), alarm management, external fault management

- **Of the Drive:**
  Protection in the event of overheating, current limitation using hardware and software, protection against corrosive environments

- **Of the Installation:**
  The intelligent design of the Altivar 61 drive power system architecture optimizes the balance between inductance and capacitance to achieve effective harmonic mitigation with 3% equivalent impedance without requiring additional panel space. This unique design minimizes dc bus ripple, reduces input currents and lowers harmonic currents. This eliminates the need to oversize power wiring, disconnect means, and short circuit protection devices. This also improves the efficiency of the drive and allows operation at higher ambient temperature than other AC drives.

- **Of the Environment:**
  Developed in accordance with the Eco-Design principle. Materials used have been selected for their minimal impact on the environment and conform to the RoHS directive (Restriction of Hazardous Substances) that prohibits certain levels of materials. Also, 88% of the parts used for the Altivar 61 drive are recyclable, conforming to the directive WEEE (Waste Electrical & Electronic Equipment).

**Easy** to control...

- Graphic screen with customizable display
- Plain text with six languages (English, Chinese, German, Spanish, French and Italian)
- Navigation wheel for easily “surfing” through the menus
- “Simply Start” menu for quick start-up and immediate benefit of the full performance of the Altivar 61 drive
- Function keys for short-cuts, on-line help or configurable for some applications
- Continuous display of the operating parameters of the motor
- Hand/auto function key provides one button bumpless transfer between terminal strip control and control with the keypad, or between communication network control and control with the keypad
Altivar® 61 Drives
Message received: all clear...

The Altivar 61 drive is a professional at communication: its messages are clear, precise, illustrated and intuitive to use.

Flexibility
with its remote mounting alternatives:
• on the door of an enclosure, with an IP54 or IP65 degree of protection
• for multipoint connection to several drives
Stores four configurations for transfer to other drives.

Protection
Multi level password protected, for allowing access to parameters or configurations with complete security.

Refine
select filtering and scaling values to analog inputs and analog outputs

Ergonomic
with its navigation button. With just one finger, freely and quickly “surf” the drop-down menu.

Clarity
of the display comprising eight lines of text and graphics. Legibility from 16 ft. Six languages available: English, Chinese, German, French, Spanish and Italian.

Simplicity
using function keys for short-cuts, direct access and on-line help, display of the minimum and maximum values of the parameters.

Customization
of parameters, display screens, on-line monitoring, creation of “user” menu.

Adaptability
add timing delays to logic inputs, logic outputs and relay output.

Modify
configure the active state on the relay and logic outputs.
The “Simply Start” menu provides easy access to the most common parameters to reduce start-up time of the Altivar 61 drive.

With PowerSuite™ software workshop you stay in control, even from a distance!

For configuring, adjusting and monitoring your Altivar drive...keep an eye on your installations via Bluetooth®...

Oscilloscope function incorporated in the Altivar 61 drive: display multiple channels using PowerSuite.

**Configure** for your application

- Integrated macro-configurations are designed for a wide variety of applications and uses: pump and fan, connection to communication networks and PID regulation. They can easily be customized.

- The architecture of the menus, hierarchical parameter system and short-cut functions enable simple and quick programming, even for the most sophisticated functions.

More on-board **diagnostics**

Ample diagnostics available via the graphic terminal simplify setting-up and maintaining your equipment.

The state of the drive is recorded at moment of a fault to assist with diagnostics:
- Elapsed time
- Line voltage
- Motor current
- and more...

Display of inputs/outputs, communication, etc.

Service messages of all types of information on the display:
- a telephone number,
- a specific instruction...
- stored in the drive.

Identity incorporated in the drive simplifies installed base management.

The architecture of the menus, hierarchical parameter system and short-cut functions enable simple and quick programming, even for the most sophisticated functions.
Altivar® 61 Drives

Evolutionary design

Unrivalled basic equipment

With the many functions already integrated in the Altivar 61 drive, you reduce the cost of solutions for your installation. The most economical solution is offered without compromise!

Interface with the typical HVAC and Pump I/O requirements such as:
- run command: Input to VFD by remote dry contact from the BAS
- speed command: Input to VFD from the BAS
- run status: Output contact from VFD to the BAS
- speed feedback: Analog output from VFD to the BAS
- fault output: Form-C contact from VFD to the BAS
- fire/safety interlock: 24Vdc supplied by VFD, Use N.C. contacts

Fans optimized for long life and serviceability

The cooling fans on the Altivar 61 drive are designed to be easily removed for cleaning and servicing. These fans can be removed without removing the drive from the wall or its enclosure and are intelligently cycled on only when required to cool the drive, maximizing the life of the fan.

With more than 100 fan and pump functions available, you benefit from:
- increased flexibility
- high level of customization
- high level of integration

Integrated Modbus® and CANopen Port

With these two standard networks, you achieve:
- simplified installation
- savings in panel space
- direct connection to building network systems

Dialogue

The graphic terminal can be multipoint connected to several drives. The Altivar 61 drive is also available with a 7-segment display for ratings up to and including 20 HP @230Vac and 100 HP @460Vac for the most economical solution.

EMC mastered

Incorporating level A conducted and radiated EMC filters, the Altivar 61 drive simplifies installation and establishes conformity of the machine for CE marking, without additional costs.

“Power Removal” function

Conforming to the machine standard EN 954-1 category 3 and the standard for electrical installations IEC/EN 61508-1 SIL2, and certified by a competent body (INERIS), it enables:
- easier machine certification
- elimination of electromechanical relays
- reduced wiring and installation times
- space savings in enclosures
For any **Mounting requirement:**

**On a wall**
- Simple compact installation use the Type 1 conduit kit

**Reduce enclosure size**
- side by side mounting reduces panel space
- industry leading 50˚ C rating
- externally mounting the heat sink with kit

**In severe environments**
- resistance to corrosive environments conforming to class 3C2 of IEC 60721-3-3
- Exposed copper is tinned, circuit boards are conformal coated in critical areas, and plastics are treated to better withstand the corrosive nature of certain oils. (This protection is standard on products 75 HP and higher @ 230 VAC and on 125 HP and higher @ 460 VAC. Add S337 to the end of the catalog number to receive this protection on smaller horsepower products)

**Modular configuration**

When you require additional inputs or outputs, a communication network connection or desire decentralized equipment control, you can select up to two option cards that snap in without requiring additional panel space

- **Input/output extension** cards:
  - Logic inputs, open collector outputs, relay, PTC probe input, analog inputs, analog outputs, pulse input

- **Communication** cards:
  - for connection to the main communication networks available on the market

  *For building networks:*
  - Lonworks, BACnet, Metasys N2, Apogee FLN P1

  *For industrial networks:*
  - Fipio, Ethernet, Modbus Plus, Profibus DP, DeviceNet, Uni-Telway, InterBus

- **Controller Inside** programmable card:
  - Allows integration of simple programs in the drive for an OEM or integrator to provide a unique solutions

- **The pump application** option card incorporates application functions for managing pumps
  - Single pump or multiple pump management with up to four pump motors with variable speed and fixed speed motors
  - Management of relative operating time
  - Set-up screens minimize start-up
  - Activate only the functions your system requires
  - Instrumentation scaling
  - Real time clock
  - System status and fault messaging
Go *green* with the **Altivar® 61 Drive!**

Let the Altivar 61 drive operate your buildings with greater efficiency. Using the Altivar 61 drive on fans and pumps can significantly reduce your energy costs. In many instances, the payback period for using an adjustable frequency drive in place of other flow control methods is less than 18 months.

Most HVAC systems are designed to keep the building cool on the hottest days and warm on the coldest days. Therefore, the HVAC system only needs to work at full capacity on the 10 or so hottest days and the 10 or so coldest days of the year. On the other 345 days, the HVAC system may operate at a reduced capacity. This is where a variable air volume system with variable frequency drives (VFDs) can be used to match air flow to actual heating and cooling demands. The VFD can reduce the motor speed when full flow is not required, thereby reducing the power required and the electrical energy used.

### An Example of an Energy Saving Calculation*

A fan with a 20 horsepower motor supplies air 10 hours a day for 260 days a year and the energy cost is $0.10 cents per kilowatt-hour. Cost of running full speed:

\[
20 \text{ hp} \times 0.746 \text{ kW/hp} \times 2600 \text{ hours} \times $0.10/\text{kWhr} = $3879.20
\]

Assuming the fan does not need to run at full speed all of the time, let's use an example of:
- Running full speed (100%) for 25% of the time
- 80% speed for 50% of the time
- 60% speed for the remaining 25% of the time

Cost of running with an AC drive controlling the motor:

\[
\begin{align*}
&20 \text{ hp} \times (1)3 \times 0.746 \text{ kW/hp} \times 650 \text{ hours} \times $0.10/\text{kWhr} = $969.80 \\
&20 \text{ hp} \times (0.8)3 \times 0.746 \text{ kW/hp} \times 1300 \text{ hours} \times $0.10/\text{kWhr} = $993.08 \\
&20 \text{ hp} \times (0.6)3 \times 0.746 \text{ kW/hp} \times 650 \text{ hours} \times $0.10/\text{kWhr} = $209.48 \\
\end{align*}
\]

Total = $2172.36

Annual savings: $3879.20 - $2172.36 = $1706.84

*Actual results may vary for closed loop pumping and variable air volume systems.*

### Conserving Earth’s *Energy*

A variable air/water/refrigerant volume HVAC system controlled by VFDs can go a long way in helping a new or existing building achieve greater energy efficiency. Not only will HVAC systems run by VFDs save money, but they also will increase the comfort of the building and reduce equipment maintenance costs and downtime. Plus, meeting the requirements of the Energy Policy Act of 2005 and achieving a more “green” system through LEED certification can offer more money-saving opportunities if the building is eligible for state and local government incentives. Ultimately, more efficient HVAC systems create more energy efficient buildings, which in turn conserves energy resources across the U.S. and the world.
The green building movement is on!

The Altivar 61 drive can help create green buildings. The U.S. Green Building Council® (USGBC) developed and administered the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™, to define green buildings. One of the prerequisites of the LEED-NC Energy and Atmosphere component is meeting both the mandatory provisions and prescriptive/performance requirements of ASHRAE 90.1-2004. This standard sets minimum requirements to promote the principles of effective, energy-conserving design for buildings and building systems. More specifically, the ASHRAE prescriptive strongly recommends that HVAC systems with total fan power greater than 5 hp have variable air volume fan control and that individual variable air volume fans with motors greater than or equal to 15 hp have variable speed drives.

For government buildings, government regulations such as the Energy Policy Act of 2005 (EPAct) mandate energy monitoring and energy efficiency improvements. LEED certification alone has its benefits. In addition to saving energy costs, it also allows the building owner to take advantage of state and local government incentives and makes the building project more marketable to tenants who are seeking more energy-efficient/sustainable facilities.

The Altivar 61 drive can help create green buildings by providing gains in energy efficiency, easier commissioning and monitoring of the building, and by its Eco-Design.
### Altivar® 61 Drives

#### Electrical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>200 · -15% to 240 +10%, 380 · -15% to 480 +10%</td>
</tr>
<tr>
<td>Displacement Power Factor</td>
<td>98% through speed range</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>50 Hz · -5% to 60 Hz +5%</td>
</tr>
<tr>
<td>Drive Input Section</td>
<td>Six pulse bridge rectifier</td>
</tr>
<tr>
<td>Drive Output Section</td>
<td>Three Phase, IGBT Inverter with Pulse Width Modulated (PWM) output Max voltage equal to input voltage</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>Galvanic isolation between power and control (inputs, outputs and power supplies)</td>
</tr>
<tr>
<td>Frequency Range of Power Converter</td>
<td>0.5 to 500 Hz</td>
</tr>
<tr>
<td>Torque/Overtorque</td>
<td>110% of nominal motor torque for 60 s, minimum</td>
</tr>
<tr>
<td>Current (Transient)</td>
<td>110% of controller rated current for 60 s, minimum</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>Selectable from 1 to 16 kHz, 12 kHz nominal rating for 1-60 hp @ 200/240 V, 1-100 hp @ 380/480 V. Selectable: 2.5 to 8 kHz, 2.5 kHz nominal rating for 75-125 hp @ 200/240 V125-900 hp @ 380/480 V.</td>
</tr>
<tr>
<td>Speed Reference Inputs</td>
<td>AI: 0 to +10 V, Impedance = 30 KOhms Used for Speed potentiometer, 1-10 KOhms AI2: Factory setting = 4 to 20mA, software configurable for current, (0-20mA, X-Y) or voltage</td>
</tr>
<tr>
<td>Analog Reference Resolution</td>
<td>0.1 for 100 Hz (11 bits)</td>
</tr>
<tr>
<td>I/O Sampling Time</td>
<td>2 ms +/- 0.5 ms on analog inputs &amp; outputs, &amp; logic inputs, 7 ms +/- 0.5 ms on relay outputs</td>
</tr>
<tr>
<td>Power Removal/Run Permissive Input</td>
<td>24Vdc input, for use to prohibit unintended equipment operation</td>
</tr>
<tr>
<td>Efficiency</td>
<td>98% at full load typical</td>
</tr>
<tr>
<td>Acceleration and Deceleration Ramps</td>
<td>0.1 to 999.9 seconds (definition in 0.1 s increments)</td>
</tr>
<tr>
<td>Skip Frequencies</td>
<td>Three configurable skip frequency/jump frequency bands</td>
</tr>
<tr>
<td>Motor Control Profiles</td>
<td>Energy economizer (flux optimization) motor algorithm to maximize energy savings. (Automatically optimizes voltage based on load.) or select from 2 point or 5 point volts/hertz profile or SLFV (sensorless flux vector)</td>
</tr>
<tr>
<td>Speed Range</td>
<td>1 to 100, open loop</td>
</tr>
<tr>
<td>Motor Protection</td>
<td>Class 10 electronic overload protection or PTC probe</td>
</tr>
<tr>
<td>Graphic Display Terminal</td>
<td>Simply Start menu, PID set-up menu, network set-up menu, Logic I/O &amp; Analog I/O mapping and status, Monitoring and self diagnostics with fault messages and status such as: Power on time, elapsed time, motor run time, line voltage, motor current, ready to run, running, motor speed</td>
</tr>
<tr>
<td>Compliance</td>
<td>RoHS and WEEE (Waste Electrical &amp; Electronic Equipment compliant)</td>
</tr>
<tr>
<td>Codes and Standards</td>
<td>UL, CSA, NOM 117, DNV, CE, C-Tick, GOST, UL 1995 Plenum rated, SEMI-F47 certified for voltage dip ride-through</td>
</tr>
</tbody>
</table>

#### Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Operation: +14 to +122˚ F (-10 to +50˚ C) Storage: -13 to +158˚ F (-25 to +70˚ C)</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% with no condensation or dripping water, conforming to IEC 60068-2-3.</td>
</tr>
<tr>
<td>Altitude</td>
<td>3,300 ft. (1,000 m) without derating; 3,300-9850 ft (1,000-3,000 m) derate output current by 1% for each additional 330 ft. (100 m). 6560 ft (2000m) maximum for corner grounded distribution system.</td>
</tr>
<tr>
<td>Enclosure Rating</td>
<td>1-60 hp @ 200/240 V, 1-100 hp @ 380/480 V: IP 41 on top IP21 on all other surfaces, Type 1 with optional conduit kit. 75-125 hp @ 200/240 V, 125-500 hp @ 380/480 V: IP 41 on top, IP30 sides &amp; front IP00 on bottom</td>
</tr>
<tr>
<td>Pollution Degree</td>
<td>1-20 hp @ 200/240 V, 1-25 hp @ 380/480 V: Pollution degree 2 per IEC/EN 61800-5-1, Option S337 provides protection per IEC 60721-3-3 Class 3C2 25-60 hp @ 200/240 V, 30-100 hp @ 380/480V: Pollution degree 3 per IEC/EN 61800-5-1, Option S337 provides protection per IEC 60721-3-3 Class 3C2 60-125hp @ 200/240 V, 125-900 hp @ 380/480V: Pollution degree 3 per IEC/EN 61800-5-1 and protection per IEC 60721-3-3 Class 3C2</td>
</tr>
<tr>
<td>Vibration Resistance</td>
<td>1-60hp @ 200/240V 1-100 hp @ 380/480 V Conforming to IEC/EN 60068-2-6 1.5mm peak to peak from 3 to 13 Hz, 1gn from 13 to 200 Hz. 75-125 hp @ 200/240V, 125-900 hp @ 380/480V: Conforming to IEC/EN 60068-2-6 1.5mm peak to peak from 3 to 10 Hz, 0.6gn from 10 to 200 Hz.</td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>1-60 hp @ 200/240 V, 1-100 hp @ 380/480 V: 15gn for 11ms conforming to IEC/EN 60068-2-27 75-125 hp @ 200/240 V, 125-500 hp @ 380/480 V: 7gn for 11ms conforming to IEC/EN 60068-2-27 600-900 hp @ 380/480 V: 4gn for 11ms conforming to IEC/EN 60068-2-27</td>
</tr>
</tbody>
</table>
### Altivar® 61 Drives Dimensions and Weights

*With LCD Graphic Display Terminal*

#### Frame Size Dimensions and Weights

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>130</td>
<td>230</td>
<td>175</td>
<td>6.61</td>
</tr>
<tr>
<td>2</td>
<td>155</td>
<td>260</td>
<td>187</td>
<td>4.82</td>
</tr>
<tr>
<td>3</td>
<td>175</td>
<td>295</td>
<td>187</td>
<td>5.5</td>
</tr>
<tr>
<td>4</td>
<td>210</td>
<td>295</td>
<td>213</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>230</td>
<td>400</td>
<td>213</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Frame Size with Type 1 Kit

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>230</td>
<td>357</td>
<td>387</td>
<td>14.05</td>
</tr>
<tr>
<td>2</td>
<td>260</td>
<td>422</td>
<td>396</td>
<td>16.61</td>
</tr>
<tr>
<td>3</td>
<td>295</td>
<td>502</td>
<td>502</td>
<td>19.75</td>
</tr>
</tbody>
</table>

For a drive without a graphic display terminal, the depth is reduced by 26mm (1.02 in)

For a drive with one option card installed, the depth is increases 23mm (0.91 in)

For a drive with two option cards installed, the depth is increases 46mm (1.81 in)

#### Frame Size Dimensions and Weights

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>240</td>
<td>420</td>
<td>236</td>
<td>30.66</td>
</tr>
<tr>
<td>7</td>
<td>240</td>
<td>550</td>
<td>266</td>
<td>37.81</td>
</tr>
<tr>
<td>8</td>
<td>320</td>
<td>550</td>
<td>266</td>
<td>37.81</td>
</tr>
<tr>
<td>9</td>
<td>320</td>
<td>630</td>
<td>290</td>
<td>45.99</td>
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</tbody>
</table>

#### Frame Size with Type 1 Kit

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>240</td>
<td>547</td>
<td>677</td>
<td>21.54</td>
</tr>
<tr>
<td>7</td>
<td>240</td>
<td>753</td>
<td>833</td>
<td>29.65</td>
</tr>
</tbody>
</table>

For a drive without a graphic display terminal, the depth is reduced by 26mm (1.02 in)

For a drive with one option card installed, the depth is increases 23mm (0.91 in)

For a drive with two option cards installed, the depth is increases 46mm (1.81 in)

#### Frame Size Dimensions and Weights

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>320</td>
<td>920</td>
<td>377</td>
<td>74.163</td>
</tr>
<tr>
<td>11</td>
<td>360</td>
<td>1022</td>
<td>377</td>
<td>80.176</td>
</tr>
<tr>
<td>12</td>
<td>340</td>
<td>1190</td>
<td>377</td>
<td>110.242</td>
</tr>
<tr>
<td>13</td>
<td>440</td>
<td>1190</td>
<td>377</td>
<td>140.309</td>
</tr>
<tr>
<td>14</td>
<td>595</td>
<td>1190</td>
<td>377</td>
<td>215.474</td>
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</table>

For a drive with one option card installed, the depth remains the same

For a drive with two option cards installed, the depth is increases 15mm (0.59 in)

#### Frame Size Dimensions and Weights

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>a Width (mm)</th>
<th>b Height (mm)</th>
<th>c Depth (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>890</td>
<td>1390</td>
<td>377</td>
<td>225.496</td>
</tr>
<tr>
<td>16</td>
<td>1120</td>
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<td>377</td>
<td>300.661</td>
</tr>
</tbody>
</table>

For a drive with one option card installed, the depth remains the same

For a drive with two option cards installed, the depth is increases 15mm (0.59 in)
Altivar® 61 Drives  Selection guide

Supply voltage: 3-phase 200...240V

<table>
<thead>
<tr>
<th>Motor kW</th>
<th>HP</th>
<th>Amps</th>
<th>References (LCD keypad included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75</td>
<td>1</td>
<td>4.8</td>
<td>ATV61H075N3(4)</td>
</tr>
<tr>
<td>1.5</td>
<td>2</td>
<td>8</td>
<td>ATV61HU15N4</td>
</tr>
<tr>
<td>2.2</td>
<td>3</td>
<td>11</td>
<td>ATV61HU22N4</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>13.7</td>
<td>ATV61HU30N4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>17.5</td>
<td>ATV61HU40N4</td>
</tr>
<tr>
<td>5.5</td>
<td>7.5</td>
<td>27.5</td>
<td>ATV61HU55N4</td>
</tr>
<tr>
<td>7.5</td>
<td>10</td>
<td>33</td>
<td>ATV61HU75N4</td>
</tr>
<tr>
<td>11</td>
<td>15</td>
<td>54</td>
<td>ATV61HD11N4</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>66</td>
<td>ATV61HD15N4</td>
</tr>
<tr>
<td>18.5</td>
<td>25</td>
<td>75</td>
<td>ATV61HD18N4</td>
</tr>
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<td>22</td>
<td>30</td>
<td>88</td>
<td>ATV61HD20N4</td>
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<tr>
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<td>40</td>
<td>120</td>
<td>ATV61HD30N4</td>
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<td>37</td>
<td>50</td>
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<td>ATV61HD37N4</td>
</tr>
<tr>
<td>45</td>
<td>60</td>
<td>176</td>
<td>ATV61HD45N4</td>
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<tr>
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<td>75</td>
<td>221</td>
<td>ATV61HD55N4</td>
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<tr>
<td>75</td>
<td>100</td>
<td>285</td>
<td>ATV61HD75N4</td>
</tr>
<tr>
<td>90</td>
<td>125</td>
<td>359</td>
<td>ATV61HD90N4</td>
</tr>
</tbody>
</table>

For 20 HP and smaller, add the letter “Z” to the end of the reference for an Altivar 61 to receive the drive with an LED keypad in place of the LCD keypad.

