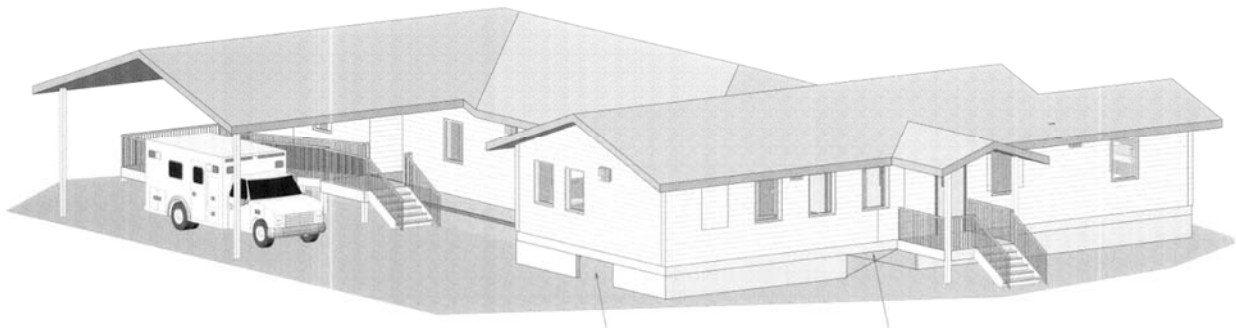




# Investigative Energy Audit For Ouzinkie Medical Clinic



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Prepared For  
**Ouzinkie Tribal Council**

Prepared By  
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**August 1, 2017**

**Prepared By:**

**ANTHC-DEHE  
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## PREFACE

The purpose of this report is to provide guidance in reducing facility operating costs and enhance the sustainability of this community. The report assess the current energy usage of the facility, provide options for reducing the amount of energy used, and evaluate the cost vs. benefit of each option.

Discussions of site specific concerns, financing options, general facility information, and an Energy Efficiency Action Plan are also included in this report.

## ACKNOWLEDGMENTS

The Energy Projects Group gratefully acknowledges the assistance of the Ouzinkie Tribal Council’s Tribal Administrator, Robert Boskofsky, and Clinic Health Aid, Trina Squartsoff.

## OVERVIEW

This report was prepared for the Ouzinkie Tribal Council. The scope of the audit focused on the Community Health Clinic and includes an analysis of building occupancy schedules, building shell, heating systems, heating and ventilations systems, domestic hot water, lighting, and other electrical loads. The Clinic was is approximately 2,315 square feet. The building consists of the original structure built in 2000, and an addition that was added in 2011. Data was based on a site survey and interviews with the building occupants and maintenance staff.

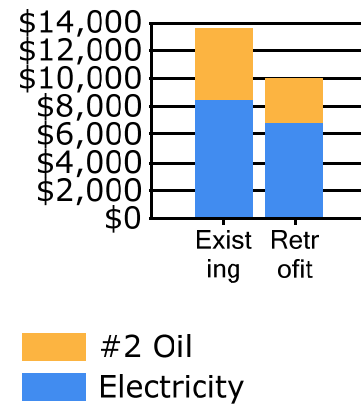
## ENERGY BASELINE

Based on unsubsidized electricity and fuel oil prices in effect at the time of the audit, the total predicted energy costs are \$13,629 per year. This includes \$8,485 for electricity and \$5,144 for #2 fuel oil.

Table 1 lists the predicted annual energy usage before and after the proposed retrofits.

### Annual Energy Costs By Fuel

#### Annual Energy Costs by Fuel



**Table 1: Predicted Annual Energy Use**

Predicted Annual Energy Use				
Fuel Use	Existing Building	With Proposed Retrofits	Total Energy Savings	Total Cost Savings
Electricity	22,072 kWh	17,879 kWh	4,193 kWh	\$ 1,612
#1 Oil	1,199 gallons	717 gallons	482 gallons	\$ 2,068

# PROPOSED ENERGY EFFICIENCY MEASURES (EEM)

Table 2 below summarizes the energy efficiency measures analyzed for the Building. Listed are the estimates of the annual savings, installed costs, and two different financial measures of investment return.

**Table 2: Priority List – Energy Efficiency Measures**

Priority	Feature	Improvement Description	Cost Estimate Basis	Annual Energy Savings	Installed Cost	Savings to Investment Ratio, SIR <sup>1</sup>	Simple Payback (Years) <sup>2</sup>
1	Crawlspace Moisture Control	Install 12mil reinforced vapor barrier in crawlspace and seal to concrete footing and around all exterior penetrations. This will stop moisture from coming into the building from the crawlspace and reduce the amount of time the ventilation fans will be required to run in order to remove the moisture.	180' roll Tape: 2 rolls @ \$35 each Caulk: 12 tubes @ \$8 each 13'x50' Plastic: 3 rolls @ \$200 each 13'x75' Plastic: 2 rolls @ \$300 each Labor: 2 workers, 8hrs/day, 2.5 days @ \$50/hr +50% contingency, logistics, admin, and overhead	\$1,507	\$5,000	8.72	3.3
2	Exterior T8 LED Lighting Retrofit	Replace existing T8 fluorescent light bulbs on exterior the of the clinic with LED bulbs and bypass the existing fluorescent lighting ballasts	2 bulb/fixture @ \$10/bulb 1/2hr per fixture @ \$50/hr Approx. 4 fixtures	\$104	\$180	8.45	1.7
3	Programmable Thermostats	Install programmable thermostat to turn down building temperatures to 60 degrees when unoccupied.	\$200 materials/zone 3 hrs @ \$50/hr /zone 9 zones +50% contingency, logistics, admin, and overhead	\$1,103	\$5,000	2.97	4.5
4	Interior T8 LED Lighting Retrofit	Replace existing T8 fluorescent light bulbs on interior the of the clinic with LED bulbs and bypass the existing fluorescent lighting ballasts	2 bulb/fixture @ \$10/bulb 1/2hr per fixture @ \$50/hr Approx. 45 fixtures	\$600	\$2,000	2.46	3.3
5	Exterior Wall Pack LED Lighting Retrofit	Replace existing High Pressure Sodium (HPS) light bulbs in the exterior wall-pack lights with LED bulbs and bypass the existing HPS lighting ballasts	1 bulb/fixture @ \$60/bulb 1 hr per fixture @ \$50/hr Approx. 12 fixtures	\$275	\$1,400	1.19	5.1
6	Air Tightening	Improve air sealing around exterior doors, install weather sealing on attic access hatches, and seal all gaps in the attic vapor barrier, particularly those above the IT Closet	Misc. Materials: \$300 8hrs @ \$50/hr +50% contingency, logistics, admin, and overhead	\$81	\$1,000	0.75	12.3
<b>TOTAL</b>				<b>\$3,671</b>	<b>\$14,580</b>	<b>4.62</b>	<b>4.0</b>