(1) For single-phase 0.75 to 7.5 kW range, select the next rating up (example: 2.2 kW - reference = ATV61H030M3).
(2) For single-phase operation, select the next rating up and add a line choke.
(3) Without EMC filter.
(4) With integrated DC bus inductance.

Supply voltage: 3-phase 380...480V

<table>
<thead>
<tr>
<th>Motor kW</th>
<th>HP</th>
<th>Amps</th>
<th>References (LCD keypad included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75</td>
<td>1</td>
<td>2.3</td>
<td>ATV61H075N5(4)</td>
</tr>
<tr>
<td>1.5</td>
<td>2</td>
<td>4.1</td>
<td>ATV61HU15N5</td>
</tr>
<tr>
<td>2.2</td>
<td>3</td>
<td>5.8</td>
<td>ATV61HU22N5</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>7.8</td>
<td>ATV61HU30N5</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>10.5</td>
<td>ATV61HU40N5</td>
</tr>
<tr>
<td>5.5</td>
<td>7.5</td>
<td>14.3</td>
<td>ATV61HU55N5</td>
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<tr>
<td>7.5</td>
<td>10</td>
<td>17.5</td>
<td>ATV61HU75N5</td>
</tr>
<tr>
<td>11</td>
<td>15</td>
<td>27.7</td>
<td>ATV61HD11N4</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>33</td>
<td>ATV61HD15N4</td>
</tr>
<tr>
<td>18.5</td>
<td>25</td>
<td>41</td>
<td>ATV61HD18N4</td>
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<td>22</td>
<td>30</td>
<td>48</td>
<td>ATV61HD22N4</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>66</td>
<td>ATV61HD30N4</td>
</tr>
<tr>
<td>37</td>
<td>50</td>
<td>79</td>
<td>ATV61HD37N4</td>
</tr>
<tr>
<td>45</td>
<td>60</td>
<td>94</td>
<td>ATV61HD45N4</td>
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<td>75</td>
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<td>ATV61HD55N4</td>
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<tr>
<td>90</td>
<td>125</td>
<td>179</td>
<td>ATV61HD90N5</td>
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<tr>
<td>110</td>
<td>150</td>
<td>215</td>
<td>ATV61HC11N5</td>
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<td>132</td>
<td>200</td>
<td>259</td>
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<td>ATV61HC22N5</td>
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<td>250</td>
<td>400</td>
<td>481</td>
<td>ATV61HC25N5</td>
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<td>315</td>
<td>500</td>
<td>616</td>
<td>ATV61HC31N5</td>
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<tr>
<td>400</td>
<td>600</td>
<td>759</td>
<td>ATV61HC40N5</td>
</tr>
<tr>
<td>500</td>
<td>700</td>
<td>941</td>
<td>ATV61HC50N5</td>
</tr>
<tr>
<td>630</td>
<td>900</td>
<td>1188</td>
<td>ATV61HC63N5</td>
</tr>
</tbody>
</table>

For 100 HP and smaller, add the letter “Z” to the end of the reference for an Altivar 61 to receive the drive with an LED keypad in place of the LCD keypad.

(1) For single-phase 0.75 to 7.5 kW range, select the next rating up (example: 2.2 kW - reference = ATV61H030M3).
(2) For single-phase operation, select the next rating up and add a line choke.
(3) Without EMC filter.
(4) With integrated DC bus inductance.

Inputs/outputs on board

- Analog input #1: +/- 10Vdc bipolar input, 1 bits + 1 sign resolution, 2ms +/- .5ms sample time
- Analog input #2: software selectable for 1-10Vdc or x-y mA x-y selectable from 0-20mA, 11 bits resolution, 2ms +/- .5ms sample time
- Analog input #1: software selectable for 1-10Vdc or x-y mA x-y selectable from 0-20mA, 10 bits resolution, 2ms +/- .5ms sample time
- Relay output #1: one NO (normally open) one NC (normally closed)
- 6 logic inputs 24Vdc, 2ms +/- .5ms sample time
- Multiple function assignment possible
- Positive logic (source) or Negative logic (sink) choice LI6 offers PTC probe assignment
- Power Removal input: 1 input for interlocking function (run permissive)
- RJ45 port Modbus or CANopen (selectable)

PowerSuite software workshop

- PowerSuite CD-ROM for PC__________VW3 A 8104
- Connection kit for PC__________VW3 A 8106
- Adaptor for wireless link Modbus-Bluetooth®__________VW3 A 8114

Input/output cards

- Logic inputs/outputs
  - 1 voltage output, 24V
  - 1 voltage output, -10V
  - 1 logic output, relay
  - 4 programmable logic inputs
  - 2 assignable logic outputs with open collector
  - 1 input for 6 PTC probes max. ____________VW3 A 3201

Extended inputs/outputs

- Same as logic inputs/outputs card +
- 2 analog inputs
- 2 analog outputs
- 1 pulse input ____________VW3 A 3202

Communication cards

- Modbus Plus ________VW3 A 3302
- Uni-Telway ________VW3 A 3303
- InterBus ________VW3 A 3304
- Profibus DP ________VW3 A 3307
- DeviceNet ________VW3 A 3309
- Ethernet ________VW3 A 3310
- Fipio ________VW3 A 3311
- LonWorks ________VW3 A 3312
- METASYS N2 ________VW3 A 3313
- APOGEE FLN ________VW3 A 3314
- BACnet ________VW3 A 3315

Controller Inside programmable card ____________VW3 A 3501

Pump application card ____________VW3 A 3503
**Altivar® 61 Drives Accessories**  
Selection guide

### Control Fan Kit
Installation of kit enables the drive to operate in higher ambient temperature. Fan mounts on top of drive and is powered from the drive.

<table>
<thead>
<tr>
<th>For Drives</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV 61H037M3...HU55M3</td>
<td>VW3 A9 401</td>
</tr>
<tr>
<td>ATV 61H075N4...HU75N4</td>
<td>VW3 A9 402</td>
</tr>
<tr>
<td>ATV 61HU75M3...HD15M3</td>
<td>VW3 A9 404</td>
</tr>
<tr>
<td>ATV 61HD11N4...HD18N4</td>
<td>VW3 A9 405</td>
</tr>
<tr>
<td>ATV 61HD18M3X...HD22M3X</td>
<td>VW3 A9 406</td>
</tr>
<tr>
<td>ATV 61HD30N4...HD37N4</td>
<td>VW3 A9 407</td>
</tr>
<tr>
<td>ATV 61HD30M3X...HD45M3X</td>
<td>VW3 A9 408</td>
</tr>
<tr>
<td>ATV 61HD45N4...HD75N4</td>
<td>VW3 A9 409</td>
</tr>
</tbody>
</table>

### Kit for Mounting Heatsink thru Back of Enclosure
Kit used to mount the heatsink of the drive outside of an enclosure. Kit includes: a metal frame, seals, mounting hardware, bracket to mount fan kit so fan can be accessed from the front of the drive.

<table>
<thead>
<tr>
<th>For Drives</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV 61H037M3...HU15M3</td>
<td>VW3 A9 501</td>
</tr>
<tr>
<td>ATV 61H075N4...HU22N4</td>
<td>VW3 A9 502</td>
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<td>ATV 61HU22M3...HU40M3</td>
<td>VW3 A9 503</td>
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</tr>
<tr>
<td>ATV 61HU75M3</td>
<td>VW3 A9 507</td>
</tr>
<tr>
<td>ATV 61HD11M3X...HD15M3</td>
<td>VW3 A9 508</td>
</tr>
<tr>
<td>ATV 61HD15N4, HD18N4</td>
<td>VW3 A9 509</td>
</tr>
<tr>
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</tr>
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<td>ATV 61HD30N4, HD37N4</td>
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<tr>
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</tr>
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<td>VW3 A9 515</td>
</tr>
<tr>
<td>ATV 61HD75M3X</td>
<td>VW3 A9 516</td>
</tr>
<tr>
<td>ATV 61HC11N4</td>
<td>VW3 A9 517</td>
</tr>
<tr>
<td>ATV 61HC16N4</td>
<td>VW3 A9 518</td>
</tr>
<tr>
<td>ATV 61HC16N4</td>
<td>VW3 A9 519</td>
</tr>
<tr>
<td>ATV 61HC25N4...HC31N4</td>
<td>VW3 A9 520</td>
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</table>

### Type 1 Conduit Kit
Kit includes: a metal box, with conduit knockouts. Kit provides conduit landing when wall mounting the drive.

<table>
<thead>
<tr>
<th>For Drives</th>
<th>Catalog Number</th>
</tr>
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<tbody>
<tr>
<td>ATV 61H037M3...HU15M3</td>
<td>VW3 A9 201</td>
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<tr>
<td>ATV 61H075N4...HU22N4</td>
<td>VW3 A9 202</td>
</tr>
<tr>
<td>ATV 61HU22M3...HU40M3</td>
<td>VW3 A9 203</td>
</tr>
<tr>
<td>ATV 61HU30N4, HU40N4</td>
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<td>ATV 61HU55M3</td>
<td>VW3 A9 205</td>
</tr>
<tr>
<td>ATV 61HU55N4, HU75N4</td>
<td>VW3 A9 206</td>
</tr>
<tr>
<td>ATV 61HU75M3</td>
<td>VW3 A9 207</td>
</tr>
<tr>
<td>ATV 61HD11N4</td>
<td>VW3 A9 208</td>
</tr>
<tr>
<td>ATV 61HD11M3X, HD15M3X</td>
<td>VW3 A9 209</td>
</tr>
<tr>
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<td>VW3 A9 210</td>
</tr>
<tr>
<td>ATV 61HD18M3X, HD22M3X</td>
<td>VW3 A9 211</td>
</tr>
<tr>
<td>ATV 61HD22N4</td>
<td>VW3 A9 212</td>
</tr>
<tr>
<td>ATV 61HD30N4, HD37N4</td>
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</tr>
<tr>
<td>ATV 61HD30M3X...HD45M3X</td>
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<td>ATV 61HD45N4...HD75N4</td>
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<td>ATV 61HD55M3X, HD75M3X</td>
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<td>ATV 61HD90N4, HC11N4</td>
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<td>ATV 61HD90M3X</td>
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<td>ATV 61HC13N4</td>
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<tr>
<td>ATV 61HC16N4</td>
<td>VW3 A9 220</td>
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<td>ATV 61HC22N4</td>
<td>VW3 A9 221</td>
</tr>
<tr>
<td>ATV 61HC25N4...HC31N4</td>
<td>VW3 A9 222</td>
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### LCD Keypad Mounting Kit
Use the remote mounting kit to mount the LCD keypad in an enclosure door. Add the clear plastic door to improve to an IP65 rating and view the LCD screen.

#### Refer to diagram for item number

<table>
<thead>
<tr>
<th>Catalog Number</th>
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<tbody>
<tr>
<td>VV3A 1101</td>
</tr>
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<td>VV3A 1102</td>
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<td>VV3A 1103</td>
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<tr>
<td>VV3A 1104 R10</td>
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<td>VV3A 1104 R30</td>
</tr>
<tr>
<td>VV3A 1104 R50</td>
</tr>
<tr>
<td>VV3A 1104 R100</td>
</tr>
</tbody>
</table>

**Note:**  
1. LCD graphic keypad: IP54 rating  
2. Remote mounting kit: includes bezel and mounting hardware  
3. Door for use with remote mount kit for IP65 rating  
4. Cable for remote mounting LCD graphic keypad RJ45 connector on each end  
   - 1 meter  
   - 3 meters  
   - 5 meters  
   - 10 meters  
   - RJ 45 female female adaptor to connect LCD keypad and cable. Not required if using VW3A1102
The efficiency of Telemecanique® branded solutions

Used in combination, Telemecanique products provide quality solutions, meeting all your Automation and Control applications requirements.

Simple machines
Altistart 01: 0.25 to 75 HP
Altivar 11: 0.25 to 3 HP
Altivar 31: 0.25 to 20 HP

Complex, high power machines
Altivar 71: 0.5 to 700 HP

Pumping and ventilation machines
Altistart 48: 3 to 1200 HP
Altivar 21: 1 to 100 HP
Altivar 61: 1 to 900 HP

A worldwide presence

Schneider Electric is a global supplier of electrical distribution, automation and control equipment products under the brand names of Square D®, Telemecanique® and Merlin Gerin®. For over 100 years, Schneider Electric has been an innovator in manufacturing products that are tailored to the demanding specifications of our customers. Backed by a global organization of 80,000 employees in 130 countries, Schneider Electric is a global electrical industry leader. With one of the strongest distribution networks in the US and around the world, you can count on Schneider Electric to keep your business running smoothly and efficiently.

Schneider Electric has been providing adjustable frequency drive solutions for HVAC and pumping applications for over 30 years. Schneider Electric has made a significant investment in research and development to design in a new generation of products to serve the HVAC and pumping marketplace.
J. EQUIPMENT DEFICIENCY REPORTS
<table>
<thead>
<tr>
<th>No.</th>
<th>Building</th>
<th>Equipment Location</th>
<th>Equipment Description</th>
<th>Manufacturer</th>
<th>Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stop</th>
<th>Re-Validate</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wildenthal Library</td>
<td>First Floor Mechanical Room</td>
<td>First Floor AHU (MZ)</td>
<td>0</td>
<td>AHU is missing fan shroud, and is very exposed.</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
<td>Wildenthal Library</td>
<td>First Floor Mechanical Room</td>
<td>First Floor AHU (MZ)</td>
<td>0</td>
<td>Steam coil lacks a steam trap</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Wildenthal Library</td>
<td>First Floor Mechanical Room</td>
<td>First Floor AHU (MZ)</td>
<td>0</td>
<td>OSA damper actuator is disconnected from the damper shaft. Exhaust air damper actuator pneumatic tubing disconnected, damper is closed. Return air damper actuator pneumatic tubing disconnected, damper is maybe 5% open.</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>4</td>
<td>Briscoe Admin</td>
<td>First Floor Mechanical Room</td>
<td>First Floor AHU</td>
<td>0</td>
<td>OSA damper not operating properly</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>5</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>Air Handling Unit 1</td>
<td>N/A</td>
<td>AHU1 Motor in Hand</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>6</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>North GP HVU 1</td>
<td>N/A</td>
<td>Heating Ventilation Unit inoperable</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>7</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>West Hot Water Pump 1</td>
<td>Baldor</td>
<td>Hot water pump 1 in Hand</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>8</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>West Steam Valves (2)</td>
<td>UNK</td>
<td>Steam Valves (2) for HX inoperable, broken, in disrepair.</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>9</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>North West GP AHU 1.2</td>
<td>N/A</td>
<td>GP AHU1.2 SAF in Hand</td>
<td>0</td>
<td>X</td>
<td>0</td>
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<td>0</td>
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<td>10</td>
<td>Graves Pierce Complex</td>
<td>Basement Mechanical</td>
<td>North West GP AHU 1.3</td>
<td>N/A</td>
<td>GP AHU1.3 SAF in Hand</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>11</td>
<td>Graves Pierce Complex</td>
<td>Pool Mechanical</td>
<td>Pool Heat Exchanger</td>
<td>UNK</td>
<td>Pool heat exchanger dilapidated.</td>
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<td>X</td>
<td>0</td>
<td>0</td>
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<tr>
<td>12</td>
<td>Gallego MP</td>
<td>Mechanical Room</td>
<td>SouthWest MPAHU M1</td>
<td>UNK</td>
<td>Return Air Damper/Actuator disconnected</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>13</td>
<td>Briscoe Admin</td>
<td>2nd Floor Mechanical</td>
<td>AHU-15</td>
<td>0</td>
<td>Outside air damper manually closed</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>14</td>
<td>Fine Arts</td>
<td>2nd Floor Mechanical</td>
<td>AHU-3</td>
<td>0</td>
<td>Outside Air Damper Manually Closed</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>15</td>
<td>Wildenthal Library</td>
<td>2nd Floor Mechanical</td>
<td>2nd Floor AHU</td>
<td>0</td>
<td>OSA damper actuator is disconnected from the damper shaft, and damper is closed. Exhaust air damper linkage is disconnected, damper is closed. Return air damper actuators are disconnected, damper is open.</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
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### Equipment Deficiency Report

<table>
<thead>
<tr>
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<th>Equipment Description</th>
<th>Manufacturer</th>
<th>Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stop</th>
<th>Re-Validate Remarks</th>
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<tbody>
<tr>
<td>16</td>
<td>Wildenthal Library</td>
<td>3rd Floor Mechanical</td>
<td>3rd Floor AHU</td>
<td></td>
<td>OA damper closed and return air damper fixed open</td>
<td>0</td>
<td>x</td>
<td>x</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>University Center</td>
<td>Basement Mech</td>
<td>Condensate Pump</td>
<td></td>
<td>Condensate Pump is leaking</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>18</td>
<td>University Center</td>
<td>Basement Mech</td>
<td>Chilled Water Pump VFD</td>
<td></td>
<td>VFD for chilled water pump is not in operation</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>19</td>
<td>Morelock Academic Building</td>
<td>1st Floor Mech</td>
<td>Hot Water Pump</td>
<td></td>
<td>Hot Water Pump is cavitation</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>20</td>
<td>Morelock Academic Building</td>
<td>1st Floor Mech</td>
<td>AHU 6</td>
<td></td>
<td>Inlet Guide Vanes are disconnected and outside airdamper is closed</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>21</td>
<td>Morelock Academic Building</td>
<td>3rd Floor Mech</td>
<td>AHU 8</td>
<td></td>
<td>Inlet Guide Vanes are disconnected and outside air damper is closed</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>22</td>
<td>Morelock Academic Building</td>
<td>3rd Floor Mech</td>
<td>Chilled Water Pump</td>
<td></td>
<td>Chilled Water Pump for Marshall Auditorium is in Hand</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>23</td>
<td>Morelock Academic Building</td>
<td>Above Auditorium</td>
<td>Marshall Aud. AHU 8</td>
<td></td>
<td>Both AHUs above Marshall Auditorium are in hand</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
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<td>24</td>
<td>Warnock Science Building</td>
<td>1st Floor Mech</td>
<td>AHU 1 VFD</td>
<td></td>
<td>AHU 1 VFD in Bypass</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
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<td>25</td>
<td>Warnock Science Building</td>
<td>1st Floor Mech</td>
<td>AHU 4 VFD</td>
<td></td>
<td>AHU 4 VFD in Bypass</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
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<tr>
<td>26</td>
<td>Warnock Science Building</td>
<td>1st Floor Mech</td>
<td>CHWP VFD</td>
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<td>x</td>
<td>0</td>
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<td>Warnock Science Building</td>
<td>1st Floor Mech</td>
<td>AHU 3 VFD</td>
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<td>AHU 3 VFD in Bypass</td>
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<td>x</td>
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<td>0</td>
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<tr>
<td>28</td>
<td>Ferguson Hall</td>
<td>Basement</td>
<td>MZ 15</td>
<td></td>
<td>OA air damper manually closed</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>0</td>
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<td>29</td>
<td>Ferguson Hall</td>
<td>Basement</td>
<td>MZ 30</td>
<td></td>
<td>OA air damper manually closed</td>
<td>0</td>
<td>x</td>
<td>0</td>
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<td>30</td>
<td>Ferguson Hall</td>
<td>2nd Floor</td>
<td>MZ 2</td>
<td></td>
<td>OA Damper Closed and Return Air Damper not fully open, Linking motor failure</td>
<td>0</td>
<td>x</td>
<td>0</td>
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<td>Report No</td>
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<td>Manufacturer</td>
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<td>Safety</td>
<td>Energy</td>
<td>Comfort</td>
<td>Work Stop</td>
<td>Re-Validate</td>
</tr>
<tr>
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<tr>
<td>31</td>
<td>Central Utility Plant</td>
<td>Chiller Plant</td>
<td>Chiller 1 Chilled Water Isolation Valve</td>
<td>N/A</td>
<td>Existing pneumatic actuator is non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>32</td>
<td>Central Utility Plant</td>
<td>Chiller Plant</td>
<td>Chiller 2 Chilled Water Isolation Valve</td>
<td>N/A</td>
<td>Existing pneumatic actuator is non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>33</td>
<td>Central Utility Plant</td>
<td>Chiller Plant</td>
<td>Condenser Water Isolation Valve</td>
<td>N/A</td>
<td>Existing pneumatic actuator is non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>34</td>
<td>Central Utility Plant</td>
<td>Chiller Plant (Outside)</td>
<td>Condenser Water Pump 1</td>
<td>N/A</td>
<td>Pump seals leaking profusely during operation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>35</td>
<td>Central Utility Plant</td>
<td>Chiller Plant (Outside)</td>
<td>Condenser Water Pump 2</td>
<td>N/A</td>
<td>Pump seals leaking profusely during operation</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>36</td>
<td>Ferguson Hall</td>
<td>West Basement Mechanical Room</td>
<td>Chilled Water Pump</td>
<td>N/A</td>
<td>Pump seals leaking profusely during operation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>37</td>
<td>Ferguson Hall</td>
<td>West Basement Mechanical Room</td>
<td>AHU 4</td>
<td>N/A</td>
<td>Outside air damper manually closed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>38</td>
<td>Ferguson Hall</td>
<td>West Basement Mechanical Room</td>
<td>AHU 4</td>
<td>N/A</td>
<td>Valve packing is leaking. Valve exterior corrosion</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>39</td>
<td>Graves-Pierce</td>
<td>Swimming Pool Above Ceiling, Classroom on SW end of building</td>
<td>FC 15</td>
<td>N/A</td>
<td>Outside air damper manually closed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>40</td>
<td>Lawrence Hall</td>
<td>1st Floor Mechanical Room</td>
<td>AHU 1</td>
<td>N/A</td>
<td>Chilled water valve appears to be non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>41</td>
<td>Lawrence Hall</td>
<td>2nd Floor Mechanical Room</td>
<td>AHU 2</td>
<td>N/A</td>
<td>Outside air damper manually closed. Adjusted return air damper replaced with manual balance dampers. Economical operation no longer possible.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>42</td>
<td>Lawrence Hall</td>
<td>3rd Floor Mechanical Room</td>
<td>AHU 3</td>
<td>N/A</td>
<td>Outside air damper manually closed. Adjusted return air damper replaced with manual balance dampers. Economical operation no longer possible.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>43</td>
<td>Morelock Academic Building</td>
<td>2nd Floor Mech</td>
<td>AHU 7</td>
<td>N/A</td>
<td>Inter-Guide Valves are disconnected and combination damper is closed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>44</td>
<td>Turner Range Animal Science</td>
<td>2nd Floor Mech</td>
<td>AHU 8</td>
<td>N/A</td>
<td>Outside air damper manually closed. Adjusted return air damper replaced with manual balance dampers. Economical operation no longer possible.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>45</td>
<td>Turner Range Animal Science</td>
<td>2nd Floor Mech</td>
<td>AHU 9</td>
<td>N/A</td>
<td>Outside air damper manually closed. Adjusted return air damper replaced with manual balance dampers. Economical operation no longer possible.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Report No.** Building: Location of the deficiency. Be as specific as possible.  
**Equipment Description:** Be as specific as possible.  
**Deficiency:** What is the problem.  
**Safety:** Check if the problem is a safety issue. P=Personal Safety, A=Indoor Air Quality, E=Equipment.  
**Energy:** Check if the problem causes extra energy to be used.  
**Comfort:** Check if the problem affects occupant comfort.  
**Work Stop:** Check if the problem stops work on the project.  
**Re-Validate:** Check if the EMS needs to be validated after the problem is resolved.  
**Remarks:** What can be done to fix it and other comments.
<table>
<thead>
<tr>
<th>Report No.</th>
<th>Building</th>
<th>Equipment Location</th>
<th>Equipment Description</th>
<th>Manufacturer</th>
<th>Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stop</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Turner Range Animal Science</td>
<td>1st Floor</td>
<td>Mech</td>
<td>AHU-1 VFD</td>
<td>AC Tech</td>
<td>Existing VFD in auto, drive in bypass.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>47</td>
<td>Turner Range Animal Science</td>
<td>1st Floor</td>
<td>Mech</td>
<td>AHU-2 VFD</td>
<td>AC Tech</td>
<td>Existing VFD in hand, drive in bypass.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>48</td>
<td>Warnock Science Building</td>
<td>1st Floor</td>
<td>Mech</td>
<td>HWP</td>
<td>VFD</td>
<td>VFD non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>49</td>
<td>Warnock Science Building</td>
<td>1st Floor</td>
<td>Mech</td>
<td>AHU 3</td>
<td>Hot Water Valve Actuator</td>
<td>VFD non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>50</td>
<td>Wildenthal Library</td>
<td>2nd Floor</td>
<td>Mech</td>
<td>2nd Floor AHU</td>
<td></td>
<td>Fan shroud has been removed. Fan belt exposed.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>51</td>
<td>Wildenthal Library</td>
<td>2nd Floor</td>
<td>Mech</td>
<td>CHWP 1 VFD</td>
<td></td>
<td>VFD non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>52</td>
<td>Wildenthal Library</td>
<td>2nd Floor</td>
<td>Mech</td>
<td>CHWP 4 VFD</td>
<td></td>
<td>VFD non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>53</td>
<td>Wildenthal Library</td>
<td>2nd Floor</td>
<td>Mech</td>
<td>CHWP 5 VFD</td>
<td></td>
<td>VFD non-functional</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Legend:**
- **Safety:** Check if the problem is a personal safety issue.
- **Energy:** Check if the problem causes extra energy to be used.
- **Comfort:** Check if the problem affects occupant comfort.
- **Work Stop:** Check if the problem stops work on the project.
- **Remarks:** What can be done to fix it and other comments.
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 1

Project Description: Sul Ross State University
Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

### Equipment Identification:

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wildenthal Library</td>
<td>first floor mechanical room</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

### Nature of Deficiency

<table>
<thead>
<tr>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU is missing fan shroud, and is very exposed.</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature Schneider Electric Representative

Project Development Manager
Title

Signature Customer Representative
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 2

Project Description: Sul Ross State University

Address:
P. O. Box C-107
Alpine, TX 79832

Contractor: Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Floor AHU (MZ)</td>
<td>steam coil lacks a steam trap</td>
</tr>
<tr>
<td>Wildenthal Library</td>
<td></td>
</tr>
<tr>
<td>first floor mechanical room</td>
<td></td>
</tr>
<tr>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White

Schneider Electric Representative

Signature

Customer Representative

Signature
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 3
Project Description: Sul Ross State University
Address: P. O. Box C-107
             Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

**Equipment Identification:**
- Building: Wildenthal Library
- Location / Room #: First floor mechanical room
- Equipment type: AHU

**Nature of Deficiency**

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description of Deficiency:**
OSA damper actuator is disconnected from the damper shaft. Exhaust air damper actuator pneumatic tubing disconnected, damper is closed. Return air damper actuator pneumatic tubing disconnected, damper is maybe 5% open.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
# Equipment Deficiency Report

**Date:** 3/10/2011  
**EDR Number:** 4

**Project Description:**  
Sul Ross State University

**Address:**  
P. O. Box C-107  
Alpine, TX 79832

**Contractor:**  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>First Floor AHU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Briscoe Admin</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>First floor mechanical room</td>
</tr>
<tr>
<td>Equipment type</td>
<td>AHU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSA damper not operating properly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Schneider Electric Representative

Project Development Manager  
Title
Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Air Handling Unit 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Graves Pierce Complex</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Basement Mechanical</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Air Handling Unit</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td>AHU1 Motor in Hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 6

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>GP HVU1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Graves Pierce</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Basement Mechanical North</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Heating Ventilation Unit</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Nature of Deficiency

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency: Heating Ventilation Unit inoperable

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

<table>
<thead>
<tr>
<th>Signature</th>
<th>Customer Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schneider Electric Representative</td>
<td></td>
</tr>
<tr>
<td>Project Development Manager</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td></td>
</tr>
</tbody>
</table>
# Equipment Deficiency Report

**Date:** 3/10/2011  
**EDR Number:** 7  
**Project Description:** Sul Ross State University  
**Address:** P. O. Box C-107  
Alpine, TX 79832  

**Attn.:** Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graves Pierce</td>
<td>Basement Mechanical West</td>
<td>Hot Water Pump</td>
<td>Baldor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description of Deficiency:** Hot water pump 1 in hand

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Signature  
Schneider Electric Representative  

**Signature**  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 8

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

| Equipment Identification:       | Steam Valves (2) |
| Building                        | Graves Pierce   |
| Location / Room #               | Basement Mech West |
| Equipment type                  | Steam Valves (2) |
| Manufacturer                    | UNK              |
| Nature of Deficiency            | Safety | Energy | Comfort | Work Stopped | Re-Validate |
| Description of Deficiency       | X       | X      |         |
Steam Valves (2) for HX inoperable, broken, in disrepair.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Date: 3/10/2011  
EDR Number: 9

Project Description: Sul Ross State University

Address: P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP AHU1.2</td>
<td>Graves Pierce</td>
<td>Air Handling Unit</td>
<td>N/A</td>
<td>Safety</td>
<td>GP AHU1.2 SAF in Hand</td>
</tr>
<tr>
<td></td>
<td>Basement Mechanical North West</td>
<td></td>
<td></td>
<td>Energy</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Comfort</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Project Development Manager  
Title
Date: 3/10/2011  
EDR Number: 10  

Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  

Contractor: Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

| Equipment Identification: | GP AHU1.3 |
| Building: | Graves Pierce |
| Location / Room #: | Basement Mechanical North West |
| Equipment type: | Air Handling Unit |
| Manufacturer: | N/A |

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP AHU1.3 SAF in Hand</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323-5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  
Signature  
Customer Representative  

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 11

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

Equipment Identification:

<table>
<thead>
<tr>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
</table>
| Graves Pierce Complex     | Heat Exchanger | UNK          | Safety | X | Energy | X | Comfort | X | Work Stopped | X | Re-Validate |}

Pool heat exchanger dilapidated.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 12

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

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<table>
<thead>
<tr>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallego MP</td>
<td>Actuator</td>
<td>UNK</td>
<td>Safety</td>
<td>Return Air Damper/Actuator disconnected</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/1/2011
EDR Number: 13

Project Description: Sul Ross State University
Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU-15</td>
<td>Briscoe Admin</td>
<td>2nd Floor Mech</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency: Outside air damper manually closed

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 14  
Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  
Attn.: Eddie Natera  
Contractor: Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

### Equipment Identification:

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Arts</td>
<td>2nd Floor Mech</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

### Nature of Deficiency

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency: Outside Air Damper Manually Closed

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White

Signature
Schneider Electric Representative

Signature
Customer Representative

Title

Project Development Manager
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 15  

Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  

Contractor: Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Building Location / Room #</th>
<th>Equipment Identification</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Floor AHU</td>
<td>2nd Floor Mech</td>
<td>AHU</td>
<td>Safety</td>
<td>OSA damper actuator is disconnected from the damper shaft, and damper is closed. Exhaust air damper linkage is disconnected, damper is closed. Return air damper actuator is disconnected, damper is open.</td>
</tr>
<tr>
<td>Wildenthal Library</td>
<td></td>
<td></td>
<td>Energy</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Comfort</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature Schneider Electric Representative  
Signature Customer Representative  

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 16  

Project Description:  
Sul Ross State University

Address:  
P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wildenthal Library</td>
<td>3rd Floor Mechanical</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA damper closed and return air damper fixed open.</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  
Signature  
Customer Representative

Project Development Manager  
Title

Schneider Electric
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 17

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Condensate Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Location / Room #</td>
<td>University Center Basement Mech</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Pump</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency:</td>
<td>Condensate Pump is leaking</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 18
Project Description: Sul Ross State University
Address: P. O. Box C-107
              Alpine, TX 79832
Att.: Eddie Natera
Contractor: Schneider Electric, Inc.
            1650 West Crosby Road
            Phone: (972) 323-1111
            Fax: (972) 323-5498
            Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Center</td>
<td>Basement Mech</td>
<td>VFD</td>
<td>Schneider Electric, Inc.</td>
</tr>
</tbody>
</table>

Nature of Deficiency

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency: VFD for chilled water pump is not in operation

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 19

Project Description: Sul Ross State University

Address:  
P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Hot Water Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Morelock Academic Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor Mech</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Pump</td>
</tr>
</tbody>
</table>

Nature of Deficiency: Safety  
Description of Deficiency: Hot Water Pump is cavitating

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Schneider Electric Representative  
Signature

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 20

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Morelock Academic Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor Mech</td>
</tr>
<tr>
<td>Equipment type</td>
<td>AHU</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Inlet Guide Vanes are disconnected &amp; outside air closed</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 21

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Morelock Academic Building</td>
<td>3rd Floor Mech</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

Nature of Deficiency: Safety

Description of Deficiency:
Inlet Guide Vanes are disconnected and outside air damper is closed

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 22  
Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Chilled Water Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Morelock Academic Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>3rd Floor Mech</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Pump</td>
</tr>
<tr>
<td>Manufacturer</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td>Chilled Water Pump for Marshall Auditorium is in Hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  
Signature  
Customer Representative  

Project Development Manager  
Title  

Schneider Electric
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 23
Project Description: Sul Ross State University
Address: P. O. Box C-107
            Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marshall Aud. AHUs</td>
<td>Safety</td>
<td>Both AHUs above Marshall Auditorium are in Hand</td>
</tr>
<tr>
<td>Morelock Academic Building</td>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>Above Auditorium</td>
<td>Comfort</td>
<td></td>
</tr>
<tr>
<td>AHU</td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Date: 3/10/2011  
EDR Number: 24  
Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  

Atttn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warnock Science Building</td>
<td>1st Floor Mech</td>
<td>VFD</td>
<td></td>
<td></td>
<td>AHU 1 VFD in Bypass</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  
Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 25

Project Description: Sul Ross State University
Address: P. O. Box C-107
                      Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Building</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warnock Science Building</td>
</tr>
<tr>
<td>Location / Room #:</td>
<td>1st Floor Mech</td>
</tr>
<tr>
<td>Equipment type:</td>
<td>VFD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>AHU 4 VFD in Bypass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323-5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Schneider Electric Representative
Signature

Signature
Customer Representative

Project Development Manager
Title

Schneider Electric
Equipment Deficiency Report

Date: 3/10/2011
EDR Number: 26

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Contractor: Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>CHWP VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Warnock Science Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor Mech</td>
</tr>
<tr>
<td>Equipment type</td>
<td>VFD</td>
</tr>
</tbody>
</table>

Nature of Deficiency: Safety | Energy | Comfort | Work Stopped | Re-Validate | x |
Description of Deficiency: Chilled Water Pump VFD in Bypass

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Schneider Electric Representative

Signature

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

**Date:** 3/10/2011  
**EDR Number:** 27  
**Project Description:** Sul Ross State University  
**Address:** P. O. Box C-107  
Alpine, TX 79832

**Contractor:** Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU 3 VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Location / Room #</td>
<td>Warnock Science Building 3rd Floor Mech</td>
</tr>
<tr>
<td>Equipment type Manufacturer</td>
<td>VFD</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency:</td>
<td>AHU 3 VFD in Bypass</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Signature Schneider Electric Representative

Signature Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/11/2010
EDR Number: 28

Project Description: Sul Ross State University

Address:
P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>MZ 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Location / Room #</td>
<td>Ferguson Hall Basement</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>AHU</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency:</td>
<td>OA air damper manually closed</td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/10/2011  
EDR Number: 29

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>MZ 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Ferguson Hall</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Basement</td>
</tr>
<tr>
<td>Equipment type</td>
<td>AHU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td>OA air damper manually closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Title
Equipment Deficiency Report

Date: 3/29/2010
EDR Number: 30

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Ferguson Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Location / Room #</td>
<td>2nd Floor</td>
</tr>
<tr>
<td>Equipment type Manufacturer</td>
<td>AHU</td>
</tr>
</tbody>
</table>

Nature of Deficiency

Description of Deficiency: OA Damper Closed and Return Air Damper not fully open, Leaving room negative

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 31

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn: Eddie Natera

Contractor: Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiller 1 Chilled Water Isolation Valve</td>
<td>Central Utility Plant</td>
<td>Chiller Plant</td>
<td>Valve Actuator</td>
<td>N/A</td>
<td>Safety</td>
<td>Energy</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing pneumatic actuator is non-functional.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Title

Project Development Manager
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 32  

Project Description: Sul Ross State University  

Address: P. O. Box C-107  
Alpine, TX 79832  

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Utility Plant</td>
<td>Chiller Plant</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiller 2 Chilled Water Isolation Valve</td>
<td>Valve Actuator</td>
<td>Schneider Electric</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nature of Deficiency: Existing pneumatic actuator is non-functional.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480.
After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  
Signature  
Customer Representative  

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 33  
Project Description: Sul Ross State University  
Address: P. O. Box C-107  
Alpine, TX 79832  

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Utility Plant</td>
<td>Valve Actuator</td>
<td>N/A</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing pneumatic actuator is non-functional.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative  

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 34

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Condenser Water Pump 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Central Utility Plant</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Chiller Plant (Outside)</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Pump</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Nature of Deficiency

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency:
Pump seals leaking profusely during operation.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
# Equipment Deficiency Report

**Date:** 3/29/2011  
**EDR Number:** 35  
**Project Description:** Sul Ross State University

**Address:** P. O. Box C-107  
Alpine, TX 79832

**Contractor:** Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condenser Water Pump 3</td>
<td>Central Utility Plant</td>
<td>Chiller Plant (Outside)</td>
<td>Pump</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description of Deficiency:** Pump seals leaking profusely during operation.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Signature  
Schneider Electric Representative

**Signature**  
Customer Representative

**Project Development Manager**  
Title

---

*Schneider Electric*
**Equipment Deficiency Report**

Date: 3/29/2011  
EDR Number: 36

**Project Description:**  
Sul Ross State University

**Address:**  
P. O. Box C-107  
Alpine, TX 79832

**Contractor:**  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ferguson Hall</td>
<td>West Basement Mechanical Room</td>
<td>Pump</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Description of Deficiency:</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pump seals leaking profusely during operation.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**  
Schneider Electric Representative  
Signature

**Customer Representative**  
Signature

Project Development Manager  
Title
Sul Ross State University
Utility Assessment Report Appendix for Energy Service Company Performance Contractor
RFQ No: 758-11-07006

Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 37

Project Description: Sul Ross State University
Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Fine Arts</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor South Mechanical Room</td>
</tr>
<tr>
<td>Equipment type</td>
<td>AHU</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td>Outside Air Damper Manually Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 38

Project Description: Sul Ross State University
Address: P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU MPE-1</td>
<td>Gallego MP</td>
<td>1st Floor West Mechanical Room</td>
<td>Chilled Water Valve</td>
<td>N/A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nature of Deficiency: Valve packing is leaking. Valve exterior corrosion.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 39
Project Description: Sul Ross State University
Address: P. O. Box C-107
Alpine, TX 79832

Contractor: Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Building Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC 15</td>
<td>Graves-Pierce Swimming Pool</td>
<td>AHU</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Outside Air Damper Manually Closed</td>
</tr>
<tr>
<td>Energy</td>
<td>X</td>
</tr>
<tr>
<td>Comfort</td>
<td>X</td>
</tr>
<tr>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature Schneider Electric Representative

Signature Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 40

Project Description: Sul Ross State University

Address: P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU-1</td>
<td>Safety</td>
<td>Energy</td>
</tr>
<tr>
<td>Lawrence Hall</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1st Floor Mechanical Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilled Water Valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chilled water valve appears to be non-functional.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 41

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Lawrence Hall</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor Mechanical Room</td>
</tr>
<tr>
<td>Equipment type</td>
<td>AHU</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency:</td>
<td>X</td>
</tr>
</tbody>
</table>

Outside air damper manually closed. Actuated return air damper replaced with manual balancing damper. Economizer operation no longer possible.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 42

Project Description:  
Sul Ross State University

Address:  
P. O. Box C-107  
Alpine, TX 79832

Attn.:  
Eddie Natera

Contractor:  
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

### Equipment Identification

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrence Hall</td>
<td>3rd Floor Mechanical Room</td>
<td>AHU</td>
<td></td>
</tr>
</tbody>
</table>

### Nature of Deficiency

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

Outside air damper manually closed. Actuated return air damper replaced with manual balancing damper. Economizer operation no longer possible.

<table>
<thead>
<tr>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

J. Shane White  
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 43

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Contractor: Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Building</th>
<th>Location / Room #</th>
<th>Equipment type</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morelock Academic Building</td>
<td>2nd Floor Mech</td>
<td>AHU</td>
<td>Safety</td>
<td>Inlet Guide Vanes are disconnected and outside air damper is closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Energy</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Comfort</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 44

Project Description: Sul Ross State University

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Building Location</th>
<th>Equipment Type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turner Range Animal Science Mech 147</td>
<td>Pump VFD</td>
<td>AC Tech</td>
<td>Safety</td>
<td>Existing VFD in bypass, drive in hand.</td>
</tr>
<tr>
<td>Safety</td>
<td>Energy</td>
<td>Comfort</td>
<td>Work Stopped</td>
<td>Re-Validate</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323-5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Schneider Electric Representative

Signature

Signature

Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 45

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Water Pump VFD</td>
<td>Safety</td>
<td>Existing VFD in hand, drive in auto.</td>
</tr>
<tr>
<td>Turner Range Animal Science</td>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>Mech 147</td>
<td>Comfort</td>
<td></td>
</tr>
<tr>
<td>Pump VFD</td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td>AC Tech</td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323-5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Schneider Electric Representative

Signature

Customer Representative

Project Development Manager
Title
# Equipment Deficiency Report

**Date:** 3/29/2011  
**EDR Number:** 46  
**Project Description:** Sul Ross State University  
**Address:** P. O. Box C-107  
Alpine, TX 79832  
**Attn.:** Eddie Natera

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU-1 VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Turner Range Animal Science</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Mech 147</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Fan VFD</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>AC Tech</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of Deficiency: Existing VFD in auto, drive in bypass.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**

Signature: Schneider Electric Representative  
Signature: Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 47

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU-2 VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Turner Range Animal Science</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>Mech 164</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Fan VFD</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>AC Tech</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency:</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing VFD in hand, drive in bypass.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White

Signature Schneider Electric Representative

Signature Customer Representative

Project Development Manager

Title
**Equipment Deficiency Report**

Date: 3/29/2011  
EDR Number: 48  

**Project Description:**  
Sul Ross State University  

**Address:**  
P. O. Box C-107  
Alpine, TX 79832  

Attn.: Eddie Natera  
Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209  

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>HWP VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Warnock Science Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>1st Floor Mech</td>
</tr>
<tr>
<td>Equipment type</td>
<td>VFD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>X</td>
</tr>
</tbody>
</table>

Description of Deficiency: Hot Water Pump VFD in Bypass

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Signature  
Schneider Electric Representative

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 49

Project Description: Sul Ross State University

Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>AHU 3 Hot Water Valve Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Warnock Science Building</td>
</tr>
<tr>
<td>Location / Room #</td>
<td>3rd Floor Mech</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Valve Actuator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Deficiency</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The hot water valve actuator has failed and been removed from the valve body.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480.