Highly Recommended
Recommended
Not Cost Effective

*Note 1: The boiler standby losses could be significantly reduced by replacing the existing boiler controller with one that allows for a programmable setback, such as the Taco brand controllers.*

*Note 2: In addition to improving energy efficiency, Air Tightening (Energy Efficiency Measure 6), will help reduce the moisture in the attic space and better preserve the roof structure.*

<sup>1</sup> Savings to Investment Ratio (SIR) is a life-cycle cost measure calculated by dividing the total savings over the life of a project (expressed in today's dollars) by its investment costs. The SIR is an indication of the profitability of a measure; the higher the SIR, the more profitable the project. An SIR greater than 1.0 indicates a cost-effective project (i.e. more savings than cost). Remember that this profitability is based on the position of that Energy Efficiency Measure (EEM) in the overall list and assumes that the measures above it are implemented first.

<sup>2</sup> Simple Payback (SP) is a measure of the length of time required for the savings from an EEM to payback the investment cost, not counting interest on the investment and any future changes in energy prices. It is calculated by dividing the investment cost by the expected first-year savings of the EEM.

## FACILITY DESCRIPTION

### **Building Occupancy Schedules**

The clinic is normally occupied between 8am and 5pm Monday through Friday by 2 to 3 local medical staff and an occasional patient. Visiting medical specialists periodically visit the clinic and add an additional 2 staff to the clinic occupancy for several days at a time. The clinic has an attached studio apartment that serves as housing for visiting medical staff. At the time of the survey, one of the full-time medical staff was living in the studio apartment and occupying it outside of the clinic's normal operating hours.

### **Building Shell**

The exterior walls are 2x6 wood-framed construction with fiberglass batt insulation.

The roof of the building is a structural truss with a cold attic space with approximately 10.5 inches of fiberglass batt insulation.

The crawlspace consists of a 3 foot high concrete stem wall insulated with Expanded Polystyrene (EPS) Insulated Concrete Forms (ICF's).

All windows were double pane windows with slight air leakage. There are approximately 156 square feet of window surface area.

There are 3 entrances into the building. The weather-sealing around the entrances was in fairly good condition, with the exception of the rear door where an exterior carpet prevented proper installation of weather-sealing under the door.

### **Heating Systems**

The heating system used in the building is:

#### **Boiler 1**

Fuel Type:	#2 Oil
Input Rating:	74,000 BTU/hr
Steady State Efficiency:	84 %
Estimated Idle Loss:	1.5 %
Heat Distribution Type:	Water
Boiler Operation:	12 Months/Year

### **Space Heating Distribution Systems**

The building is heated by a baseboard heating system that circulates hot water around the building.

### **Building Ventilation Systems**

The building relies on operable windows and exhaust fans for ventilation.

### **Domestic Hot Water System**

Domestic hot water for the building is provided by a hot water heater with an approximate capacity of 20 gallons. The heater is indirectly heated by the boiler.

### **Lighting**

The interior space is lit with T8 lighting fixtures, and the exterior is lit with a combination of T8 lighting fixtures and exterior wall-pack fixtures. The lights use an estimated 10,000 kWh annually.

### **Other Electrical Loads**

The Pick-Point medication dispenser, refrigerators, IT computer equipment, coffee pot, oven/range, and microwave contribute to the electrical load as well.

### **Major Equipment**

**Table 3: Major Electrical Equipment**

<b>Equipment</b>	<b>Rating (Watts)</b>	<b>Approx. Annual Usage (kWh)</b>
Med Dispenser	~540	~4,700

Personal Computers	~90	~200
IT Equipment	~350	~3,000
Microwave	~1,000	~120
Coffee Maker	~1,000	~550
Clothes Dryer	~3,400	~180
Washing Machine	~400	~22
Oven / Cooking Range	~1,000 per burner	~52

## PROJECT FINANCING

The total estimated cost of the EEM's \$14,580. The payback for the implemented EEM's is approximately 4.0 years. ANTHC is willing to assist the community with acquiring funds to complete the scope of work recommended in this energy audit.

There are several options for financing energy efficiency projects within the State of Alaska. These include the use of grants, loans, and other funding opportunities. Below is some information on potential funding opportunities.

**Energy Efficiency Revolving Loan Program** – This is a loan administered by the Alaska Housing Finance Corporation (AHFC) for use by any applicant who is also the owner of the building where the work will take place. It provides a loan for permanent energy-efficiency projects with a completion window of one year.

**Sustainable Energy Transmission and Supply Program** – This is a loan administered by the Alaska Energy Authority (AEA) for a government, business, or other organized body of people. It provides a loan for energy-efficiency or power transmission or distribution projects.

**USDA-RD Communities Facilities Direct Loan & Grant Program** - This is a loan or grant provided by the US Department of Agriculture – Rural Development (USDA-RD) for any essential community facility in a rural area. It provides a loan or grant to develop essential community facilities with upgrades or equipment for improvement.

## MEASUREMENT AND VERIFICATION

The results of these recommended measures can be measured through the collection of energy use data through the monthly bills provided by the local electric utility and the local fuel oil supplier. Collecting data and performing a historical comparison is the simplest method of validating the energy and cost savings seen by the measures. Additionally, active remote monitoring systems are available that can collect and store data regarding energy and fuel usage. These systems allow the user to track the usage in real time and can be shared more easily with partners across the state.

# APPENDICES

## Appendix A – Scanned Energy Billing Data

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Accrual Basis

### Native Village of Ouzinkie Transaction Detail By Account July 2016 through June 2017

Type	Date	Num	Name	Memo	Class	Clr	Split	Amount	Balance
<b>533.301 - Clinic Vehicle</b>									
Check	07/15/16	22398	Spruce Island Fuel, ...	Inv. # 15454; ...	Clinic		101.999 - Spec...	62.09	62.09
Check	09/14/16	22565	Spruce Island Fuel, ...	Inv. 15515, a...	Clinic		101.999 - Spec...	70.19	132.28
Check	11/03/16	22780	Spruce Island Fuel, ...	inv 15655	Clinic		101.999 - Spec...	40.49	172.77
Check	12/09/16	22862	Spruce Island Fuel, ...	23 Gal Ambul...	Clinic		101.999 - Spec...	62.09	234.86
Check	12/09/16	22862	Spruce Island Fuel, ...	45 Gal Ambul...	Clinic		101.999 - Spec...	117.88	352.74
Credit Card Charge	12/11/16		Amazon.com	inv...1800	Clinic		115.999 - MC ...	87.99	440.73
Check	01/04/17	22943	Quick, Chris	DMV for amb...	Clinic		101.999 - Spec...	10.00	450.73
Check	01/17/17	22978	Spruce Island Fuel, ...	INV # 15758	Clinic		101.999 - Spec...	29.69	480.42
Check	03/08/17	23108	Spruce Island Fuel, ...	INV# 15968	Clinic		101.999 - Spec...	44.09	524.51
Credit Card Charge	03/20/17		Ebay	Clinic Tires	Clinic		115.999 - MC ...	219.80	744.31
Check	04/12/17	23190	Progressive Insurance	Clinic Ambula...	Clinic		101.999 - Spec...	839.00	1,583.31
Check	05/02/17	23248	NAPA	Ambulance B...	Clinic		101.999 - Spec...	290.58	1,873.89
Check	06/08/17	23357	Spruce Island Fuel, ...	INV#16147	Clinic		101.999 - Spec...	64.67	1,938.56
Total 533.301 - Clinic Vehicle								1,938.56	1,938.56
<b>542.301 - CLINIC Supplies</b>									
Check	05/02/17	23252	Island Air	Broomsticks ...	Clinic		101.999 - Spec...	24.00	24.00
Check	05/11/17	23262	Island Air	Freight 3/7/2...	Clinic		101.999 - Spec...	41.12	65.12
Total 542.301 - CLINIC Supplies								65.12	65.12
<b>547.301 - CLINIC Electricity</b>									
Check	07/15/16	22399	City of Ouzinkie	Inv. # 12116; ...	Clinic		101.999 - Spec...	365.11	365.11
Check	08/08/16	22464	City of Ouzinkie	inv. 12224, 93...	Clinic		101.999 - Spec...	363.24	728.35
Check	09/15/16	22571	City of Ouzinkie	inv. 12338 10...	Clinic		101.999 - Spec...	400.64	1,128.99
Bill	09/30/16		City of Ouzinkie	1000 kwh, inv...	Clinic		2699 - A/P	389.80	1,518.79
Check	11/22/16	22822	City of Ouzinkie	inv # 12557	Clinic		101.999 - Spec...	853.34	2,372.13
Check	01/17/17	22974	City of Ouzinkie	INV NO 1267...	Clinic		101.999 - Spec...	48.83	2,420.96
Check	02/14/17	23045	City of Ouzinkie	inv 12911	Clinic		101.999 - Spec...	993.30	3,414.26
Check	03/21/17	23149	City of Ouzinkie	INV#13006, k...	Clinic		101.999 - Spec...	491.38	3,905.64
Check	04/12/17	23187	City of Ouzinkie	INV# 13125	Clinic		101.999 - Spec...	461.45	4,367.09
Check	05/04/17	23254	City of Ouzinkie	INV#13218	Clinic		101.999 - Spec...	519.47	4,886.56
Check	06/08/17	23355	City of Ouzinkie	INV# 13340	Clinic		101.999 - Spec...	483.42	5,369.98
Total 547.301 - CLINIC Electricity								5,369.98	5,369.98