After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White  
Schneider Electric Representative

Signature

Signature  
Customer Representative

Project Development Manager

Title
Equipment Deficiency Report

Date: 3/29/2011
EDR Number: 50

Project Description: Sul Ross State University
Address: P. O. Box C-107
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road
Phone: (972) 323-1111
Fax: (972) 323-5498
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification: Building Location / Room #</th>
<th>2nd Floor AHU Wildenthal Library 2nd Floor Mech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>AHU</td>
</tr>
<tr>
<td>Nature of Deficiency</td>
<td>Safety</td>
</tr>
<tr>
<td>Description of Deficiency: Fan shroud has been removed. Fan belt exposed.</td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative
Signature
Customer Representative

Project Development Manager
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 51

Project Description: Sul Ross State University

Address:  
P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera
Schneider Electric, Inc.
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and / or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>CHWP1 VFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Location / Room #</td>
<td>Wildenthal Library</td>
</tr>
<tr>
<td>Equipment type Manufacturer</td>
<td>CHWP VFD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Safety</th>
<th>Energy</th>
<th>Comfort</th>
<th>Work Stopped</th>
<th>Re-Validate</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFD non-functional.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480.
After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

**J. Shane White**

Signature  
Schneider Electric Representative

Signature  
Customer Representative

Project Development Manager  
Title
Equipment Deficiency Report

Date: 3/29/2011  
EDR Number: 52

Project Description: Sul Ross State University

Address: P. O. Box C-107  
Alpine, TX 79832

Attn.: Eddie Natera

Contractor: Schneider Electric, Inc.  
1650 West Crosby Road  
Phone: (972) 323-1111  
Fax: (972) 323-5498  
Project Number: PC08P0209

Schneider Electric, Inc., while performing the Detailed Energy Audit installation, has discovered a deficiency in the performance of the below piece of equipment. Please note the brief description of this deficiency. Schneider Electric, Inc. requests that the CBC Maintenance Department schedule the required repair and/or maintenance.

<table>
<thead>
<tr>
<th>Equipment Identification:</th>
<th>Building Location / Room #</th>
<th>Equipment Type</th>
<th>Manufacturer</th>
<th>Nature of Deficiency</th>
<th>Description of Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHWP4 VFD</td>
<td>Wildenthal Library</td>
<td>Pump Room</td>
<td>CHWP VFD</td>
<td>Safety</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Energy</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Comfort</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Work Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Re-Validate</td>
<td></td>
</tr>
</tbody>
</table>

VFD non-functional.

If you have any questions please contact Shane White, PE, Project Manager, Phone: (972) 323 - 5480. After completion of required repairs or maintenance please contact TAC for re-validation of equipment if required.

J. Shane White
Signature
Schneider Electric Representative

Signature
Customer Representative

Project Development Manager
Title
K. DETAILED EQUIPMENT NARRATIVE
OVERVIEW
The facility descriptions outlined here and illustrated in the following table were determined using a mixture of facility surveys by Schneider Electric personnel and interviews of Sul Ross State University’s facilities personnel. The following are short descriptions of the table's contents:

Building Data
- # - The number of the building described
- Name – The name of the building
- GSF – The gross square footage of the building
- Campus Location – The area in which the building resides
- Roof – The existing roof type
- Ext – The exterior fascia of the building
- Building use – The building’s primary function
- Year – The year of construction

HVAC
- Heating and Cooling Types – The primary systems serving the building
- Air Distribution Systems – The primary air distribution system serving the building
- BAS – Type of building automation system serving the building

Fixtures
- Domestic Water Fixtures – General plumbing fixtures: faucets, toilets, urinals, etc…
- Lighting Fixtures – Primary light source for the building

The following table describes the facilities that are included in this project.
<table>
<thead>
<tr>
<th>THWCR Inventory Bldg #</th>
<th>Customer Map Building #</th>
<th>Building Description</th>
<th>Gross SF</th>
<th>Location</th>
<th>Roof</th>
<th>Ext</th>
<th>Heating Type</th>
<th>Air Dist</th>
<th>EMS</th>
<th>Plumbing</th>
<th>Lig</th>
</tr>
</thead>
<tbody>
<tr>
<td>402</td>
<td>2</td>
<td>ACAD/COMPUTER RESOURCE CENTER</td>
<td>17,663</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1909</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>402</td>
<td>4</td>
<td>BRISCOE ADMINISTRATION BUILDING</td>
<td>43,084</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1919</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>203</td>
<td>28</td>
<td>CENTRAL HEATING &amp; COOLING PLANT</td>
<td>9,608</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>sheet metal</td>
<td>Instruction</td>
<td>1905</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>412</td>
<td>31</td>
<td>CERAMICS/SCULPTURE BLDG</td>
<td>3,252</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1903</td>
<td>gas-UH</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>104</td>
<td>16</td>
<td>FIBROUSION GYM</td>
<td>22,300</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1909</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>406</td>
<td>10</td>
<td>FINE ARTS BUILDING</td>
<td>29,972</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1902</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>406</td>
<td>17</td>
<td>DALLAS CENTER - Multipurpose</td>
<td>17,904</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>2000</td>
<td>CUP-HW</td>
<td>None</td>
<td>T2</td>
</tr>
<tr>
<td>406</td>
<td>20</td>
<td>GRAVES-PIERCE COMPLEX</td>
<td>66,291</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1967</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>406</td>
<td>22</td>
<td>GRAVES-PIERCE SWIMMING POOL</td>
<td>13,340</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1965</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>406</td>
<td>32</td>
<td>INDUSTRIAL TECHNOLOGY BUILDING</td>
<td>18,110</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1965</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>100</td>
<td>1</td>
<td>LAWRENCE HALL</td>
<td>26,962</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1906</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>401</td>
<td>3</td>
<td>MORELOCK ACADEMIC BUILDING</td>
<td>62,024</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1902</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>681</td>
<td>29</td>
<td>PHY PLANT MAIN &amp; S/C VACUUM</td>
<td>6,916</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1975</td>
<td>gas-UH</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>681</td>
<td>29</td>
<td>PHY PLANT OPERATIONS COMPLEX</td>
<td>13,364</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1975</td>
<td>gas-UH</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>687</td>
<td>9</td>
<td>UNIVERSITY CENTER</td>
<td>91,569</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>2001</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>403</td>
<td>12</td>
<td>WARNER SCIENCE BUILDING</td>
<td>49,023</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1965</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
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<tr>
<td>407</td>
<td>5</td>
<td>WILBRAHAM LIBRARY</td>
<td>97,671</td>
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<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1969</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>407</td>
<td>af</td>
<td>BETTY E TUNBRIDGE ART CENTER</td>
<td>20,391</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1975</td>
<td>HW Boiler</td>
<td>High Flow</td>
<td>T2</td>
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<tr>
<td>408</td>
<td>11</td>
<td>MCCOY MUSEUM BUILDING</td>
<td>17,272</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1963</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>408</td>
<td>13</td>
<td>CENTENNIAL BUILDING</td>
<td>21,013</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1963</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>106</td>
<td>16</td>
<td>FLETCHER HALL</td>
<td>27,862</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1983</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
<tr>
<td>107</td>
<td>17</td>
<td>MOUNTAINVILLE HALL &amp; DINING</td>
<td>36,982</td>
<td>Main Campus</td>
<td>sheet metal</td>
<td>brick</td>
<td>Instruction</td>
<td>1983</td>
<td>CUP-HW</td>
<td>High Flow</td>
<td>T2</td>
</tr>
</tbody>
</table>
L. CONSTRUCTION PHASING PLAN
<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Sul Ross State University Energy Retrofit</strong></td>
<td>348 days</td>
<td>Fri 6/3/11</td>
<td>Wed 10/3/12</td>
</tr>
<tr>
<td>2</td>
<td>Award Contract/Notice to Proceed (ARRA funded Project)</td>
<td>1 day</td>
<td>Fri 6/3/11</td>
<td>Fri 6/3/11</td>
</tr>
<tr>
<td>3</td>
<td>Payment and Performance Bond</td>
<td>5 days</td>
<td>Fri 6/3/11</td>
<td>Thu 6/9/11</td>
</tr>
<tr>
<td>4</td>
<td>Certificate of Insurance</td>
<td>4 days</td>
<td>Fri 6/3/11</td>
<td>Wed 6/8/11</td>
</tr>
<tr>
<td>5</td>
<td>Complete Design Documents for Construction</td>
<td>30 days</td>
<td>Fri 6/3/11</td>
<td>Thu 7/14/11</td>
</tr>
<tr>
<td>6</td>
<td>1st AIA Billing and Schedule of Values Approved</td>
<td>10 days</td>
<td>Fri 6/3/11</td>
<td>Thu 6/16/11</td>
</tr>
<tr>
<td>7</td>
<td>Issue ARRA Subcontracts</td>
<td>20 days</td>
<td>Fri 6/3/11</td>
<td>Thu 6/30/11</td>
</tr>
<tr>
<td>8</td>
<td>Employee Access and Parking Setup</td>
<td>10 days</td>
<td>Fri 7/15/11</td>
<td>Thu 7/28/11</td>
</tr>
<tr>
<td>9</td>
<td>Finalize Construction Schedule</td>
<td>15 days</td>
<td>Fri 7/15/11</td>
<td>Thu 8/4/11</td>
</tr>
<tr>
<td>10</td>
<td>Office Set-up as required</td>
<td>25 days</td>
<td>Fri 6/3/11</td>
<td>Thu 7/7/11</td>
</tr>
<tr>
<td>11</td>
<td>Award Contract/Notice to Proceed (non-ARRA funded Project)</td>
<td>1 day</td>
<td>Fri 9/30/11</td>
<td>Fri 9/30/11</td>
</tr>
<tr>
<td>12</td>
<td>Issue non-ARRA Subcontracts</td>
<td>15 days</td>
<td>Mon 10/3/11</td>
<td>Fri 10/21/11</td>
</tr>
<tr>
<td>13</td>
<td><strong>Lighting Retrofit Project</strong></td>
<td>165 days</td>
<td>Mon 7/11/11</td>
<td>Fri 2/24/12</td>
</tr>
<tr>
<td>14</td>
<td>Base Lighting Efficiency Project</td>
<td>111 days</td>
<td>Mon 7/11/11</td>
<td>Mon 12/12/11</td>
</tr>
<tr>
<td>15</td>
<td>Vending Machine Lighting disable</td>
<td>30 days</td>
<td>Mon 8/8/11</td>
<td>Fri 9/16/11</td>
</tr>
<tr>
<td>16</td>
<td>Base Lighting Material Disposal</td>
<td>5 days</td>
<td>Tue 12/13/11</td>
<td>Mon 12/19/11</td>
</tr>
<tr>
<td>17</td>
<td>Additional Lighting Efficiency Project</td>
<td>90 days</td>
<td>Mon 10/17/11</td>
<td>Fri 2/17/12</td>
</tr>
<tr>
<td>18</td>
<td>Additional Material Disposal</td>
<td>5 days</td>
<td>Mon 2/20/12</td>
<td>Fri 2/24/12</td>
</tr>
<tr>
<td>19</td>
<td><strong>Water Conservation Project</strong></td>
<td>110 days</td>
<td>Mon 7/18/11</td>
<td>Fri 12/16/11</td>
</tr>
<tr>
<td>20</td>
<td>Main campus E&amp;G buildings</td>
<td>45 days</td>
<td>Mon 7/18/11</td>
<td>Fri 9/16/11</td>
</tr>
<tr>
<td>21</td>
<td>Main campus Aux buildings</td>
<td>10 days</td>
<td>Mon 9/19/11</td>
<td>Fri 9/30/11</td>
</tr>
<tr>
<td>22</td>
<td>Main campus Housing buildings</td>
<td>55 days</td>
<td>Mon 10/3/11</td>
<td>Fri 12/16/11</td>
</tr>
<tr>
<td>23</td>
<td><strong>MEP Project</strong></td>
<td>210 days</td>
<td>Mon 11/7/11</td>
<td>Fri 8/24/12</td>
</tr>
<tr>
<td>24</td>
<td>Multizone damper installations</td>
<td>135 days</td>
<td>Mon 11/21/11</td>
<td>Fri 5/25/12</td>
</tr>
<tr>
<td>25</td>
<td>SS replacement for Phys Plant Complex</td>
<td>40 days</td>
<td>Mon 11/7/11</td>
<td>Fri 12/30/11</td>
</tr>
<tr>
<td>26</td>
<td>HW valve replacements for VFD install</td>
<td>129 days</td>
<td>Wed 12/14/11</td>
<td>Mon 6/11/12</td>
</tr>
<tr>
<td>27</td>
<td>CHW valve replacements for VFD install</td>
<td>151 days</td>
<td>Mon 11/21/11</td>
<td>Mon 6/18/12</td>
</tr>
<tr>
<td>28</td>
<td>ALL motor replacements for VFD install</td>
<td>50 days</td>
<td>Mon 11/21/11</td>
<td>Mon 1/27/12</td>
</tr>
<tr>
<td>29</td>
<td>FPHE for CHW Plant</td>
<td>94 days</td>
<td>Mon 4/16/12</td>
<td>Thu 8/23/12</td>
</tr>
<tr>
<td>30</td>
<td>chw/hw pressure taps for BAS</td>
<td>126 days</td>
<td>Mon 12/12/11</td>
<td>Mon 6/4/12</td>
</tr>
</tbody>
</table>

**Project:** Sul Ross State University
**Date:** Tue 4/12/11

**Energy Retrofit Project**

**Project Summary**

**External Tasks**

**External Milestone**

**Deadline**

**Project Summary**

**External Tasks**

**External Milestone**

**Deadline**
M. MEASUREMENT & VERIFICATION PLAN
M. MEASUREMENT AND VERIFICATION PLAN

Section I – Performance Tracking Methodology Overview
Section II – IPMVP Option D Verified Savings
Section III – IPMVP Option A Verified Water Savings
Section IV – Savings Capacity Confirmation

Section I – Performance Tracking Methodology Overview
Savings are computed using the techniques defined in Sections II – IV of this schedule. Each section details a specific approach for evaluating the savings performance of a portion of the project. The details of computing savings are specific to each section and should not be interpreted to apply to all sections. Savings to be used for guarantee reconciliation is the sum of the savings defined in Sections II – IV of this schedule.

Section II – IPMVP Option D Verified Savings

A. Description
B. Measurements
C. Estimated Parameters
D. Energy Savings Calculations
E. Cost Savings
F. Building List
G. Causes for Adjustment
H. Calendar and Schedules
I. Standards of Service and Comfort
J. Other Information
K. Project Specific Customer Responsibilities

A. Description
The method of determining energy savings described in this section uses “Option D – Calibrated Simulation” as described in the International Performance Measurement and Verification Protocol (IPMVP). In brief, the energy savings resulting from this project will be measured as follows:

One year of utility metered post-project energy use will be used to calibrate a computer simulation of the campus with all ECMs installed. This calibrated computer model will be modified by removing the effect of the ECMs to generate a simulation of the Baseline energy use. The energy savings from the project will be the difference between the sum of the Baseline and sum of the Post-retrofit computer models’ energy use.

B. Measurements
Utility data will be collected for one year following the conclusion of construction for the meters below.
**Electric Meters**

<table>
<thead>
<tr>
<th>Meter Name</th>
<th>Account Number</th>
<th>Utility Co.</th>
<th>Rate</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRC Electric</td>
<td>6401926-8</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Briscoe Admin Electric</td>
<td>6401914-4</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Centennial Electric</td>
<td>6136717-3</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Central Plant Electric 1</td>
<td>6415296-0</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Central Plant Electric 2</td>
<td>6401918-5</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Central Plant Electric 3</td>
<td>6401922-7</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Central Plant Electric 4</td>
<td>6415294-5</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Central Plant Electric 5</td>
<td>6415293-7</td>
<td>Reliant/AEP</td>
<td>SPP – A</td>
<td>kWh</td>
</tr>
<tr>
<td>Ferguson Electric</td>
<td>6401909-4</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Fine Arts Electric</td>
<td>3401921-9</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Fletcher Electric</td>
<td>6401907-8</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>GP/PPG Electric 1</td>
<td>6415298-6</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>GP/PPG Electric 2</td>
<td>6401919-3</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Industrial Tech Electric 1</td>
<td>6401917-7</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
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<td>Industrial Tech Electric 2</td>
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<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
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<td>Lawrence Electric</td>
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<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Morelock Electric</td>
<td>6401923-5</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Museum Electric</td>
<td>6444250-2</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>Physical Plant Electric</td>
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<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
</tr>
<tr>
<td>RAS Center Electric</td>
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<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
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<tr>
<td>University Center Electric</td>
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<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
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<tr>
<td>Warnock Electric</td>
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<td>Reliant/AEP</td>
<td>SPP</td>
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<tr>
<td>Wildenthal Library Electric</td>
<td>6415295-2</td>
<td>Reliant/AEP</td>
<td>SPP</td>
<td>kWh, kW</td>
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</table>

**Gas Meters**

<table>
<thead>
<tr>
<th>Meter Name</th>
<th>Account Number</th>
<th>Utility Co.</th>
<th>Rate</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centennial Gas</td>
<td>15-01-0130</td>
<td>CenterPoint</td>
<td>GSLV-598-A</td>
<td>MCF</td>
</tr>
<tr>
<td>Central Plant Gas</td>
<td>18-01-0030</td>
<td>CenterPoint</td>
<td>GSLV-598-A</td>
<td>MCF</td>
</tr>
<tr>
<td>RAS Center Gas</td>
<td>18-01-0010</td>
<td>CenterPoint</td>
<td>GSLV-598-A</td>
<td>MCF</td>
</tr>
</tbody>
</table>

**Facility Data**

During the Investment Grade Audit, detailed facility information is collected for use in savings projections. Throughout the construction period and first performance year, detailed information about the Post-Retrofit conditions is collected as well. Trend data from the Building Automation System is also collected during the audit and performance phases. All facility information collected during these periods will be used to assist in the calibration of the computer models. This will include, but is not limited to, variables such as equipment size, operating hours, and temperature set-points.
C. Estimated Parameters
Calibration of the models will require making estimates in place of measured data for many parameters. Because the data collected for each building and simulation during the Investment Grade Audit and Post-Retrofit periods will be different, it is not possible to individually list all estimated parameters. In all cases where reliable measured data has been collected by Schneider Electric, that data will be used in place of estimated parameters.

D. Energy Savings Calculations
Energy and demand units saved will be determined by the following equation:

\[ E_S = E_B - E_G \]

Where:
- \( E_S \) = Energy Units Saved
- \( E_B \) = Normalized Base Year Energy
- \( E_G \) = Normalized Guarantee Period (Post-Retrofit) Energy

Normalized Base Year Energy

The Normalized Base Year energy use is the output of the calibrated computer simulation, modified to account for the conditions before the project. The Normalized Base Year will account for the baseline adjustment presented in the Investment Grade Audit. The following steps outline the process for calibrating the computer simulation and determining the Normalized Base Year energy use.

1. Collect all Measurements and Finalize Calibration Data
   During the first year after the conclusion of construction, all information to be used for calibrating the post-project computer model will be collected. If data is missing or data collection errors are present, the missing data will be estimated. Before advancing any further in the model calibration process, this estimated data will be presented to the University for review and approval.

2. Weather Normalize the Utility Data
   In order to remove the effects of the single measurement year’s weather from the savings calculation, the utility data will be modified to represent the level of energy use in a typical year. This is accomplished by modeling the relationship between weather and energy use during the post-project measurement year. The “Normal” set of weather for the same weather station will be used as an input to the weather model. The data to be used for the weather normalization will come from the National Weather Service Station at El Paso, Texas. If a statistically significant relationship between the measurement year’s weather and the measurement year’s energy use cannot be derived with this simplistic model, this step will be delayed. In that case, the computer simulation will not be created and calibrated using normalized data, but will instead be created and calibrated using measurement period data. The weather input to the computer simulation will then be adjusted to calculate the normalized utility data. If the weather data source becomes unavailable or a superior source is identified, Schneider Electric may select an alternative data source with the University’s approval.
Calibrate the Computer Simulation
Using the Normalized Utility Data and all other information collected about the post-retrofit buildings, a computer simulation of each facility will be created and calibrated. The software used for these models is primarily eQUEST. Other simulation tools may be used as needed to account for very small buildings or central plant energy use. Each model is to be calibrated such that the cumulative variance over the year between the software predicted energy use and the normalized energy use is less than 5%. Each model is also to be calibrated such that the variance in any calendar month is no more than 20% of the normalized energy use. This model is to be calibrated with assumptions, estimations, and measured data from the actual post-retrofit period conditions. Once the model for each facility has been satisfactorily calibrated, the model results will be available for review.

Normalize the Facility Conditions to the Base Year Conditions
Each facility is a dynamic place that can experience significant changes impacting the energy use. All changes to the facility outside of those created from the retrofit should be modified in the calibrated model to reflect the conditions during the Base Year. Examples of changes that may fall into this category include: building renovations/additions, HVAC system additions/renovations, occupancy hours, set-points, customer initiated ECMs, etc. The purpose of this step is to avoid unfairly taking credit or losses due to changes outside the scope of the project. A list of potential changes and the necessary steps to isolate their impact is included in Paragraph G.