note: 0.36 base  
+0.0353 surcharge  
-0.1358 p/c



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Accrual Basis

**Native Village of Ouzinkie**  
**Transaction Detail By Account**  
 July 2016 through June 2017

Type	Date	Num	Name	Memo	Class	Clr	Split	Amount	Balance
<b>548.301 - CLINIC Fuel</b>									
Check	07/15/16	22398	Spruce Island Fuel, ...	Inv. # 15437; ...	Clinic		101.999 · Spec...	172.26	172.26
Check	09/14/16	22565	Spruce Island Fuel, ...	inv. 15550, cli...	Clinic		101.999 · Spec...	78.59	250.85
Bill	09/30/16		Ouzinkie Native Cor...	inv. 15588, ht...	Clinic		2699 · A/P	390.31	641.16
Bill	09/30/16		Spruce Island Fuel, ...	inv. 15588, cli...	Clinic		2699 · A/P	390.31	1,031.47
General Journal	10/31/16	841AJE	Ouzinkie Native Cor...	remove duplic...	Clinic		2699 · A/P	-390.31	641.16
Check	12/09/16	22862	Spruce Island Fuel, ...	229 Gal	Clinic		101.999 · Spec...	599.89	1,241.05
Check	01/17/17	22978	Spruce Island Fuel, ...	INV # 15811	Clinic		101.999 · Spec...	450.55	1,691.60
Check	02/02/17	23008	Spruce Island Fuel, ...	Jan fuel clinic	Clinic		101.999 · Spec...	477.54	2,169.14
Check	03/08/17	23108	Spruce Island Fuel, ...	INV# 15944	Clinic		101.999 · Spec...	549.02	2,718.16
Check	04/12/17	23186	Spruce Island Fuel, ...	INV# 16023	Clinic		101.999 · Spec...	494.69	3,212.85
Check	05/04/17	23255	Spruce Island Fuel, ...	INV# 16090	Clinic		101.999 · Spec...	826.40	4,039.25
Check	06/08/17	23357	Spruce Island Fuel, ...	INV#16146	Clinic		101.999 · Spec...	294.53	4,333.78
Total 548.301 · CLINIC Fuel								4,333.78	4,333.78
<b>556.301 - Clinic Maintenance</b>									
Check	07/21/16	22409	Spenard Builders Su...	Inv. # 90715124	Clinic		101.999 · Spec...	338.37	338.37
Check	07/21/16	22410	Sutliff True Value H...	Inv. # 426715	Clinic		101.999 · Spec...	194.87	533.24
Check	09/15/16	22570	Servant Air	inv 081516 31	Clinic		101.999 · Spec...	22.00	555.24
Check	09/15/16	22570	Servant Air	inv 081616 06	Clinic		101.999 · Spec...	22.00	577.24
Check	09/15/16	22570	Servant Air	inv 081916 08	Clinic		101.999 · Spec...	22.00	599.24
Check	11/03/16	22779	Spenard Builders Su...	inv. 90724683	Clinic		101.999 · Spec...	1,196.94	1,796.18
Credit Card Charge	11/10/16		Amazon.com	INV****0618	Clinic		115.999 · MC ...	19.58	1,815.76
Credit Card Charge	11/10/16		Amazon.com	INV****0618	Clinic		115.999 · MC ...	14.49	1,830.25
Credit Card Charge	11/10/16		Amazon.com	INV****0618	Clinic		115.999 · MC ...	66.95	1,897.20
Credit Card Charge	11/10/16		Amazon.com	INV****0618	Clinic		115.999 · MC ...	106.35	2,003.55
Check	11/21/16	22818	Scott's Heating & Pl...	inv. # 40756	Clinic		101.999 · Spec...	215.19	2,218.74
Check	11/22/16	22821	Sutliff True Value H...	inv # 440934	Clinic		101.999 · Spec...	19.74	2,238.48
Check	11/22/16	22821	Sutliff True Value H...	inv # 442244	Clinic		101.999 · Spec...	649.87	2,888.35
Check	11/22/16	22821	Sutliff True Value H...	inv # 500103	Clinic		101.999 · Spec...	43.92	2,932.27
Check	11/22/16	22824	Servant Air	inv # 1021615	Clinic		101.999 · Spec...	160.00	3,092.27
Check	01/23/17	22984	Servant Air	inv. 11716 40	Clinic	X	101.999 · Spec...	0.00	3,092.27
Check	01/23/17	22985	Servant Air	inv. 11716 40	Clinic		101.999 · Spec...	75.40	3,167.67
Check	02/02/17	23004	Anderson, Irene R	reim. for painti...	Clinic		101.999 · Spec...	14.36	3,182.03
Check	02/14/17	23044	Island Air	paint from Sut...	Clinic		101.999 · Spec...	33.95	3,215.98
Check	02/14/17	23049	Sutliff True Value H...	inv 508313	Clinic		101.999 · Spec...	385.98	3,601.96
Check	02/14/17	23049	Sutliff True Value H...	inv 508408	Clinic		101.999 · Spec...	49.92	3,651.88
Credit Card Charge	02/15/17		Amazon.com	#15 - #18 IN...	Clinic		115.999 · MC ...	21.94	3,673.82
Credit Card Charge	02/15/17		Amazon.com	#15 - #18 IN...	Clinic		115.999 · MC ...	64.51	3,738.33
Credit Card Charge	02/15/17		Amazon.com	#15 - #18 IN...	Clinic		115.999 · MC ...	68.54	3,806.87
Credit Card Charge	02/15/17		Amazon.com	#15 - #18 IN...	Clinic		115.999 · MC ...	68.54	3,875.41
Total 556.301 · Clinic Maintenance								3,875.41	3,875.41

## Appendix B – Energy Audit Report – Project Summary

ENERGY AUDIT REPORT – PROJECT SUMMARY	
General Project Information	
PROJECT INFORMATION	AUDITOR INFORMATION
<b>Building:</b> Ouzinkie Medical Clinic	<b>Auditor Company:</b> Company
<b>Address:</b> Ouzinkie, AK	<b>Auditor Name:</b> Curtis Boudreau
<b>City:</b> Ouzinkie	<b>Auditor Address:</b> Auditor Address
<b>Client Name:</b> Trina Squartsoff	
<b>Client Address:</b>	<b>Auditor Phone:</b> (907) 729-3528
	<b>Auditor FAX:</b>
<b>Client Phone:</b> (907) 680-2265	<b>Auditor Comment:</b>
<b>Client FAX:</b>	
Design Data	
<b>Building Area:</b> 2,315 square feet	<b>Design Space Heating Load:</b> Design Loss at Space: 35,473 Btu/hour with Distribution Losses: 35,473 Btu/hour Plant Input Rating assuming 82.0% Plant Efficiency and 25% Safety Margin: 54,075 Btu/hour Note: Additional Capacity should be added for DHW and other plant loads, if served.
<b>Typical Occupancy:</b> 0 people	<b>Design Indoor Temperature:</b> 68 deg F (building average)
<b>Actual City:</b> Ouzinkie	<b>Design Outdoor Temperature:</b> 12.1 deg F
<b>Weather/Fuel City:</b> Ouzinkie	<b>Heating Degree Days:</b> 8,931 deg F-days
Utility Information	
<b>Electric Utility:</b> Ouzinkie, City of - Commercial - Sm	<b>Natural Gas Provider:</b> None
<b>Average Annual Cost/kWh:</b> \$0.384/kWh	<b>Average Annual Cost/ccf:</b> \$0.000/ccf

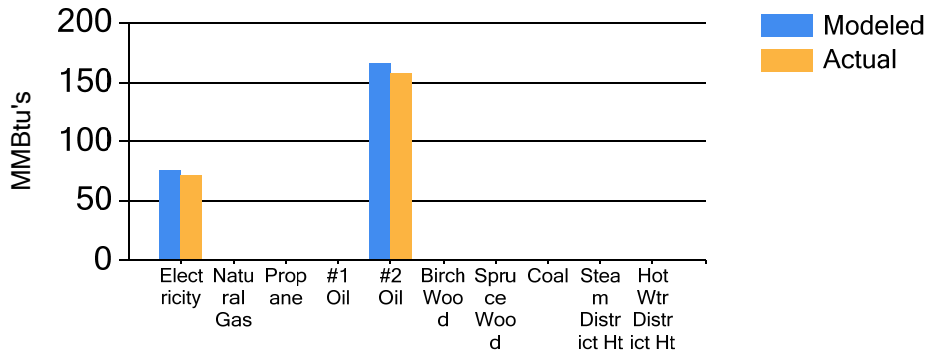
Annual Energy Cost Estimate									
Description	Space Heating	Space Cooling	Water Heating	Ventilation Fans	Lighting	Refrigeration	Other Electrical	Service Fees	Total Cost
Existing Building	\$5,300	\$0	\$149	\$278	\$3,847	\$569	\$3,427	\$60	<b>\$13,629</b>
With Proposed Retrofits	\$3,070	\$0	\$178	\$54	\$2,601	\$569	\$3,427	\$60	<b>\$9,959</b>
Savings	\$2,230	\$0	-\$29	\$224	\$1,246	\$0	\$0	\$0	<b>\$3,671</b>

Building Benchmarks			
Description	EUI (kBtu/Sq.Ft.)	EUI/HDD (Btu/Sq.Ft./HDD)	ECI (\$/Sq.Ft.)
Existing Building	104.0	11.65	\$5.89
With Proposed Retrofits	69.1	7.73	\$4.30
EUI: Energy Use Intensity - The annual site energy consumption divided by the structure's conditioned area. EUI/HDD: Energy Use Intensity per Heating Degree Day. ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.			

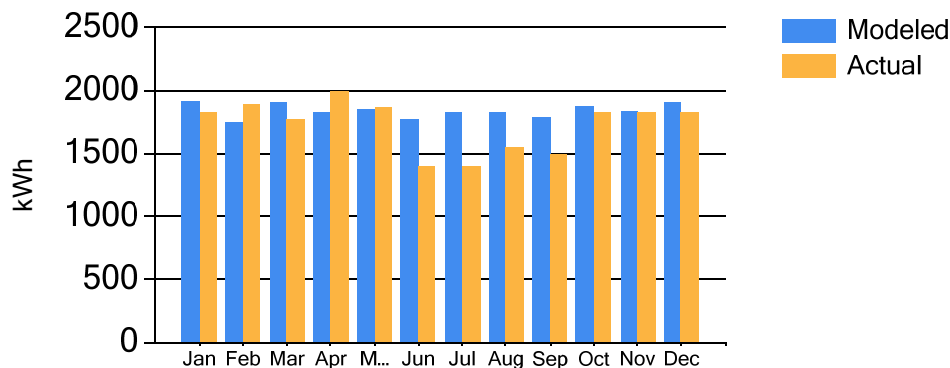
## Appendix C – Actual Fuel Use versus Modeled Fuel Use

The graphs below show the modeled energy usage results of the energy audit process compared to the actual energy usage report data. The model was completed using AkWarm modeling software. The orange bars show actual fuel use, and the blue bars are AkWarm’s prediction of fuel use.

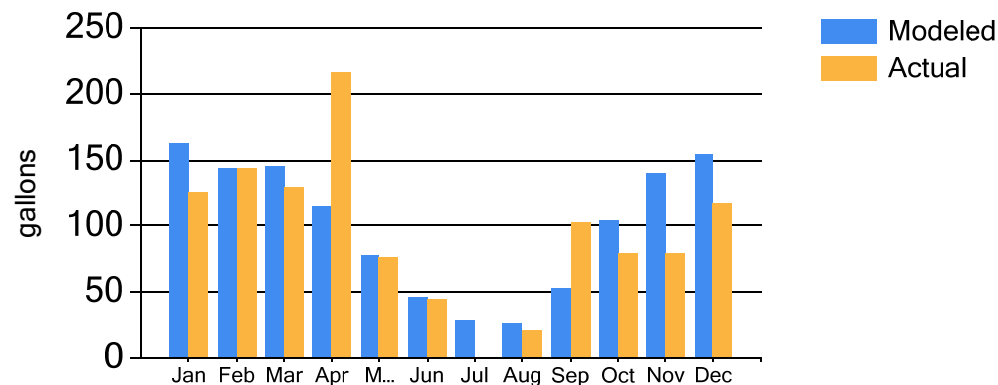
### Annual Energy Use



### Electricity Use



### #2 Fuel Oil Use



## Appendix D - EUI Calculation Details

The Tanana Power Company provides electricity to the residents of Tanana as well as to all commercial and public facilities.