Modify the Computer Simulation to Remove ECMs
The final step to creating the Normalized Base Year energy use is to remove the changes caused by the ECMs from the computer simulation. Each ECM should be removed individually so the savings performance can be analyzed by ECM. Measurements taken during the Investment Grade Audit may be required to properly model pieces of equipment that have experienced significant changes. To assist in clarifying the building operating schedules in the baseline, Paragraph H lists the Base Year operating schedules.

Normalized Guarantee Period (Post-Retrofit) Energy
The Normalized Guarantee Period energy use is the output of the calibrated computer simulation, modified to account for the facility conditions before the project and adjusted to account for any failure to utilize the installed ECMs. The following steps outline the process for calibrating the computer simulation and determining the Normalized Guarantee Period energy use.

Collect all Measurements and Finalize Calibration Data
During the first year after the conclusion of construction, all information to be used for calibrating the post-project computer model will be collected. If data is missing or data collection errors are present, the missing data will be estimated. Before advancing any further in the model calibration process, this estimated data will be presented to the University for review and approval.

Weather Normalize the Utility Data
In order to remove the effects of the single measurement year’s weather from the savings calculation, the utility data will be modified to represent the level of energy use in a typical year.
This is accomplished by modeling the relationship between weather and energy use during the post-project measurement year. The “Normal” set of weather for the same weather station will be used as an input to the weather model. The data to be used for the weather normalization will come from the National Weather Service Station at El Paso, TX. If a statistically significant relationship between the measurement year’s weather and the measurement year’s energy use cannot be derived with this simplistic model, this step will be delayed. In that case, the computer simulation will not be created and calibrated using normalized data, but will instead be created and calibrated using measurement period data. The weather input to the computer simulation will then be adjusted to calculate the normalized utility data. If the weather data source becomes unavailable or a superior source is identified, Schneider Electric may select an alternative data source with the University’s approval.

**Calibrate the Computer Simulation**

Using the Normalized Utility Data and all other information collected about the post-retrofit buildings, a computer simulation of each facility will be created and calibrated. The software used for these models is primarily eQUEST. Other simulation tools may be used as needed to account for very small buildings or central plant energy use. Each model is to be calibrated such that the cumulative variance over the year between the software predicted energy use and the normalized energy use is less than 5%. Each model is also to be calibrated such that the variance in any calendar month is no more than 20% of the normalized energy use. This model is to be calibrated with assumptions, estimations, and measured data from the actual post-retrofit period conditions. Once the model for each facility has been satisfactorily calibrated, the model results will be available for review.

**Normalize the Facility Conditions to the Base Year Conditions**

Each facility is a dynamic place that can experience significant changes impacting the energy use. All changes to the facility outside of those created from the retrofit should be modified in the calibrated model to reflect the conditions during the Base Year. Examples of changes that may fall into this category include: building renovations/additions, HVAC system additions/renovations, occupancy hours, set-points, customer initiated ECMs, etc. The purpose of this step is to avoid unfairly taking credit or losses due to changes outside the scope of the project. A list of potential changes and the necessary steps to isolate their impact is included in Paragraph G.

**Modify the Computer Simulation to Reflect Optimal ECM Use**

Unexpected facility conditions can occasionally lead to misuse of the Energy Conservation Measures. If this occurs for any reason other than a failure of the ECMs to properly function, the computer model should be corrected to match the expected utilization of the ECMs. To assist in clarifying the expected building operating schedule and set-points, this information has been provided in Paragraphs H and I.
E. Cost Savings

Energy and demand cost savings will be determined by applying the utility rates below to the Normalized Base Year and Normalized Guarantee Period energy uses:

<table>
<thead>
<tr>
<th>Name of Utility: Rate Schedule:</th>
<th>Reliant/AEP SPP (State Power Program)</th>
<th>Reliant/AEP SPP – A (State Power Program)</th>
<th>CenterPoint GSLV-598-A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Charge</td>
<td>Unit</td>
<td>Comments</td>
</tr>
<tr>
<td>Consumption Charge:</td>
<td>$0.05</td>
<td>Per kWh</td>
<td></td>
</tr>
<tr>
<td>Distribution Charge:</td>
<td>$3.21</td>
<td>Per Billed kW</td>
<td></td>
</tr>
<tr>
<td>CTC Charge:</td>
<td>$0.000039</td>
<td>Per kWh</td>
<td></td>
</tr>
<tr>
<td>System Benefit Fund:</td>
<td>$0.000657</td>
<td>Per kWh</td>
<td></td>
</tr>
<tr>
<td>Transmission Charge:</td>
<td>$1.245</td>
<td>Per kW</td>
<td></td>
</tr>
<tr>
<td>TCRF:</td>
<td>$0.354695</td>
<td>Per kW</td>
<td></td>
</tr>
<tr>
<td>Energy Efficiency Recov:</td>
<td>$0.000081</td>
<td>Per kWh</td>
<td></td>
</tr>
<tr>
<td>State Colleges and Universities Discount:</td>
<td>-20%</td>
<td>Per $</td>
<td>Applies to Distribution Charge, System Benefit Fund, and Transmission Charge only</td>
</tr>
</tbody>
</table>

Determination of Billed kW: Greater of monthly 15 minute peak kW or 80% of the greatest 15 minute peak kW in the previous 11 months.
F. Building List
The following table lists the buildings that were served by guarantee meters during the base year period. Changes to these buildings uncaused by the project may require an adjustment to the computer simulations.

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Gross Area (SF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic/Computer Resource Center</td>
<td>17,660</td>
</tr>
<tr>
<td>Briscoe Administration Building</td>
<td>44,460</td>
</tr>
<tr>
<td>Centennial Building</td>
<td>21,010</td>
</tr>
<tr>
<td>Central Plant</td>
<td>6,608</td>
</tr>
<tr>
<td>Ferguson Hall</td>
<td>22,300</td>
</tr>
<tr>
<td>Francois Fine Arts Building</td>
<td>26,878</td>
</tr>
<tr>
<td>Fletcher Hall</td>
<td>27,562</td>
</tr>
<tr>
<td>Graves-Pierce Complex</td>
<td>255,604</td>
</tr>
<tr>
<td>Pete P. Gallego Center</td>
<td></td>
</tr>
<tr>
<td>Industrial Technology Building</td>
<td>18,110</td>
</tr>
<tr>
<td>Ceramics and Sculpture Building</td>
<td>3,233</td>
</tr>
<tr>
<td>Lawrence Hall</td>
<td>25,292</td>
</tr>
<tr>
<td>Morelock Academic Building</td>
<td>42,426</td>
</tr>
<tr>
<td>McCoy Building (Museum of the Big Bend)</td>
<td>17,272</td>
</tr>
<tr>
<td>Physical Plant</td>
<td>20,107</td>
</tr>
<tr>
<td>Everett E. Turner RAS Center</td>
<td>20,530</td>
</tr>
<tr>
<td>Morgan University Center</td>
<td>51,566</td>
</tr>
<tr>
<td>Warnock Science Building</td>
<td>46,080</td>
</tr>
<tr>
<td>Wildenthal Library</td>
<td>67,821</td>
</tr>
</tbody>
</table>

G. Causes for Adjustment

<table>
<thead>
<tr>
<th>Cause</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition of New Building, or Renovation/Addition to Existing Building w/ Independent Utility Metering and HVAC Service</td>
<td>1. None required. Building is independently metered. No effect on savings tracking of other buildings.</td>
<td>1. N/A</td>
</tr>
<tr>
<td></td>
<td>2. Customer will notify ESCO when additions are planned.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. ESCO will review the addition plans and determine if the addition is likely to increase energy use above the threshold limits. *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. If the addition is expected to exceed any of the threshold limits then all incoming utilities</td>
<td></td>
</tr>
<tr>
<td>Addition of New Building or New Energy User on Existing Utility or HVAC Service **</td>
<td>1. Customer will notify ESCO when additions are planned.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. ESCO will review the addition plans and determine if the addition is likely to increase energy use above the threshold limits. *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. If the addition is expected to exceed any of the threshold limits then all incoming utilities</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>Action</td>
<td>Responsibility</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| Addition to Existing Building on Existing Utility or HVAC Service ** | 1. Customer will notify ESCO when additions are planned.  
2. ESCO will review the addition plans and determine if the addition is likely to increase energy use above the threshold limits. *  
3. If the addition is expected to exceed any of the threshold limits, sub-meter the addition, just as for a new building.  
4. If the addition is below all of the threshold limits, the addition’s energy consumption will be estimated from computerized building simulation, manual calculations or as a ratio of the main building’s energy consumption, obtained either from sub-meter data and/or energy simulations. | 1. Customer  
2. ESCO  
3. Customer  
4. ESCO |
| Renovation / Modification of an Existing Building on Existing Utility or HVAC Service ** | 1. Customer will notify ESCO when building renovations are planned.  
2. ESCO will review the renovation plans and determine if the renovations are likely to cause a change in energy use that would exceed the threshold limits. *  
3. If the renovations are expected to raise or lower energy consumption more than the threshold limits, the renovation will be sub-metered for both pre and post renovation periods until the effect on energy has been determined.  
4. If the expected changes are less than the threshold limits, the effect on energy may be estimated, or, at ESCO’S option, ignored. | 1. Customer  
2. ESCO  
3. Customer  
4. ESCO |
| Demolition / Abandonment of an Existing Building on Existing Utility or HVAC Service ** | 1. Customer will notify ESCO when a demolition or abandonment is planned.  
2. ESCO will determine if the demolition/abandonment is likely to decrease energy use more than the threshold limits. *  
3. If the expected decrease is more then the threshold limits, the building will be sub-metered for both pre and post demolition periods until the effect on energy has been determined.  
4. If the expected changes are less than the threshold limits, the effect on energy may be estimated, or, at ESCO’S option, ignored. | 1. Customer  
2. ESCO  
3. Customer  
4. ESCO |
<table>
<thead>
<tr>
<th>Cause</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Change in Occupancy, Occupancy Hours, Calendar or Set-points | 1. Customer will maintain records of occupancy levels, operating hours and operating calendar and apprise ESCO of the latest figures at least annually.  
2. If at any point during the guarantee term any of these values change more than the threshold limits*, ESCO may estimate the impact of this change and adjust the baseline accordingly. | 1. Customer  
2. ESCO       |
| Re-commissioning of Out-of-Service Buildings ** | 1. When a building is scheduled to be re-commissioned, sub-metering equipment will be installed to measure; a) the building’s energy use in its out-of-service condition, and b) the building’s energy use after re-commissioning.  
2. ESCO will use the metered values to adjust the base year for the increased energy consumption. | 1. Customer  
2. ESCO       |
| Customer Initiated ECM’s                   | 1. If a Customer initiated ECM is estimated to save less than 5% of this contract’s annual guaranteed energy savings, no adjustment will be made to the savings measured under this contract.  
2. To measure savings from a Customer initiated ECM, Customer will develop a separate M&V plan to track the ECM’s savings. Pending agreement from ESCO, the resulting savings from Customer initiated ECM will be subtracted from this contract’s savings.  
3. In no event will the original M&V plan’s current year measured savings be reduced below the immediately preceding year’s savings due to a Customer initiated ECM. | 1. N/A  
2. Customer  
3. N/A        |
| Missing bills                              | 1. Customer agrees to send complete and accurate copies of utility invoices for meters ** included in this contract to ESCO within 10 days of receipt of such invoices or authorize ESCO to access the utility information directly from the utility provider to ensure prompt measurement of project savings.  
2. If utility invoices are not received by ESCO within 60 days of the end of the service period, ESCO will estimate the savings based on guaranteed savings prorated for the utility billing period to which the bill relates and for subsequent billing periods that are affected by an increase in energy and/or demand that could have been avoided or detected earlier had ESCO been provided with the utility data in accordance with these Customer responsibilities in item #1.  
3. In the event ESCO receives the utility bill and/or utility data subsequent to the above action, ESCO | 1. Customer  
2. ESCO  
3. ESCO       |
## Cause

<table>
<thead>
<tr>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| will incorporate the utility data into the savings analysis. If such data produces savings results greater than savings calculated as set forth in item #2, the greater amount will be used in determining achieved savings. | 1. ESCO  
2. Customer  
3. ESCO |

### Failure to perform Project Specific Customer Responsibilities as defined in Paragraph K.

1. If ESCO determines Customer has not performed the Project Specific Customer Responsibilities as defined in Paragraph K, ESCO may adjust the savings to account for this impact. This adjustment will account for the increased energy use and/or the resulting lost savings.  
2. Customer will resume performance of the Project Specific Customer Responsibilities as defined in Paragraph K.  
3. In no event will the current year’s adjusted savings be reduced below the immediately preceding year’s savings due to a failure to perform Customer Specific Project Responsibilities.  

### Other Causes

Other causes for adjustment may occur due to changes in certain baseline conditions. These causes include, but are not limited to, those described in Paragraph J.

### Threshold Limits:

- **Area** – 1% of base year area as shown in Paragraph F  
- **Electricity** – 1% of highest annual peak demand by meter in Paragraph B  
- **Natural Gas** – 1% of installed base year gas-heating capacity  
- **Air Conditioning** – 1% of installed base year air-conditioning capacity  
- **Occupancy** – 1% of base year occupancy  
- **Occupied Hours** – 5 hours/week for any zone as defined in Paragraph H  
- **Set-points** – 0.5 degrees from the set-points defined in Paragraph I  

**Reference Paragraphs B and F for the associated meters and facilities included in the baseline.**

### H. Calendar, Schedules, and Set-Points

Below are the Base Year and Post Project expected operating schedules and set-points. Any variation from the Post Project values may be a cause for an adjustment to the determined savings.

- **SU/SB** = setup/setback  
- **WD** = weekday  
- **WE** = weekend  

**ACRC**

Base Case: SU/SB = 90/55  
AHU 1 and AHU 2:  
WD: 9 am – 11 pm  
Sat: 10 am – 6 pm
Sun: 10 am – 5 pm
Fan coils: 24/7

EMS: SU/SB = 90/55
AHU 1 and AHU 2:
  WD: 9 am – 11 pm
  Sat: 10 am – 6 pm
  Sun: 10 am – 5 pm
Fan Coils:
  WD: 7 am – 11 pm
  WE: 8 am – 6 pm

**Briscoe Admin**
Base Case: SU/SB = none
All AHUs:
  WD 6 am – 6 pm
  Sat 8 am – noon
  Sun Off
EMS: SU/SB = 90/55
All AHUs:
  WD 6 am – 6 pm
  Sat 8 am – noon
  Sun Off
Note: Briscoe has DX units for server room that run 24/7 in base case and in EMS case.

**Ferguson**
Base Case:
  MZ 1 A & B:
    Jan 1 – Aug 21:  5 am – 9 pm 7 days/wk
    Aug 22 – Dec 31: WD 8 am – 6 pm, WE Off
  MZ 2:
    Jan 1 – Aug 21:  5 am – 9 pm 7 days/wk
    Aug 22 – Dec 31: 8 am – 6 pm 7 days/wk
All units off the week of Thanksgiving
SU/SB = 85/55
EMS:
  MZ 1 A & B:
    WD 8 am – 6 pm, WE Off
  MZ 2 : Aug 22 – Dec 31:
    8 am – 6 pm 7 days/wk
All units off the week of Thanksgiving
SU/SB = 85/55

**Francois Fine Arts**
Base Case:
  7 am – 9 pm 7 days/wk; no SU/SB
EMS:
  7 am – 9 pm 7 days/wk; SU/SB = 85/55
Graves Pierce
Base Case: SU/SB = 85/55
   AHUs GP 1-1, GP-1-2, and GP-1-3: have fans scheduled 24/7 but the temp schedules match "All other AHUs" below (the fans were in "hand")
   AHUs serving vacant dorm portion (used for storage) are off and only turn on to maintain SU/SB temps
   Heater for Pool:
      WD 7 am – 10 pm; 11 am – 6 pm (set to maintain 80 deg)
   All other AHUs
      WD 6 am – 9 pm; WE 8 am – 9pm
EMS: SU/SB = 85/55
   AHUs serving vacant dorm portion (used for storage) are off and only turn on to maintain SU/SB temps
   Heater for Pool:
      WD 7 am – 10 pm; 11 am – 6 pm (set to maintain 80 deg)
   All other AHUs
      WD 6 am – 9 pm; WE 8 am – 9pm

Gallego
Base Case: SU/SB = 85/55
   WD 7 am – 6 pm; WE Off
   Off during spring break and Thanksgiving
EMS: SU/SB = 85/55
   WD 7 am – 6 pm; WE Off
   Off during spring break and Thanksgiving

Lawrence Hall
Base Case: SU/SB = 85/55
   All AHUs: 5 am – 10 pm 7 days/wk
EMS: SU/SB = 85/55
   All AHUs: WD 8 am – 10 pm; WE 8 am – 5 pm

Morelock Education
Base Case: SU/SB = none
   All AHUs:
      Jan – Oct: 6 am – 8 pm 7 days/wk
      Nov – Dec: 6 am – 6 pm 7 days/wk
EMS: SU/SB = 90/55
   All AHUs:
      Jan – Oct: 6 am – 8 pm 7 days/wk
      Nov – Dec: 6 am – 6 pm 7 days/wk

Physical Plant
Base Case: no SU/SB
   7.5 ton split: 7 am – 7 pm 7 days/wk
   Swamp coolers and Window units: WD 7 am – 7 pm; WE off
   Unit heaters: WD 8 am – 7 pm; WE off
EMS: 90/45 SU/SB
University Center
Base Case: SU/SB = 85/55
    All AHUs:
         Mon – Sat 5 am – 11 pm
         Sun 7 am – 11 pm

EMS: SU/SB = 85/55
    All AHUs:
         Mon – Sat 5 am – 11 pm
         Sun 7 am – 11 pm

Warnock Science
Base Case: SU/SB = 85/55
    All AHUs:
         Jan: 24/7 (fans only – VFDs in hand/bypass)
         Feb 1 – Apr – 15: 6 am – 9 pm 7 days/wk
         Apr 16 – Nov 1: 24/7 (fans only – VFDs in hand/bypass)
         Nov: 6 am – 9 pm 7 days/wk
         Dec: 24/7 (fans only – VFDs in hand/bypass)

EMS: SU/SB = 85/55
    All AHUs:
         WD 6 am – 7 pm
         Sat 8 am – 10 pm
         Sun 10 am – 5 pm

Wildenthal Library
Base Case: SU/SB = 85/55
    All AHUs:
         Jan 1 – Jan 2: 8 am – 8 pm 7 days/wk
         Jan 3 – May 23: 7 am – midnight 7 days/wk
         May 24 – May 29: 8 am – 8 pm 7 days/wk
         May 30 – Aug 7 am – midnight 7 days/wk
         Aug 9 – Aug 14: 8 am – 8 pm 7 days/wk
         Aug 15 – Oct 17: 7 am – midnight 7 days/wk
         Oct 18 – Nov 20: 8 am – 8 pm 7 days/wk
         Nov 21 – Nov 28: Off
         Nov 29 – Dec 17: 7 am – midnight 7 days/wk
         Dec 18 – Dec 31: Off

EMS: SU/SB = 85/55
    All AHUs:
         WD 9 am – 9 pm
         Sat 7 am – 7 pm
         Sun 11 am – 9 pm

Turner RAS
Base Case: SU/SB = 85/55
    AHU 1 and 2:
Sul Ross State University
Utility Assessment Report Appendix for
Energy Service Company Performance Contractor
RFQ No: 758-11-07006

5 am – midnight 7 days/wk
AHU 3:
   WD 6 am – 6 pm; WE off
EMS: SU/SB = 85/55
   All AHUs:
       WD 6 am – 6 pm; WE off

McCoy Museum
Base Case: 24/7
EMS: 24/7

Centennial
Base Case: SU/SB = 90/55
   Server room units: 24/7
   All other units: 6 am – 6 pm 7 days/wk (except off during thanksgiving and Christmas breaks)
EMS: SU/SB = 90/55
   Server room units: 24/7
   All other units:
       WD 6 am – 6 pm
       WE Off
       Thanksgiving and Christmas breaks: Off

I. Standards of Service and Comfort
Customer agrees to operate the conditioned spaces in the facilities listed in Paragraph F within the temperature ranges scheduled in the Temperature Control Table below. ESCO reserves the right to adjust for operating conditions outside the range specified in this table.

Temperature Control Table

<table>
<thead>
<tr>
<th>Heating Set-point Range</th>
<th>Cooling Set-point Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied</td>
<td>67°F - 71°F</td>
</tr>
</tbody>
</table>

J. Other Information
Following are key baseline conditions and calculation assumptions. Significant deviation from any or all of these conditions constitutes a cause for adjustment. In the event a cause for adjustment occurs, ESCO will use an appropriate means to estimate the effect of the change and add or subtract the adjustment for the current billing period. All calculations will be made available to Customer upon request.

The guaranteed savings assume that no significant increase or decrease, in quantity or capacity, will occur in installed equipment and plug loads such as fans, pumps, lighting, copiers, computers, printers, ovens, etc. ESCO reserves the right to adjust for changes in quantity and/or capacity of any of these items. Customer agrees to provide to ESCO access to Customer’s premises and/or records for purposes of determining the occurrence and/or
magnitude of any such changes.

K. Project Specific Customer Responsibilities
Customer agrees to maintain the Energy Conservation Measures in original condition with allowance for normal wear and tear. If an Energy Conservation Measure becomes non-operational, Customer agrees to repair the measure promptly. If Customer chooses not to repair the failed measure, ESCO reserves the right to adjust the amount of guaranteed savings associated with that measure in the yearly savings guarantee.

Customer must maintain all parts of the Project Site(s). If Customer has no preventative maintenance program in place, Customer must comply with the general maintenance requirements specified by equipment manufacturers and/or the Maintenance Tasking guidelines that follow.

If Customer has an existing preventative maintenance program currently in force at time of contract execution, that program must be continued throughout the guarantee term of this contract. Equipment must be maintained in proper working condition in all cases where the performance of said equipment affects or could affect the guarantee. Should Customer refuse to perform the required maintenance, ESCO and Customer shall agree to one of the following means of recourse: a) ESCO will adjust the guaranteed savings associated with that equipment, or b) ESCO may terminate this guarantee contract upon seven (7) days written notice.

General Responsibilities
Customer agrees to: a) provide, or cause its suppliers to provide, periodic utility invoices to ESCO in a timely manner; b) execute all Customer responsibilities as scheduled in Schedule D; c) provide to ESCO reasonable access to all Customer facilities and information necessary for ESCO to perform its responsibilities. Access will include, but is not limited to, the following items:

- All buildings listed in Paragraph F
- All buildings served by the meters listed in Paragraph B
- All mechanical equipment rooms in the above buildings
- All temperature control and energy management systems which control part or all of any of the above buildings
- Personnel with responsibility for operating and/or managing any of the above buildings
- Monthly utility invoices and billing history for all of the meters listed in Paragraph B
- Construction documents, equipment inventories, and other documents that may be helpful in evaluating a cause for adjustment as listed in Paragraph G
- Any data from meters or sub-meters relevant to M&V associated with this contract.

Telephone/Network Communications:
Customer will be responsible for providing communications and or network interface to all buildings for operation and PASS support.
**Maintenance Tasking For Mechanical Equipment**

As part of this agreement, Customer and ESCO concur that proper maintenance is an essential part of a complete energy conservation program. Therefore; Customer agrees to maintain all new and existing mechanical equipment involved with the Performance Contract to insure maximum operating efficiencies. Standard preventative maintenance procedures should be followed to improve equipment performance and extend equipment life.

As the energy savings guarantee agreement progresses with time, Customer will be responsible to provide to ESCO annual documentation that proper maintenance of equipment has been performed. This condition will be in effect throughout the duration of this agreement. In the event, ESCO finds that the mechanical systems are not being maintained, ESCO retains the right to adjust the performance assurance report to recapture any lost energy savings from a lack of mechanical maintenance.

For the duration of this agreement, Customer will replace pneumatic control air compressors as they reach the end of their useful life to help ensure that clean, oil free air is delivered to the various pneumatic control air systems in their buildings.

**Maintenance Tasking For Energy Management System and Automatic Temperature Control System**

Customer will perform all general maintenance of the energy management system and automatic temperature control systems to insure proper performance and energy savings at each facility of Customer, for the full term of the performance guarantee. Standard preventative maintenance procedures and repairs should be followed.

Customer will perform daily facilities monitoring and review alarm summaries.

Following project completion, Customer will be responsible to provide to ESCO evidence that proper maintenance of equipment has been performed. This documentation will be provided annually to ESCO for the duration of this agreement.

ESCO will make periodic spot checks, during the term of the contract, to ensure that the energy management system and automatic temperature control systems have been maintained and are fully functional. In the event ESCO finds that the systems have been modified or non-functional, ESCO retains the right to adjust the performance assurance report to recapture any lost energy savings from the changes, and to continue making these adjustments until the changes are corrected.
Section III – IPMVP Option A Verified Water Savings

A. Description
Savings in this section are determined by using an “Option A: Partially Measured Retrofit Isolation” approach as described in the International Performance Measurement & Verification Protocol. A brief description of this method follows:

Separation of the energy use of the equipment affected by an Energy Conservation Measure (ECM) from the energy use of the rest of the facility is required. Measurements are combined with some parameters that are estimated (rather than measured) to determine the amount of energy saved. Parameters that are not changing due to the ECM are estimated and parameters that are changing are measured. The estimated parameters should have engineering estimates or mathematical modeling to verify their reasonableness. With this method, take measurements once in the pre-retrofit period and once in the post-retrofit period, not repeatedly through the lifetime of the project.

For this water project, the parameters to be measured are the water consumption of each pre-retrofit and post-retrofit fixture type. The estimated parameters include the fixture uses per day and number of days used per year for each fixture.

B. Measurements
Water measurements will be taken on a sample set of each pre-retrofit and post-retrofit fixture type to determine the average water use for each fixture type. For sinks and showers, flow rate (in gallons per minute) will be measured. For toilets and urinals, water consumption per flush will be measured. At least 8 measurements will be taken for each fixture type (unless fewer exist). Measurements will continue to be taken for a given fixture type until the 95% confidence interval for the true population mean spans no more than 10% above and below the mean of the sample (or until all fixtures have been measured). The mean of the valid sample set will be treated as the water consumption for that fixture type for all savings calculations.

The average water consumption of each type of fixture is measured in the same manner for both pre-retrofit and post-retrofit conditions. The preferred locations for measurements for the new retrofit types will be locations where some previous measurement was taken. The number of post-retrofit samples measured is independent from the number of pre-retrofit samples taken. These measurements are taken to determine the average water consumption of each fixture type, not the reduction of water in any specific locations. All measurements should be taken using the same equipment. Metering equipment should be verifiably calibrated.

C. Estimated Parameters
The table below contains the estimated parameters for each group of fixtures. Identified in this table are annual uses and the MCF of natural gas saved per thousand gallons of water saved. For sinks, showers, and other, the uses per day are recorded in minutes. For toilets and urinals,
### D. Water Savings Calculations

Water savings for each retrofit is the difference of the pre-retrofit and post-retrofit water consumption for each fixture in the retrofit. For both the pre-retrofit and post-retrofit configurations, water consumption is the product of the measured water use for that fixture type, the quantity of fixtures, and the number of annual uses.

### E. Cost Savings

Water cost savings is the product of the kGal of water saved and the water cost per kGal saved. Water cost: $3.50 / kGal

Sewer cost savings is the product of the kGal of water saved and the sewer cost per kGal saved. Sewer cost: $2.70 / kGal

Heating Fuel savings is the product of the heating fuel price per kGal as defined in Paragraph C and the kGal of water saved.
Section IV – Savings Capacity Confirmation

The process of using measurement to reliably determine actual savings is an integral part of an on-going energy management program. The expense of performing these measurements to more certainly know the savings must be balanced with the gain in savings certainty to avoid negating the financial benefit from the savings. Where there is little doubt about the magnitude of the savings, verification of the potential to achieve savings will be performed. The table below outlines the verification and confirmation steps for the energy and operational savings included in this section. The capacity to achieve these savings has been verified during the design phase. During the performance period, the steps in the table below will be used to confirm the savings capacity continues to exist. In the event that the savings capacity no longer exists, ESCO will estimate the impact of the reduced savings potential. Customer will be responsible for maintaining the savings potential and any lost savings opportunities. In no case will ESCO claim credit for savings lower than the values in the table below for reconciliation purposes.

<table>
<thead>
<tr>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kokernot Field Irrigation</td>
<td>$13,230</td>
</tr>
<tr>
<td>Savings</td>
<td>Savings have been modeled based on well opportunity. ESCO will perform inspection to confirm well is operating as intended and with sufficient capacity.</td>
</tr>
<tr>
<td>Boiler Plant Make-Up Water</td>
<td>$12,144</td>
</tr>
<tr>
<td>Savings</td>
<td>These savings are associated with the limited condensate return from the campus steam distribution system. The steam decentralization project will eliminate the lost steam and required make-up water. ESCO will review boiler plant make-up water logs after the project to evaluate the continued savings capacity.</td>
</tr>
<tr>
<td>Steam Boiler Chemical Savings</td>
<td>$18,000</td>
</tr>
<tr>
<td>Savings</td>
<td>These savings are for the reduction in boiler plant chemical treatment costs. ESCO will review maintenance records to evaluate savings capacity.</td>
</tr>
<tr>
<td>Steam System Maintenance</td>
<td>$54,000</td>
</tr>
<tr>
<td>Savings</td>
<td>These savings are for the reduction in boiler plant and steam distribution system repair costs. ESCO will review maintenance records to evaluate savings capacity.</td>
</tr>
</tbody>
</table>
N. SAMPLE CONTRACT
This is an Energy Services Contract ("Contract") by and between Schneider Electric Buildings Americas, Inc. ("ESCO"), and XXX ("Customer"). ESCO hereby agrees to provide and perform the energy conservation measures set forth in the attached schedules which are listed below and incorporated herein for all purposes as if fully copied and set forth at length, subject to the terms and conditions set forth herein:

Schedule A, Scope of Work
Schedule B, Performance Assurance Support Services Contract
Schedule C, Performance Guarantee
Schedule D, Methodology and Baseline
Schedule E, Payment Schedule
Schedule F, Project Specific Customer Responsibilities
Schedule G, Dispute Resolution
Schedule H, Utility Assessment Report

DEFINITIONS

2. "Date of Commencement" is the latest signature date of a party hereto as set forth below.
3. The "Contract Documents" consist of this Contract, the Schedules identified above, and any fully executed modification issued after execution of this Contract. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by ESCO. The Contract Documents are complementary, and ESCO’S performance shall be required only to the extent consistent with the Contract Documents.
4. "Work" means the services required by the Contract Documents, whether completed or partially completed and, includes all labor, materials, equipment and services provided or to be provided by ESCO to fulfill ESCO’S obligations. The Work may constitute the whole or a part of the Project.
5. "Substantial Completion" refers to and shall mean the date the conservation measures are sufficiently implemented in accordance with the Contract Documents that Customer may utilize the Project for the use for which it is intended, and is fully complete except for minor items, adjustments and/or corrections.
6. "Day" as used herein shall mean calendar day unless otherwise specifically designated.
7. "Change Order" is defined as a written change in the Project executed by both parties.
8. "Implementation Contract" means those portions of this Contract that refer to the installation of the Energy Efficiency Improvements that make up the Project.
9. "Performance Assurance Support Services Contract" or "PASS Contract" as defined in schedule B are services provided after Substantial Completion has been reached and the Savings Guarantee Commencement Date has occurred.
10. M&V means Measurement and Verification defined as: the process of using measurement to reliably determine actual savings created within an individual facility by an energy management, energy conservation or energy efficiency project or program. As savings cannot be directly measured, the savings can be determined by comparing measured use before and after implementation of a project, making appropriate adjustments for changes in conditions.
TERMS AND CONDITIONS

ARTICLE 1 – DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

1.1 ESCO shall achieve Substantial Completion of the entire Work not later than 365 days from Date of Commencement, subject to adjustments of this Contract Time as provided in the Contract Documents.

ARTICLE 2 – CONTRACT SUM AND PAYMENTS

2.1 IMPLEMENTATION CONTRACT PAYMENTS - The total of all Implementation Contract Payments shall be $XXX. This is a fixed price Contract. The Implementation Contract Payments cover the total cost of installation including but not limited to: engineering, design, cost of material, Subcontractor costs, labor, contract administration, project management and all other costs incurred by ESCO to complete the scope of work included in Schedule A. These payments shall be made as scheduled in Schedule E: Payment Schedule. If any payment is over thirty (30) days late, the Customer shall pay to ESCO late fees in accordance with the then current Texas statute regarding prompt payment and ESCO reserves the right to terminate this Contract due to non-payment upon thirty days prior written notice (see article 13.5).

2.2 PERFORMANCE ASSURANCE SUPPORT SERVICES PAYMENTS - Customer shall pay annual payments for the PASS Contract as listed below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year One</td>
<td>$Included in the price of the contract</td>
</tr>
<tr>
<td>Year Two</td>
<td>$XXX</td>
</tr>
<tr>
<td>Year Three</td>
<td>$XXX</td>
</tr>
<tr>
<td>Year Four</td>
<td>Year three price modified by the change in CPI since the beginning of the year three agreement.</td>
</tr>
<tr>
<td>Year Five to Fifteen</td>
<td>Prior year modified by the last 12 months change in CPI.</td>
</tr>
</tbody>
</table>

The first year PASS Contract begins on the Savings Guarantee Commencement Date defined in Schedule C and it continues for fifteen years thereafter unless terminated early in accordance with the terms set forth herein. Payment for each year's PASS Contract as outlined above is due within 30 days of the start of that year's PASS Contract. If the PASS Contract is canceled due to non-payment, ESCO reserves the right to cancel the Savings Guarantee provided herein.

ARTICLE 3 – CUSTOMER

3.1 Except for permits and fees, which are the responsibility of ESCO under the Contract Documents, Customer shall secure and pay for necessary approvals, easements, assessments and charges required for the use or occupancy of permanent structures or permanent changes in existing facilities.

3.2 If ESCO fails to correct Work which is not in accordance with the requirements of the Contract Documents or persistently fails to carry out the Work in accordance with the Contract Documents, Customer, upon seven days prior written notice to ESCO, may order ESCO to stop the Work, or any portion thereof, until the cause for such order has been eliminated. However, the right of Customer to stop the Work shall not give rise to a duty on the part of Customer to exercise this right for the benefit of ESCO or any other person or entity.

3.3 The Customer agrees to repair or replace as necessary any defective existing equipment that causes equipment installed by ESCO to not perform in its intended manner.
3.4 Pertinent information under Customer's control shall be furnished by Customer with reasonable promptness.

3.5 The foregoing are in addition to other duties and responsibilities of Customer enumerated herein.

ARTICLE 4 – ESCO

4.1 ESCO shall supervise and direct the Work, using ESCO’S skill and attention and in accordance with the standards of the industry. All work will comply with all local, university, Texas State University System, state and federal codes and regulations. ESCO shall be solely responsible for and have control over means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.

4.2 Unless otherwise provided in the Contract Documents, ESCO shall provide and pay for labor, materials, tools, equipment and machinery necessary for the proper execution and completion of the Work.

4.3 ESCO shall enforce strict discipline and good order among ESCO’S employees and other persons carrying out the Contract.

4.4 ESCO warrants to Customer that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required by the Contract Documents, that the Work will be free from defects, and that the Work will conform with the requirements of the Contract Documents. ESCO’S warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by Customer, ESCO shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

4.5 Unless otherwise provided in the Contract Documents, ESCO shall pay sales, consumer, use, and other similar taxes which are legally enacted when bids are received or negotiations concluded, whether or not effective or merely scheduled to go into effect, and shall secure and pay for the building permit and other permits, licenses and inspections necessary for proper execution and completion of the Work.

4.6 ESCO shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work.

4.7 ESCO shall keep the premises and surrounding areas free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, ESCO shall remove from and about Project waste materials, rubbish, ESCO’S tools, equipment, machinery and surplus material.

4.8 ESCO shall provide Customer access to the Work in preparation and progress wherever located.

4.9 ESCO shall pay all royalties and license fees; shall defend suits or claims for infringement or patent rights and shall hold Customer harmless from loss on account thereof.

4.10 To the fullest extent permitted by law, ESCO shall indemnify and hold harmless Customer, and agents and employees thereof and Customer’s Board of Regents from and against claims, damages, losses and expenses, including, but not limited to, attorney's fees, arising out of or resulting from performance of the Work provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused in whole or in part by negligent, grossly negligent or bad faith acts or
omissions of ESCO, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable. In no event shall ESCO be liable for any incidental, indirect, special, or consequential damages of any kind related to this Contract.

4.11 In claims against any person or entity indemnified under Paragraph 4.10 by an employee of ESCO, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph 4.10 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for ESCO or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts. Nothing herein shall obligate Customer to pay such claims or damages.

4.12 Pertinent information under ESCO's care and control shall be furnished to Customer by ESCO with reasonable promptness upon request.

4.13 In the event that ESCO makes any modification or adjustment to any terms or conditions set forth in this Contract or the Schedules attached hereto, ESCO shall only make such modification or adjustment to the extent explicitly permitted under this Contract and shall provide written notice to Customer prior to the modification or adjustment taking effect.

4.14 ESCO will provide a copy of the certification by the design architect or engineer that will be submitted to SECO (prior to construction) that verifies to the agency or institution that the construction or renovation will comply with the standards that are established under provisions of 34 TAC § 19.34.

ARTICLE 5 – DISPUTE RESOLUTION, RIGHTS, AND REMEDIES

5.1 In the event of any controversy or claim arising out of or relating to this Contract, or the breach thereof, the parties agree to follow the procedures set forth in Chapter 2260, Texas Government Code, and as set forth in Schedule G attached hereto, in an attempt to resolve the dispute.

5.2 Nothing in this Contract shall be construed to limit the constitutional, statutory, or common law rights, immunities, defenses or privileges of the parties hereto.

ARTICLE 6 – SUBCONTRACTS

6.1 A Subcontractor is a person or entity who has a direct contract with ESCO to perform a portion of the Work at the site.

6.2 Unless otherwise stated in the Contract Documents or the bidding requirements, ESCO if requested in writing by Customer, shall furnish in writing to Customer the names of the Subcontractors to whom ESCO plans to award work. Contracts between ESCO and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to ESCO by the terms of the Contract Documents, and to assume toward all the obligations and responsibilities which ESCO, by the Contract Documents, assumes toward Customer, and (2) allow to the Subcontractor the benefit of all rights, remedies and redress afforded to ESCO by these Contract Documents.

6.3 ESCO shall make a good faith effort to utilize HUB Subcontractors in the performance of the Work. ESCO agrees to provide Customer with quarterly reports of HUB usage.

ARTICLE 7 – CHANGES IN THE WORK

7.1 The Customer, with ESCO’S consent, may order changes in Work consisting of additions, deletions or modifications, the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by
Customer and ESCO.

7.2 The Contract Sum and Contract Time shall be changed only by Change Order.

7.3 The cost or credit to Customer from a change in the Work shall be determined by mutual agreement and, in the absence of such agreement, shall be decided by the dispute resolution process provided in Article 5.

ARTICLE 8 – TIME

8.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Contract, ESCO confirms that the Contract Time is a reasonable period for performing the Work.

8.2 The date of Substantial Completion is the date certified by ESCO in accordance with Section 9.3.

8.3 If ESCO is delayed at any time in progress of the Work by changes ordered in the Work, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties or any other causes which are beyond the control of ESCO, then the Contract time shall be extended by Change Order.

ARTICLE 9 – PAYMENTS AND COMPLETION

9.1 Payments shall be made as provided in Article 2 of this Contract.

9.2 Payments may be withheld on account of (1) defective Work not remedied, (2) claims filed by third parties, (3) failure of ESCO to make payments properly to the Subcontractors or for labor, materials or equipment, (4) persistent failure to carry out the Work in accordance with the Contract Documents.

9.3 Upon substantial completion, ESCO will issue a Certificate of Substantial Completion. ESCO shall perform this Project in phases due to the length of the installation period. As each phase is complete a Certificate of Substantial Completion will be issued for that phase and the Customer shall receive beneficial use. The warranty period of each phase will begin upon issuance of the Certificate of Substantial Completion for that phase.

9.4 Final payment shall not become due until ESCO has delivered to Customer a complete release of all liens arising out of this Contract covering all labor, materials, and equipment for which a lien could be filed, or a bond satisfactory to Customer to indemnify Customer against such lien.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

10.1 ESCO shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of this Contract. ESCO shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to (1) Employees on the Work and other persons who may be affected thereby; (2) The Work and materials and equipment to be incorporated therein; and (3) Other property at the site or adjacent thereto.

ESCO shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss. ESCO shall promptly remedy damage, injury or loss at the site caused in whole or in part by ESCO, a Subcontractor, a Sub-subcontractor, or anyone directly or
indirectly employed by any of them, or by anyone for whose acts they may be liable and for which
ESCO is responsible under Sections 10.1 and 10.2 set forth herein, except for damage or loss
attributable to acts or omissions of Customer or by anyone for whose acts either of them may be
liable, and not attributable to the fault or negligence of ESCO. The foregoing obligations of ESCO
are in addition to ESCO’S obligations under Paragraph 4.10.

10.2 The scope of work or service to be performed by ESCO pursuant to this Contract, and
the compensation to be paid to ESCO hereunder for work or services performed, expressly
exclude any work or service of any nature associated or connected with the identification,
abatement, cleanup, control or removal of environmentally hazardous materials. "Hazardous
Materials" to include, but not be limited to, asbestos and PCBs discovered in or on the premises.
Customer agrees that all duties and obligations in connection with any hazardous materials
located in or on the premises are strictly Customer's. Customer represents to the best of
Customer's knowledge there are no hazardous materials in or on the premises which will affect,
be affected by, come in contact with, or otherwise impact upon or interfere with the work to be
performed by ESCO pursuant to this Contract.

Should ESCO become aware or suspect the presence of hazardous materials during
performance of its work under this Contract, ESCO will be authorized to cease work in the
affected area immediately, and will promptly notify Customer of the conditions discovered.
Should ESCO stop work because of the discovery or suspicion of hazardous materials, the time
for performance of ESCO'S work or service will be extended to cover the period required for
abatement, cleanup, or removal of the hazardous materials. ESCO will not be held responsible
for any claims, damages, costs, or expenses of any kind associated with the period during which
ESCO has stopped work as a result of hazardous materials. If appropriate, ESCO will be entitled
to an equitable adjustment of the Contract price for any related, reasonable, and necessary costs
or other charges incurred by ESCO in connection with the existence of its rights under this
Section.

Customer will be responsible for taking all necessary steps to correct, abate, clean up, or control
hazardous materials in accordance with all applicable statutes and regulations. Customer
specifically agrees, to the extent allowed by state and federal law, to indemnify and to hold
ESCO, its officers, agents and employees harmless from and against any and all claims,
demands, damages, or causes of action in any way arising out of the release of hazardous
materials into the air, soil, or any water system or water course, or any actions taken in
connection with same, or any failure to act.