The average cost for each type of fuel used in this building is shown below in Table 4. This figure includes all surcharges, subsidies, and utility customer charges:

**Table 4: Energy Cost Rates for each Fuel Type.**

Average Energy Cost	
Description	Average Energy Cost
Electricity	\$ 0.3844/kWh
#1 Oil	\$ 4.29/gallons

Table 5 shows the calculated results for the building Energy Use Index (EUI), which determines the total energy usage for a type of building for comparison with other buildings of the same type. This allows the user to determine the relative energy use of a building in relation to others of the same type or use.

**Table 5: EUI Calculations**

Energy Type	Building Fuel Use per Year	Site Energy Use per Year, kBTU	Source/Site Ratio	Source Energy Use per Year, kBTU
Electricity	22,072 kWh	75,330	3.340	251,604
#1 Oil	1,199 gallons	165,480	1.010	167,135
Total		240,811		418,739
BUILDING AREA		2,315	Square Feet	
BUILDING SITE EUI		104	kBTU/Ft²/Yr	
BUILDING SOURCE EUI		181	kBTU/Ft²/Yr	
* Site – Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued March 2011.				

Table 6 shows information on common energy use benchmarks used to characterize the efficiency of a building.

**Table 6: Energy Efficiency Benchmarks for Building**

Building Benchmarks			
Description	EUI (kBtu/Sq.Ft.)	EUI/HDD (Btu/Sq.Ft./HDD)	ECI (\$/Sq.Ft.)
Existing Building	104.0	11.65	\$5.89
With Proposed Retrofits	69.1	7.73	\$4.30
EUI: Energy Use Intensity - The annual site energy consumption divided by the structure's conditioned area. EUI/HDD: Energy Use Intensity per Heating Degree Day. ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.			

## Appendix F – Materials Specifications

### Man-Door Bottom Sweep

#### Pemko 18062\_NB Brush Seal/180 Degree Aluminum Retainer

- This brush gasketing is supplied with a Nylon Brush ("NB") insert - item number P38062 (available in gray or black).
- Painted white insert is item number P516062W.

##### Ratings



BHMA Certified



Smoke Tested - UL1784



Fire Rated - UL10C - Positive Pressure



Underwriters Laboratory 4L10



GREENGUARD Gold Certified

##### Finishes



**18062CNB:** C - Clear Anodized Aluminum with Gray Nylon Brush insert



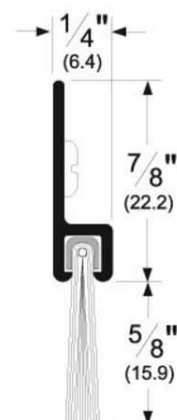
**18062DNB:** D - Dark Bronze Anodized Aluminum with Black Nylon Brush insert



**18062GNB:** G - Gold Anodized Aluminum with Black Nylon Brush insert



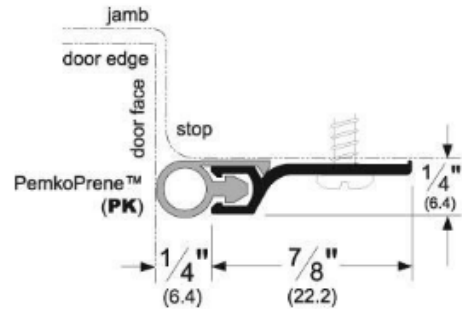
**18062PWNB:** PW - Painted White Aluminum with White Nylon Brush insert



## Man-Door Gasket for Top Sill and Side Jambs

### Pemko 303\_PK (PG) Standard Perimeter Gasketing

- Category J gaskets for use with listed steel frames and/or classified steel covered composite, hollow metal doors rated up to and including 3 hours; wood and plastic covered composite doors rated up to and including 1-1/2 hours; and wood core doors rated for 20 minutes.
- Rigid jamb weatherstrip is shown mounted on openings with 1/16" gaps; however, each weatherstrip can seal gaps up to the depth of its seal.
- Seal depth is provided on each illustration.
- Stainless Steel fasteners are standard.
- Other fasteners are available.
- Model 303\_ is available with self-adhesive, two-sided tape (TST) and tek screws (3 slotted holes per part) for easy installation.
- To obtain this option, add "TST" to the end of the part number when ordering (i.e. 303APK36TST).
- This perimeter gasketing is supplied with a PemkoPrene® ("PK") insert - item number PK47 (available in gray or black).



#### Ratings



Air Infiltration Tested



BHMA Certified



Smoke Tested - UL1784



Fire Rated - UL10C - Positive Pressure



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Environmental Product Declaration



Health Product Declaration

**Declare.** Declare



GREENGUARD Gold Certified

#### Finishes



**303APK:** A - Mill Finish Aluminum Aluminum with Gray PemkoPrene insert



**303BDGPK:** BDG - Bright Dip Gold Anodized Aluminum with Black PemkoPrene insert



**303CPK:** C - Clear Anodized Aluminum with Gray PemkoPrene insert



**303DPK:** D - Dark Bronze Anodized Aluminum with Black PemkoPrene insert



**303GPK:** G - Gold Anodized Aluminum with Black PemkoPrene insert



**303PWPK:** PW - Painted White Aluminum with Black PemkoPrene insert



**303SNPK:** SN - Satin Nickel Anodized Aluminum with Black PemkoPrene insert

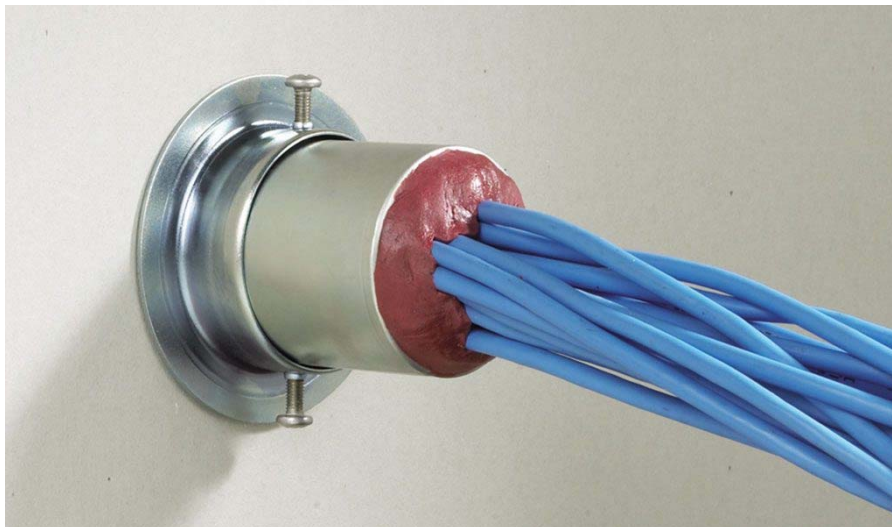
## Attic Access Hatch Weather-Stripping

PRODUCT	SKU	UPC	SPECS	COLOR
<b>D-Section 1/4" Thick - Fits Medium Gaps</b>	V25GA	077578012551	5/16" W, 1/4" T, 17 ft L, D-Section	Grey
	V25BA	077578011776	5/16" W, 1/4" T, 17 ft L, D-Section	Brown
	V25WA	077578011783	5/16" W, 1/4" T, 17 ft L, D-Section	White
	V25BK	077578059228	5/16" W, 1/4" T, 17 ft L, D-Section	Black





## Permanently Flexible Putty Sealant (For Sealing Communication Cable Conduit in IT Closet Ceiling)





# Programmable Thermostat

**Robertshaw** 9701i2



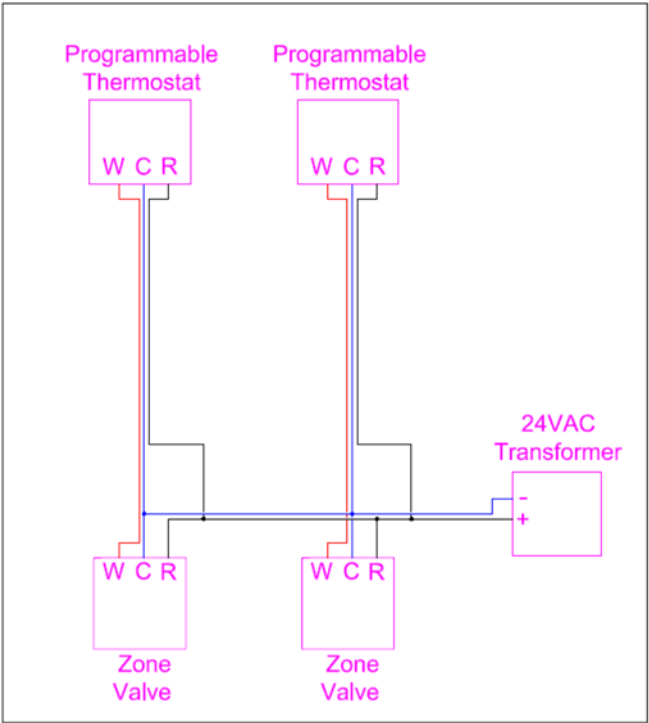
## Menu Driven Display

7 Day Programmable with 2, 4 or 6 Events Per Day

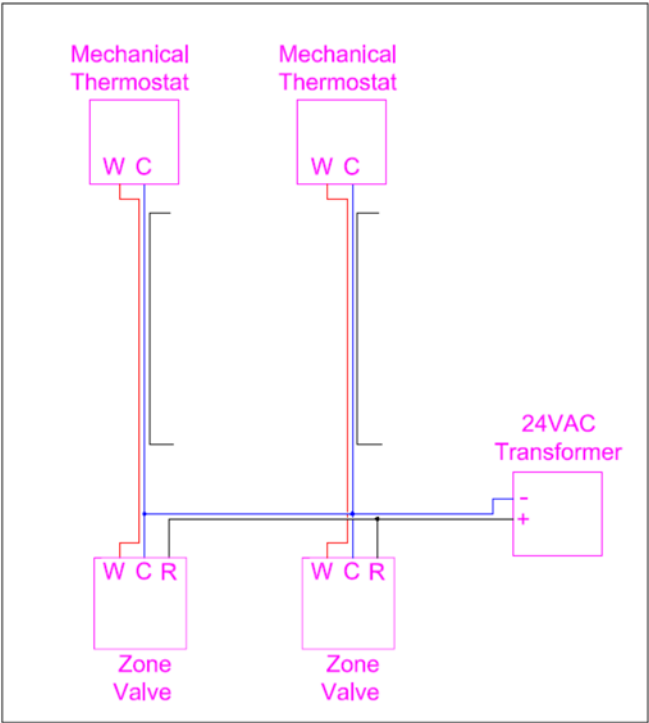
9701i2 - 1 Heat / 1 Cool

## Worry-Free Memory Storage

Even during power outages, the thermostat maintains set point and programmed parameters.