ARTICLE 11 – INSURANCE

11.1 ESCO shall purchase from and maintain, in a company or companies lawfully authorized
to do business in the jurisdiction in which the Project is located, insurance for protection from
claims under workers’ or workmen's compensation acts and other employee benefit acts which
are applicable, claims for damages because of bodily injury, including death, and from claims for
damages, other than to the Work itself, to property which may arise out of or result from ESCO’S
operation under this Contract, whether such operations be by ESCO or by a Subcontractor or
anyone directly or indirectly employed by any of them. This insurance shall be primary and
written for not less than limits of liability specified in the Contract Documents or required by law,
whichever coverage is greater, and shall include contractual liability insurance applicable to the
ESCO's obligations under Paragraph 4.10. Certificates of such insurance shall be filed with
Customer prior to commencement of the Work. Customer, its employees and Customer's Board
of Regents, and its employees, shall be named as additional insured parties under the
Commercial General Liability and Automobile Liability insurance policies required under this
Contract, but only with respect to liability arising out of the operations performed by or on behalf
of ESCO on behalf of Customer as required by this written Contract and allowed by law.

11.2 Waivers of Subrogation. ESCO and Customer waive all rights against each other and
any of their subcontractors, sub-subcontractors, agents and employees, each of the other for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to Article 11.1 or other property insurance applicable to the Work. ESCO or Customer, as appropriate, shall require separate contractors, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

ARTICLE 12 – CORRECTION OF WORK

12.1 ESCO shall promptly correct Work rejected by Customer for failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of one year from the date of Substantial Completion of the contract or by terms as an applicable special warranty required by the Contract Documents. The provisions of this Article 12.1 apply to Work done by Subcontractors as well as to Work done by direct employees of ESCO.

12.2 Nothing contained in this Article 12 shall be construed to establish a period of limitation with respect to other obligations, which ESCO might have under the Contract Documents. Establishment of the time period of one year as described in Section 12.1 above relates only to the specific obligation of ESCO to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish ESCO’S liability with respect to ESCO’S obligations other than specifically to correct the Work.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

13.1 This Contract shall be governed by the laws of the state Texas irrespective of its conflict of laws provisions. Venue shall lie in Texas.

13.2 As between Customer and ESCO, any applicable statute of limitation shall commence to run and any alleged cause of action shall be deemed to have accrued (1) Not later than the date of Substantial Completion for acts or failures to act occurring prior to the relevant date of Substantial Completion; (2) Not later than the date of the relevant act or failure to act by ESCO for acts or failures to act occurring after the date of Substantial Completion.

13.3 Should either party to this Contract suffer injury or damage to person or property because of any act or omission of the other party, notification shall be made in writing to such other party within a reasonable time after first observance of such injury or damage.

13.4 Notice, if and when given, shall be given in written and/or electronic form by the designated representatives for both ESCO and Customer listed below. Receipt of notices delivered in electronic form may take the form of read receipts or as an electronic reply of acknowledgement. If receipt of electronic notice is not given by the receiving party within 72 hours, the sending party shall provide written notice to be delivered physically to the representative address provided here.
ARTICLE 14 – TERMINATION OF THIS CONTRACT

14.1 If Customer fails to make payments to ESCO as set forth in Schedule E: Payment Schedule, through no fault of ESCO, ESCO shall use procedures set forth in Article 5 to recover from Customer payment for all Work executed and for proven loss with respect to materials, equipment, tools, and machinery, including reasonable overhead, profit and damages applicable to the Project.

14.2 If ESCO defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of this Contract or is otherwise in breach of Contract, Customer, after seven days' written notice to ESCO and without prejudice to any other remedy Customer may have, may terminate this Contract and make good such deficiencies of ESCO and may deduct the cost thereof from the payment then or thereafter due ESCO.

14.3 Notwithstanding any contrary term or condition set forth herein, Customer shall have the right to terminate the PASS Contract portion of this Contract upon written notice to ESCO, given at least thirty days prior to the annual renewal date of the PASS Contract.

ARTICLE 15 – OTHER CONDITIONS OR PROVISIONS

15.1 If any provision of this Contract shall be held to be invalid, illegal, or unenforceable, the validity, legality and enforceability of the remaining provisions shall not be affected or impaired thereby.

15.2 Customer is responsible for providing all required telephone lines and telephone service required for this project.

15.3 Customer must maintain all parts of the Project Site(s) as set forth in Schedule F: Project Specific Customer Responsibilities. If Customer has no preventative maintenance program in place, Customer must comply with the general maintenance requirements specified by equipment manufacturers and/or the Maintenance Tasking Sheets in Schedule F.
15.4 If Customer has an existing preventative maintenance program currently in force at time of Contract execution, that program must be continued throughout the guarantee term of this Contract. Equipment must be maintained in proper working condition in all cases where the performance of said equipment affects or could affect the guarantee. Should Customer refuse to perform the required maintenance as per Schedule F, ESCO and Customer shall use the procedures set forth in Article 5 to resolve any disagreement.

**ARTICLE 16 – BONDING**

16.1 Performance Bond - ESCO shall procure, maintain, and furnish Customer a certificate of Performance Bond pursuant to the requirements of the Texas Government Code and this provision for the Project specified herein. The Performance Bond shall be procured prior to the performance of any services under this Contract. Such Performance Bond shall be issued by a surety authorized to transact business in the State of Texas with an A.M. Best rating of at least A-VII; shall be in a form acceptable to Customer and mutually acceptable in form and substance with ESCO’s surety; in the amount of $XXX; payable to Customer; and conditioned on the full and faithful performance of ESCO’s obligations, agreements and covenants hereunder. Such Performance Bond shall be maintained throughout the term of this Contract. ESCO shall provide Customer with documentation of its compliance with this provision.

16.2 Payment Bond - ESCO shall procure, maintain, and furnish Customer a certificate of Payment Bond pursuant to the requirements of the Texas Government Code and this provision for the Project specified herein. The Payment Bond shall be procured prior to the entering into contractual arrangements with or the performance of any services by Subcontractors under this Contract. Such Payment Bond shall be issued by a surety authorized to transact business in the State of Texas with an A.M. Best rating of at least A-VII; shall be in a form acceptable to Customer and mutually acceptable in form and substance with ESCO’s surety; in the amount that is equal to or in excess of any and all amounts which may be due and owed to the Subcontractors; payable to Customer; and conditioned on ESCO performing the services as herein described and ESCO making all payments to its Subcontractors and materialmen for work, labor, materials, machinery, equipment and other debts owed. Such Payment Bond shall be maintained throughout the term of this Contract and until all Subcontractors and materialmen providing services on the Project are paid. ESCO shall provide Customer with documentation of its compliance with this provision.

16.3 Notwithstanding any provision to the contrary contained in the bond or this bonded Contract, the payment and performance bonds provided hereunder guarantee the performance of the Implementation Contract portion of this Contract, and shall not be construed to guarantee the performance of (i) any efficiency or energy savings guarantees, (ii) any support provided under a maintenance service agreement, or (iii) any other guarantees or warranties with terms beyond one (1) year in duration from the completion of the Implementation Contract portion of this Contract.

**ARTICLE 17 – CONFLICT OF INTEREST**

17.1 ESCO certifies there is no conflict of interest between itself and the 3rd party ESPC reviewer.
APPROVAL

“CUSTOMER”

By _____________________________  By _____________________________
(Signature)                       (Signature)

Print Name ___________________________  Print Name ___________________________

Title _____________________________  Title _____________________________

Date _____________________________  Date _____________________________

Schneider Electric Buildings Americas, Inc.
Schedule A: Scope of Work
Schedule B: Performance Assurance Support Services Contract

PERFORMANCE ASSURANCE SUPPORT SERVICES (PASS)

ESCO'S Performance Assurance Support Services (PASS) group will assist Customer and its facility personnel in achieving efficient operation of Customer's facilities for a term up to 15 years from the date of substantial completion. This effort has two primary objectives: achieving the guaranteed savings and assisting Customer in maintaining functionality of the buildings and their systems. Achieving these objectives will require communication as described below between Customer’s staff and their designated representative of the PASS group. These objectives will be achieved via several means:

A Designated PASS Consultant
To provide support and achieve the best possible savings results, ESCO will assign an individual PASS consultant to Customer. The PASS consultant provides Customer with a point of contact for support and guarantee management that is involved in their project before construction is completed. The designated PASS consultant will be familiar with the project scope and M&V plans along with any unique performance goals or benchmarking efforts included in the Project.

Year 1 – 2 PASS Services

Performance Assurance Functions:

- **Monitoring**
  The PASS group will monitor Customer’s facilities, their systems, and their vital signs through a combination of remote and on-site efforts. These efforts will be combined with training Customer’s staff during and at the conclusion of project implementation on efficient facility operation and how to use building systems to gather data on building performance characteristics and benchmarking parameters. These parameters can then be used to help identify potential problems with the mechanical, electrical, air-distribution, and other systems critical to achieving the desired building performance and guaranteed savings as well as work with the facility staff to enhance and implement energy conservation programs.

- **Utility Accounting**
  By tracking the measurements and data defined in Schedule D, PASS will measure the performance of the Project’s conservation measures in accordance with the M&V approach defined in Schedule D.

- **Reporting**
  Customer will receive quarterly performance-tracking reports via ESCO’S eSavings online energy management dashboard. These reports will detail current monthly savings, year to date savings, and guaranteed savings in both dollars and utility units. The reporting will also encompass environmental benefits associated with the Project’s performance.

Support Services Functions:

- **Real-Time Technical Support**
  The PASS group will provide Customer with technical support, troubleshooting assistance, and operational consultation to help ensure proper performance of the Project scope as defined in Schedule A and ensure that savings are achieved. ESCO and Customer agree that achieving the goals and guarantees set forth for this project will require clear, consistent communication by both parties. Customer can maintain communication and access support
from their PASS consultant or other members of the PASS group in multiple ways.

- ESCO’S PASS Line (800-274-5551 + 4 or 972-323-5300) offers support for urgent issues that arise. Live PASS representatives answer this line during business hours (central time). In the event all representatives are busy, Customer may leave a message and expect a response within 1 hour during business hours (central time). After-hours calls will be responded to within 4 hours by an on-call PASS consultant.
- PASS@buildings.schneider-electric.com is a centralized email communication portal to which all PASS consultants have access. This tool is a vehicle to obtain answers to general questions or non-urgent items.
- ESCO’S eSavings energy management dashboard also provides email communication with Customer’s designated PASS consultant.

In a further effort to provide responsiveness and accountability to Customer’s needs, ESCO’S PASS group has developed a Customer Assistance Tracking System to log Customer calls and track the development of solutions to issues with building performance or savings achievement. CATS or another system will be used for these purposes.

- ECM consulting
Should Customer experience further facility improvements, additions, new construction, or other building modification at some point in the term of this Contract, ESCO’S PASS group will be available to provide guidance and recommendations on a wide variety of building attributes from system types to operational strategies and building construction types for an additional fee. Design oversight and consultation are available as well as utility master planning and capital improvement master planning.

- Site Visits
As part of ensuring that Customer’s staff is trained to operate the systems in a manner consistent to achieve the savings guarantee and functionality of buildings and systems, the PASS Consultant will make periodic site visits. Site visits to assist in troubleshooting issues pertinent to warranty or other service will also be conducted as deemed appropriate. ESCO will provide up to four, single day, site visits each year.

- Ongoing training
Savings guarantees are not achievable unless Customer maintains, repairs, and operates the buildings and systems in an efficient and effective manner. Training for Customer’s staff by ESCO’S project installation and PASS personnel will occur during project installation and during the guarantee period as deemed appropriate by ESCO. Training requirements beyond the scope of ESCO’S standard construction and PASS training is available with additional fees to be negotiated between Customer and ESCO.

Year 3 – 15 PASS Services

Performance Assurance Functions:

- Monitoring
The PASS group will monitor Customer’s facilities, their systems, and their vital signs through a combination of remote and on-site efforts. These efforts will be combined with training Customer’s staff during and at the conclusion of project implementation on efficient facility operation and how to use building systems to gather data on building performance characteristics and benchmarking parameters. These parameters can then be used to help identify potential problems with the mechanical, electrical, air-distribution, and other systems critical to achieving the desired building performance and guaranteed savings as well as work with the facility staff to enhance and implement energy conservation programs.

- Utility Accounting
By tracking the measurements and data defined in Schedule D, PASS will measure the performance of the Project’s conservation measures in accordance with the M&V approach defined in Schedule D.

- **Reporting**
  Customer will receive one end of year performance-tracking report via ESCO’S eSavings online energy management dashboard. This report will detail current monthly savings, year to date savings, and guaranteed savings in both dollars and utility units. The reporting will also encompass environmental benefits associated with the Project’s performance.

**Support Services Functions:**

- **Real-Time Technical Support**
  The PASS group will provide Customer with technical support, troubleshooting assistance, and operational consultation to help ensure proper performance of the Project scope as defined in Schedule A and ensure that savings are achieved. ESCO and Customer agree that achieving the goals and guarantees set forth for this project will require clear, consistent communication by both parties. Customer can maintain communication and access support from their PASS consultant or other members of the PASS group in multiple ways.
  
  - ESCO’S PASS Line (800-274-5551 + 4 or 972-323-5300) offers support for urgent issues that arise. Live PASS representatives answer this line during business hours (central time). In the event all representatives are busy, Customer may leave a message and expect a response within 1 hour during business hours (central time). After-hours calls will be responded to within 4 hours by an on-call PASS consultant.
  
  - PASS@buildings.schneider-electric.com is a centralized email communication portal to which all PASS consultants have access. This tool is a vehicle to obtain answers to general questions or non-urgent items.
  
  - ESCO’S eSavings energy management dashboard also provides email communication with Customer’s designated PASS consultant.

In a further effort to provide responsiveness and accountability to Customer’s needs, ESCO’S PASS group has developed a Customer Assistance Tracking System to log Customer calls and track the development of solutions to issues with building performance or savings achievement. CATS or another system will be used for these purposes. Customer will be limited to 20 hours of support each guarantee year.

- **Site Visits**
  As part of ensuring that Customer’s staff is trained to operate the systems in a manner consistent to achieve the savings guarantee and functionality of buildings and systems, the PASS Consultant will make periodic site visits. Site visits to assist in troubleshooting issues pertinent to warranty or other service will also be conducted as deemed appropriate. ESCO will provide one, two day, site visit each year.
Schedule C: Performance guarantee

In accordance with Texas State Energy Conservation Office (SECO) guidelines ESCO guarantees that Customer will save $XXX in Year 1 and $XXX annually in Years 2-15 in Total Dollar Savings, calculated as shown herein during the 15-year guarantee term. As allowed under SECO guidelines the Total Dollar Savings for this project will include: utility savings, operation and maintenance cost savings, and a utility rebate. In the event the annual savings are less than the amount stated above, ESCO will pay Customer the difference between the guaranteed amount and the calculated amount. ESCO will make payments for any savings shortfall to Customer within 30 days of that year’s annual Guaranteed Savings Reconciliation. The procedure used to calculate savings is described in Schedule D Section I - Performance Tracking Methodology.

GUARANTEED SAVINGS RECONCILIATION

The guarantee term (and first year PASS Contract) will commence on the first day of the first billing period following the month in which ESCO delivers to Customer the “Notice of Substantial Completion”. This date is referred to as the Savings Guarantee Commencement Date.

Within sixty (60) days of receiving pertinent utility bills after the Savings Guarantee Commencement Date and each anniversary of the Savings Guarantee Commencement Date, and within sixty (60) days of receiving pertinent utility bills after the end of the guarantee term, ESCO will determine the Total Dollar Savings for the immediately preceding period.

The savings generated during the period from the “Date of Commencement” to the Savings Guarantee Commencement Date will be called “Implementation Period Savings”. Implementation Period Savings will be added to the Savings Calculation made on the first anniversary of the Savings Guarantee Commencement Date for reconciliation purposes.

Customer agrees to: a) provide, or cause its suppliers to provide, periodic utility invoices to ESCO in a timely manner; b) execute all customer responsibilities as scheduled in Schedule D; c) provide to ESCO reasonable access to all Customer facilities and information necessary for ESCO to perform its responsibilities. Access will include, but is not limited to, the following items:

- All buildings served by the scope included in Schedule A or specifically listed in Schedule D.
- All buildings served by the meters listed in Schedule D.
- All mechanical equipment rooms in the above buildings.
- All temperature control and energy management systems which control part or all of any of the above buildings.
- Personnel with responsibility for operating and/or managing any of the above buildings.
- Monthly utility invoices and billing history for all of the meters listed in Schedule D.
- Construction documents, equipment inventories, and other documents that may be helpful in evaluating a cause for adjustment as listed in Schedule D.
Schedule D: Methodology and Baseline

Section I – Performance Tracking Methodology Overview
Savings are computed using the techniques defined in Sections II – V of this schedule. Each section details a specific approach for evaluating the savings performance of a portion of the project. The details of computing savings are specific to each section and should not be interpreted to apply to all sections. Savings to be used for guarantee reconciliation is the sum of the savings defined in Sections II – V of this schedule.

Section II – IPMVP Option C Verified Savings
A. Description
B. Baseline Definition
C. Determination of Adjusted Baseline
D. Determination of Energy Units Saved
E. Determination of Energy Dollars Saved
F. Meter Tuning
G. Meter List
H. Building List
I. Weather Source
J. Energy Rates
K. Causes for Adjustment
L. Calendar and Schedules
M. Standards of Service and Comfort
N. Other Information

A. Description
The method of determining energy savings described in this section uses “Option C – Main Meter Measurement” as described in the International Measurement and Verification Protocol (IPMVP). In brief, the energy savings resulting from this project will be measured as follows:

Energy savings will be measured by comparing the guarantee period’s total energy consumption and demand to the total energy consumption and demand for the same area in the base year period. Base year energy and demand will be adjusted for differences in weather, facility operation and facility modifications to estimate how much energy would have been used in the guarantee period if the energy conservation measures had not been implemented. The energy saved is the difference between the adjusted base year consumption and the guarantee period consumption. The demand saved is the difference between the adjusted base year demand and the guarantee period demand. Energy cost savings is the difference between the cost of the base year
consumption and demand and the guarantee period consumption and demand. This process will be followed for each fuel type involved in the guarantee.

B. Baseline Definition
The base year is the period of time, as agreed to in this document, which establishes the pre-retrofit conditions used as the point of reference for determining guaranteed savings. The guarantee period is any one or more billing periods during the term of the guarantee during which guaranteed savings are measured.

The baseline is that set of parameters that describes both the energy consumed in the base year and the conditions that caused that consumption to occur. This set of parameters includes utility consumption, facility use information, weather data and other information as may be necessary to describe the base year conditions. In addition, the baseline includes certain mathematical values, calculated by a model, that are used to correlate the base year energy consumption with the factors that caused that consumption. The baseline to be used for this project is fully defined in this section’s paragraphs A through N. Customer agrees to accept modifications to this baseline that are necessary to account for changes in the facilities and their use which may have occurred prior to the execution of this agreement but come to the attention of ESCO after the execution of this agreement.

C. Determination of Adjusted Baseline
Base year consumption is adjusted to estimate what the current guarantee period consumption would have been if no energy conservation measures had been implemented. This is accomplished by adjusting for these factors:

- Changes in the number of days between the base year and guarantee year billing periods
- Changes in weather between the base year and guarantee year billing periods
- Changes in facility use between the base year and guarantee year billing periods
- Modifications to the facility between the base year and guarantee year periods

Adjusted base year consumption is calculated as follows for each fuel type:

\[ Q = C_D \times (T_i - T_{i-1}) + C_H \times HDD_i + C_C \times CDD_i + O_i + M_i, \]

where:

- \( Q \) = adjusted base year consumption
- \( C_D \) = a constant representing units of consumption per billing period day as calculated by model
- \( T_i \) = ending date of current billing period
- \( T_{i-1} \) = ending date of previous billing period
- \( C_H \) = a constant representing units of consumption per heating degree day as calculated by model
- \( HDD_i \) = heating degree days in the current billing period
- \( C_C \) = a constant representing units of consumption per cooling degree day as calculated by model

Adjusted Base Year Consumption = Weather Independent Consumption + Weather Dependent Consumption + Offset + Use and Modification Adjustments
CDDi = cooling degree days in the current billing period
Oi = offset for the current billing period
Mi = other adjustments for the current billing period

Adjusted base year demand is calculated with a slightly different formula as follows:

\[ D = D_D \times (T_i - T_{i-1}) + D_H \times \left( \frac{HDD_i}{(T_i - T_{i-1})} \right) + D_C \times \left( \frac{CDD_i}{(T_i - T_{i-1})} \right) + O_i + M_i, \]

or

\[ \text{Adjusted Base Year Demand} = \text{Weather Independent Demand} + \text{Weather Dependent Demand} + \text{Offset} + \text{Use and Modification Adjustments} \]

Where:

- \( D \) = adjusted base year demand
- \( D_D \) = a constant representing units of demand per billing period day as calculated by model
- \( D_H \) = a constant representing units of demand per heating degree day as calculated by model
- \( D_C \) = a constant representing units of demand per cooling degree day as calculated by model

**Weather Independent Consumption**

Because utility meters are not always read on the same day of the month, the number of days in a meter’s billing period frequently varies. The term, \( C_D \times (T_i - T_{i-1}) \), in the above equation is used to account for this difference, where \((T_i - T_{i-1})\), gives the number of days in the guarantee year billing period. Thus, Weather Independent Consumption is the consumption per day times the number of days in the guarantee year billing period. The approach is identical for demand, except that the term \( D_D \) is substituted for \( C_D \).

**Weather Dependent Consumption**

Change in weather between the base year and guarantee year periods is accounted for with the term, \( C_H \times HDD_i + C_C \times CDD_i \). Weather Dependent Consumption is consumption per degree-day times the number of degree-days in the guarantee year billing period. A cooling degree-day is the difference between the average daily temperature and the balance point temperature (AvgTemp – BalanceTemp). A heating degree-day is the difference between the balance point temperature and the average daily temperature (BalanceTemp – AvgTemp). Degree-days are either positive numbers or zero. If the degree-day calculation yields a negative number, the period is considered to have zero degree-days of that type. The balance point temperature is different for each building and for each fuel type. The balance point temperatures used for this project are defined in Paragraph F. The weather station used to determine daily temperatures is specified in Paragraph I.

Demand is treated similarly. The exception being that “degree-days per day” is substituted for total degree-days. This provides a measure of average daily weather intensity.

**Offset**

Offset is that portion of the energy consumption that cannot be accounted for with the Weather Independent and Weather Dependent consumption. It is mostly attributable to
seasonal changes in facility use such as summer shutdown and holidays. An Offset figure is defined for each billing period in the base year. Offset for the base year is defined in Paragraph F. Since the guarantee period may overlap two or more base year billing periods, the guarantee period offset will be the weighted average of the base year offset for the corresponding guarantee year period. Offset for the guarantee period is determined with this equation:

$$O_i = O_1 \times \frac{dG_1}{dB_1} + O_2 \times \frac{dG_2}{dB_2} + \ldots + O_n \times \frac{dG_n}{dB_n}$$

Where:
- $O_i$ = current guarantee period offset
- $O_1$ = base year period 1 offset
- $O_2$ = base year period 2 offset
- $O_n$ = base year period n offset
- $dG_1$ = days in guarantee period that overlap base year period 1
- $dG_2$ = days in guarantee period that overlap base year period 2
- $dG_n$ = days in guarantee period that overlap base year period n
- $dB_1$ = days in base year period 1
- $dB_2$ = days in base year period 2
- $dB_n$ = days in base year period n
- n = number of base year periods overlapped by guarantee year period

Other Adjustments
Additional adjustments to the base year may be made to compensate for modifications and additions to a facility or to compensate for changes in how a facility is used. A list of known Causes for Adjustment is shown in Paragraph K along with means to determine the magnitude of these adjustments.

The total adjustment for any given period will be determined with this equation:

$$M_i = Adj_1 + Adj_2 + \ldots + Adj_n$$

Where $Adj_1$, $Adj_2$, and $Adj_n$ are all of the adjustments determined to be necessary for the guarantee period. The sign of the adjustment will be positive when the change will cause an increase in energy and the sign of the adjustment will be negative when the change will cause a decrease in energy. Upon request, ESCO will provide an explanation of the derivation of these adjustments to Customer.

If additional changes occur, other than those listed in Paragraph K, ESCO will document to Customer how adjustments will be determined for said changes. Any such adjustment will be added to the term $M_i$ in the equation above.

D. Determination of Energy Units Saved
Energy and demand units saved will be determined by the following equation:

$$E = E_B - E_G$$

Where:
- $E$ = Energy (or demand) Units Saved
- $E_B$ = Adjusted Base Year Consumption
- $E_G$ = Guarantee Period Consumption
E. Determination of Energy Dollars Saved

For the purposes of this Measurement and Verification approach, energy dollars saved will be determined as follows:

\[ \$ = (\$B - \$G) \]

Where:

- \$ = Energy Dollars Saved
- \$B = Cost of Adjusted Base Year Energy, for All Fuel Types
- \$G = Cost of Guarantee Period Energy, for All Fuel Types

The cost of energy in any period will be determined by applying the energy rates, as defined in Paragraph J, or the actual energy rates during the period, at the discretion of ESCO, to the energy used in a given period for each fuel type.

F. Meter Tuning

The purpose of meter tuning is to establish a relationship between the weather and the consumption and demand measured by a particular meter. Tuning consists of identifying relationships between "historic" utility performance and weather (heating degree days and/or cooling degree days). The end result is a set of coefficients, which will be used in modeling the energy use of a facility to calculate the energy savings or penalty associated with weather adjusting the baseline energy usage.

During the project installation, the PASS department will select the twelve (12) month baseline period (12 months prior to the beginning of installation typically) for each guarantee meter and determine the meter tuning coefficients. These coefficients will be submitted to Customer for review prior to the start of the guarantee period.

The meter tuning effects will be calculated using a software package which has been accepted as meeting the requirements of the (IPMVP) International Performance Measurement and Verification Protocol.

G. Meter List

The following meters will be used to measure actual energy consumption for both the base year and guarantee periods.

### Electric Meters

<table>
<thead>
<tr>
<th>Meter Name</th>
<th>Account Number</th>
<th>Utility Co.</th>
<th>Rate</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

### Gas Meters

<table>
<thead>
<tr>
<th>Meter Name</th>
<th>Account Number</th>
<th>Utility Co.</th>
<th>Rate</th>
<th>Units</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>
H. Building List
The following table lists the buildings that were served by guarantee meters during the base year period.

<table>
<thead>
<tr>
<th>Bldg No.</th>
<th>Building Name</th>
<th>Area (ft²)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

I. Weather Source

Weather Data Source
Data for weather compensation adjustments will be Daily High-Low Temperatures obtained from the National Weather Service Station at WEATHER STATION NAME. In the event the specified weather station is de-activated, weather data will be collected from the nearest weather station with suitable observations. If the data source becomes unavailable or a superior source is identified, ESCO may select an alternative data source with Customer’s approval.

J. Energy Rates

Electricity

<table>
<thead>
<tr>
<th>Name of Utility:</th>
<th>Rate Schedule:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Charge</td>
</tr>
<tr>
<td>Customer Charge:</td>
<td>Per Billing Period</td>
</tr>
<tr>
<td>Demand Charges:</td>
<td>Per Billed kW</td>
</tr>
<tr>
<td>Consumption Charges:</td>
<td>Per kWh</td>
</tr>
<tr>
<td>Other Charges:</td>
<td>Per kWh</td>
</tr>
</tbody>
</table>
**Natural Gas**

<table>
<thead>
<tr>
<th>Name of Utility:</th>
<th>Rate Schedule:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Charge</strong></th>
<th><strong>Unit</strong></th>
<th><strong>Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Charge:</strong></td>
<td>Per Billing Period</td>
<td></td>
</tr>
<tr>
<td><strong>Consumption Charges:</strong></td>
<td>Per MCF</td>
<td></td>
</tr>
<tr>
<td><strong>Other Charges:</strong></td>
<td>Per MCF</td>
<td></td>
</tr>
</tbody>
</table>

**K. Causes for Adjustment**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition of New Building, or Renovation/Addition to Existing Building w/ Independent Utility Metering and HVAC Service</td>
<td>1. None required. Building is independently metered. No effect on savings tracking of other buildings.</td>
<td>1. N/A</td>
</tr>
<tr>
<td>Addition of New Building or New Energy User on Existing Utility or HVAC Service **</td>
<td>1. Customer will notify ESCO when additions are planned. 2. ESCO will review the addition plans and determine if the addition is likely to increase energy use above the threshold limits. * 3. If the addition is expected to exceed any of the threshold limits then all incoming utilities (consumption and demand) and HVAC service will be sub-metered. 4. If the addition is below all of the threshold limits, the addition’s energy consumption will be estimated from computerized building simulation, manual calculations or as a ratio of the main building’s energy consumption, obtained either from sub-meter data and/or energy simulations.</td>
<td>1. Customer 2. ESCO 3. Customer 4. ESCO</td>
</tr>
<tr>
<td>Addition to Existing Building on Existing Utility or HVAC</td>
<td>1. Customer will notify ESCO when additions are planned. 2. ESCO will review the addition plans and</td>
<td>1. Customer 2. ESCO 3. Customer</td>
</tr>
</tbody>
</table>
| Service ** | 1. determine if the addition is likely to increase energy use above the threshold limits. *  
2. If the addition is expected to exceed any of the threshold limits, sub-meter the addition, just as for a new building.  
3. If the addition is below all of the threshold limits, the addition’s energy consumption will be estimated from computerized building simulations, manual calculations or as a ratio of the main building’s energy consumption, obtained either from sub-meter data and/or energy simulations.  
4. ESCO |
| --- | --- |
| Renovation / Modification of an Existing Building on Existing Utility or HVAC Service ** | 1. Customer will notify ESCO when building renovations are planned.  
2. ESCO will review the renovation plans and determine if the renovations are likely to cause a change in energy use that would exceed the threshold limits. *  
3. If the renovations are expected to raise or lower energy consumption more than the threshold limits, the renovation will be sub-metered for both pre and post renovation periods until the effect on energy has been determined.  
4. If the expected changes are less than the threshold limits, the effect on energy may be estimated, or, at ESCO’S option, ignored.  
1. Customer  
2. ESCO  
3. Customer  
4. ESCO |
| Demolition / Abandonment of an Existing Building on Existing Utility or HVAC Service ** | 1. Customer will notify ESCO when a demolition or abandonment is planned.  
2. ESCO will determine if the demolition/abandonment is likely to decrease energy use more than the threshold limits. *  
3. If the expected decrease is more then the threshold limits, the building will be sub-metered for both pre and post demolition periods until the effect on energy has been determined.  
4. If the expected changes are less than the threshold limits, the effect on energy may be estimated, or, at Customer’s option, ignored.  
1. Customer  
2. ESCO  
3. Customer  
4. ESCO |
| Change in Occupancy, Occupancy Hours, Calendar or Set-points Reference Schedule D Section II-G and Section II-H for baseline conditions. | 1. Customer will maintain records of occupancy levels, operating hours and operating calendar and apprise ESCO of the latest figures at least annually.  
2. If at any point during the guarantee term any of these values change more than 5% of its baseline value, ESCO may estimate the impact of this change and adjust the baseline accordingly.  
1. Customer  
2. ESCO |
| Re-commissioning of Out-of-Service Buildings ** | 1. When a building is scheduled to be re-commissioned, sub-metering equipment will be installed to measure; a) the building's energy use in its out-of-service condition, and b) the building’s energy use after re-commissioning.  
2. ESCO will use the metered values to adjust the base year for the increased energy consumption.  
1. Customer  
2. ESCO |
| Customer Initiated ECM’s | 1. If a Customer initiated ECM is estimated to save less than 5% of this contract’s annual guaranteed energy savings, no adjustment will be made to the 1. N/A  
2. Customer  
3. N/A |
savings measured under this contract.

2. To measure savings from a Customer initiated ECM, Customer will develop a separate M&V plan to track the ECM’s savings. Pending agreement from ESCO, the resulting savings from Customer initiated ECM will be subtracted from this contract’s savings.

3. In no event will the original M&V plan’s current year measured savings be reduced below the immediately preceding year’s savings due to a Customer initiated ECM.

### Missing bills

1. Customer agrees to send complete and accurate copies of utility invoices for meters ** included in this contract to ESCO within 10 days of receipt of such invoices or authorize ESCO to access the utility information directly from the utility provider to ensure prompt measurement of project savings.

2. If utility invoices are not received by ESCO within 60 days of the end of the service period, ESCO will estimate the savings based on guaranteed savings or previously achieved savings at the discretion of ESCO prorated for the utility billing period to which the bill relates and for subsequent billing periods that are affected by an increase in energy and/or demand that could have been avoided or detected earlier had ESCO been provided with the utility data in accordance with these Customer responsibilities in item #1.

3. In the event ESCO receives the utility bill and/or utility data subsequent to the above action, ESCO will incorporate the utility data into the savings analysis. If such data produces savings results greater than savings calculated as set forth in item #2, the greater amount will be used in determining achieved savings.

### Other Causes

Other causes for adjustment may occur due to changes in certain baseline conditions. These causes include, but are not limited to, those described in Schedule D Section II-I.

1. ESCO

* Threshold Limits:

<table>
<thead>
<tr>
<th>Category</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>1% of base year area as shown in Schedule D Section II-C</td>
</tr>
<tr>
<td>Electricity</td>
<td>1% of highest annual peak demand resulting from the Meter Tuning Contract discussed in Schedule D Section II-A</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1% of installed base year gas-heating capacity</td>
</tr>
<tr>
<td>Other Fuel</td>
<td>1% of installed base year maximum capacity</td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>1% of installed base year air-conditioning capacity</td>
</tr>
</tbody>
</table>

* Reference Schedule D Section II-B and Section II-C for the associated meters and facilities included in the baseline.
L. Calendar and Schedules

**Calendar**

<table>
<thead>
<tr>
<th>Date(s)</th>
<th>Event</th>
<th>Date(s)</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Schedules**

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Schedule Type</th>
<th>Daily Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekday</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weekday</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weekend</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Holiday</td>
<td>Off</td>
</tr>
</tbody>
</table>

**Start Times**  1 hour prior to scheduled event for area in question

**Stop Times**  After scheduled event for area in question

**Special Requirements**  As demanded for given area in question, adjustment required, unless demanded in base year.

**Occupancy**

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Occupancy Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekdays</td>
<td></td>
</tr>
<tr>
<td>Weekends</td>
<td>No normal occupied hours</td>
</tr>
<tr>
<td>Holidays</td>
<td>No normal occupied hours</td>
</tr>
</tbody>
</table>
M. Standards of Service and Comfort

Customer agrees to operate the conditioned spaces in the facilities listed in Schedule D Section II-C within the temperature ranges scheduled in the Temperature Control Table below. ESCO reserves the right to adjust the baseline for operating conditions outside the range specified in this table.

In the event that an adjustment to the baseline is made, ESCO shall submit the baseline adjustments to Customer and describe the reasons for the adjustment.

<table>
<thead>
<tr>
<th>Temperature Control Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating Set-point Range</td>
</tr>
<tr>
<td>Occupied</td>
</tr>
<tr>
<td>Unoccupied</td>
</tr>
</tbody>
</table>

N. Other Information

Other Key Baseline Conditions

Following are key baseline conditions and calculation assumptions. Significant deviation from any or all of these conditions constitutes a cause for adjustment. In the event a cause for adjustment occurs, ESCO will use an appropriate means to estimate the effect of the change and add or subtract the adjustment for the current billing period. All calculations will be made available to Customer upon request.

- The guaranteed savings assume that no significant increase or decrease, in quantity or capacity, will occur in installed equipment and plug loads such as fans, pumps, lighting, copiers, computers, printers, ovens, etc. ESCO reserves the right to adjust for changes in quantity and/or capacity of any of these items. Customer agrees to provide to ESCO access to Customer’s premises and/or records for purposes of determining the occurrence and/or magnitude of any such changes.

SECTION III – SAVINGS

A. Baseline Maintenance\Other Costs
B. Other Energy Savings

A. Baseline Maintenance\Other Costs

<table>
<thead>
<tr>
<th>Facility</th>
<th>Annual Amount</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>
**Explanation:**

**B. Other Energy Savings**

**Stipulated Savings**

<table>
<thead>
<tr>
<th>Facility</th>
<th>Annual Amount</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Other Measured Energy Savings**

Other Measured Energy Savings will be determined as follows:

\[
\begin{align*}
$O &= EO \times \$/\text{Unit} \\
EO &= E_{MB} - E_{MG}
\end{align*}
\]

Where:

- $O = $Other Measured Energy Savings
- $/\text{Unit} = \text{Cost of Energy per Unit Measured}
- $EO = $Other Measured Energy Units Saved
- $E_{MB} = \text{Measured Base Year Consumption}
- $E_{MG} = \text{Measured Guarantee Year Consumption}

The total Other Measured Energy Savings for any guarantee period will be the sum of the Other Measured Energy Savings for all sites and fuel types.

**Explanation of Methodology**

ECM/Site Name: ____________________________
IPMVP Method: ____________________________
Option A ______________ Option B ______________
Brief Description of Rationale: ____________________________

Pre-retrofit Values

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Source</th>
<th>Frequency of Measurement</th>
<th>Measurement Method</th>
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Post-retrofit Values

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Schedule E: Payment Schedule

The payment schedule is as follows:

ESCO may submit Payment Request Forms and payments shall be made to ESCO on a monthly basis during construction. Customer shall promptly forward payment to ESCO in an amount equal to the value of services rendered less a 5% retainage since the last interim payment as shown on the Schedule of Values provided prior to the start of construction and consistent with the Summary Table of Utility Cost Reduction Measures provided in the Utility Audit Report. Retainage to be paid upon substantial completion of each applicable scope (discipline) of work as accepted by the Customer.

Payment Terms: Customer shall be billed in accordance with Chapter 2251 of the Texas Government code and payment shall be made no later than thirty days following the later of (i) delivery of goods or completion of the services and (ii) delivery of an invoice to customer. Interest, if any, on past due payments shall accrue and be paid in accordance with Chapter 2251 of the Texas Government Code. Payee must be in good standing, not indebted to the State of Texas, and current on all taxes owed to the State of Texas for payment to occur.
   a. Payment on any contract will be withheld from ESCO if ESCO is determined to be more than 30 days delinquent for Child Support.
   b. ESCO will be responsible for referencing the purchase order number(s) on any invoice(s), packing list(s), correspondence, etc. Invoicing must coincide to prices quoted on a unit, hourly, etc. basis.
Schedule F: Project Specific Customer Responsibilities

Customer agrees to maintain the Energy Conservation Measures in original condition with allowance for normal wear and tear. If an Energy Conservation Measure becomes non-operational, Customer agrees to repair the measure promptly. If Customer chooses not to repair the failed measure, ESCO reserves the right to adjust the amount of guaranteed savings associated with that measure in the yearly savings guarantee.

GENERAL INFORMATION FOR CUSTOMER

Telephone/Network Communications:
Customer will be responsible for providing communications lines to all campus buildings.

Installation Material Storage:
ESCO will be responsible for providing off-site storage for installation materials at each work site.

MAINTENANCE TASKING FOR MECHANICAL EQUIPMENT

As part of this Contract, Customer and ESCO concur that proper maintenance is an essential part of a complete energy conservation program. Therefore; Customer agrees to maintain all new and existing mechanical equipment involved with the Performance Contract to ensure maximum operating efficiencies. Manufacturers recommended preventative maintenance procedures should be followed to improve equipment performance and extend equipment life.

As the energy savings guarantee agreement progresses with time, Customer will be responsible to provide to ESCO annual documentation that proper maintenance of equipment has been performed. This condition will be in effect throughout the duration of this Contract. In the event ESCO finds that the mechanical systems are not being maintained, ESCO retains the right to reasonably adjust the performance assurance report to recapture any lost energy savings from a lack of mechanical maintenance.

For the duration of this Contract, Customer will replace pneumatic control air compressors as they reach the end of their useful life to help ensure that clean, oil free air is delivered to the various pneumatic control air systems on their campuses.

MAINTENANCE TASKING FOR ENERGY MANAGEMENT SYSTEM AND AUTOMATIC TEMPERATURE CONTROL SYSTEM

Customer will perform all general maintenance of the energy management system and automatic temperature control systems to ensure proper performance and energy savings at each facility of Customer, for the full term of the performance guarantee. Standard preventative maintenance procedures and repairs should be followed.

Customer will perform daily facilities monitoring and review alarm summaries.

Following project completion, Customer will be responsible to provide to ESCO evidence that proper maintenance of equipment has been performed. This documentation will be provided annually to ESCO for the duration of this Contract.

ESCO will make periodic spot checks, during the term of this Contract, to ensure that the energy management system and automatic temperature control systems have been maintained and are fully functional. In the event ESCO finds that the systems have been modified or non-functional, ESCO retains the right to adjust the performance assurance report to recapture any lost energy savings from the changes, and to continue making these adjustments until the changes are corrected.
Schedule G: Alternative Dispute Resolution

(1) The dispute resolution process provided for in Chapter 2260 of the Government Code shall be used, as further described herein, by the Customer and ESCO to attempt to resolve any claim for breach of Contract made by the ESCO:
   
   (A) ESCO’s claims for breach of this Contract that the parties cannot resolve in the ordinary course of business shall be submitted to the negotiation process provided in Chapter 2260 subchapter B, of the Government Code. To initiate the process, ESCO shall submit written notice, as required by subchapter B, to Customer’s Executive Vice President for Finance and Administration. Said notice shall specifically state that the provisions of Chapter 2260, subchapter B, are being invoked. A copy of the notice shall also be given to all other representatives of Customer and ESCO otherwise entitled to notice under the parties’ Contract. Compliance by ESCO with subchapter B is a condition precedent to the filing of a contested case proceeding under Chapter 2260, subchapter C, of the Government Code.

   (B) The contested case process provided in Chapter 2260, subchapter C, of the Government Code is ESCO’s sole and exclusive process for seeking a remedy for any and all alleged breaches of Contract by Customer if the parties are unable to resolve their disputes under subparagraph (A) of this paragraph.

   (C) Compliance with the contested case process provided in subchapter C is a condition precedent to seeking consent to sue from the Legislature under Chapter 107 of the Civil Practices and Remedies Code. Neither the execution of this Contract by Customer nor any other conduct of any representative of Customer relating to the contract shall be considered a waiver of sovereign immunity to suit.

(2) Neither the occurrence of an event nor the pendency of a claim constitutes grounds for the suspension of performance by ESCO, in whole or in part.
Schedule H: Utility Assessment Report

This contract has been assembled in support of the Utility Assessment Report prepared for XXX. This report was originally presented to the Customer on XXX with final revisions made until the finalization of the financing terms, and third party engineering review. The completed Utility Assessment Report will be submitted prior to date of commencement.

The proposal included several UCRM’s that may or may not have been included in the final contract. The final scope of work for inclusion is driven by the final financing terms. It was the University’s intent to include as many of these UCRM’s as possible under a self-funding project.