**New**  
**Programmable Thermostat Wiring**



**Existing**  
**Mechanical Thermostat Wiring**

- (Red) Thermostat Off/On Signal, typically red or white
- (Blue) -24VAC Common , typically white or blue
- (Black) +24VAC Power Supply, typically red, black, or orange

# LED T8 Light Bulb

**THINKLUX**  
LIGHTING

**4 FOOT**  
Fluorescent Replacement



**DIRECT WIRE**  
Ballast Bypass

**High  
Output  
LED**  
T8 | T12



## Performance Specifications

REPLACEMENT FOR: T8 OR T12 4 FOOT FLUORESCENT TUBE

BRIGHTNESS (LUMENS): 2400

COLOR TEMPERATURE: 4000K | 5000K

COLOR ACCURACY (CRI): 80

DIMENSIONS 1.02" X 47.2"

POWER CONSUMPTION: 18 WATTS

VOLTAGE: 120-277 VOLTS

DIMMABLE: NO

## Dimensions / Additional Data

CERTIFICATIONS: UL, DESIGNLIGHTS (DLC)

PRODUCT/ORDER CODE:  
4000K - 18WT8P-4F-40K-BYP  
5000K - 18WT8P-4F-50K-BYP

## Lifespan / Cost To Run

PROJECTED LIFE:  
@3 HRS/DAY 50,000 HRS

YEARLY ENERGY COST:  
3 HRS/DAY @ .11 KWH \$2.17

## WARRANTY

5 YEAR THINKLUX LIGHTING LIMITED WARRANTY  
EARTHLED PRODUCT PROTECTION PLAN IS AVAIL

# LED T8 Tube - Hybrid

Ballast-compatible & line voltage bypass retrofit



## Installation Instructions

Please read through this installation guide before beginning the installation of the THINKLUX Lighting HYB Series LED T8 tube. This LED tube is a combination T8 tube which can be installed as a direct plug-in, ballast-compatible tube, or as a ballast-bypass retrofit bulb where the luminaire must first be modified prior to LED bulb installation. Page 1 of this installation manual is for installing the LED bulb as a direct-replacement, and pages 2 and 3 are for installation as a ballast bypass configuration.

### Cautions and Warnings - Direct Plug-in, Ballast Compatible

These LED lamps are intended to replace fluorescent T8 tube lamps with an ANSI designation of 32W/48T8.

**WARNING: RISK OF ELECTRIC SHOCK - DISCONNECT POWER AT THE SOURCE BEFORE INSTALLATION.**

**WARNING:** risk of fire or electric shock. Do not alter, relocate, or remove wiring, lampholders, power supply, or any other electrical component.

SUITABLE FOR DAMP LOCATIONS

SUITABLE FOR USE IN TOTALLY ENCLOSED LUMINAIRES.

THIS DEVICE IS NOT INTENDED FOR USE WITH EMERGENCY EXITS.

**NOTE:** If installing multiple LED T8 tubes into a single fixture, the maximum number of tubes per fixture is 4

DIRECT REPLACEMENT FOR 32W/48T8 LAMPS ONLY

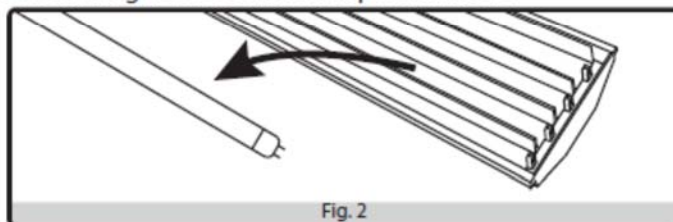
**CAUTION - IF THE LAMP OR LUMINAIRE EXHIBITS UNDESIRABLE OPERATION (BUZZING, FLICKERING, ETC.), IMMEDIATELY TURN OFF POWER, REMOVE LAMP FROM LUMINAIRE AND CONTACT MANUFACTURER.**

**CAUTION - RISK OF FIRE - IF INSTALLING THIS LAMP IN A PRE-HEAT LUMINAIRE, REMOVE THE AUTOMATIC STARTERS FROM THEIR HOLDERS BEFORE INSTALLING LAMP.**

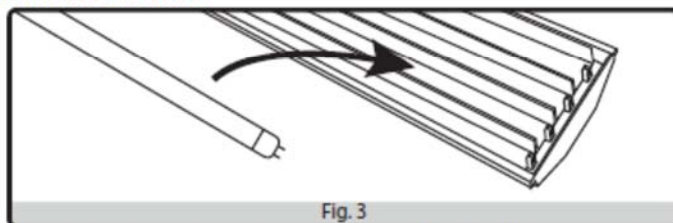
THIS LAMP ONLY OPERATES ON MAGNETIC OR ELECTRONIC BALLASTS. IF LAMP DOES NOT LIGHT WHEN THE LUMINAIRE IS ENERGIZED, REMOVE LAMP FROM LUMINAIRE AND CONTACT LAMP MANUFACTURER OR QUALIFIED ELECTRICIAN.

### Installation - Direct Plug-in, Ballast-Compatible

1. Switch off power supply before installation. Remove the fixture diffuser if necessary.
2. Remove existing fluorescent T8 lamp from fixture



3. Install the LED T8 tube



4. Switch on power supply and ensure that LED bulb(s) are operating properly. Replace the fixture diffuser if necessary.

[www.aethlux.com](http://www.aethlux.com)

Page 1 of 3

# LED T8 Tube - Hybrid

Ballast-compatible & line voltage bypass retrofit



This part of the installation manual (pages 2-3) is only intended for the installation of the LED T8 lamp as LED retrofit kit, where modification of the luminaire will be required prior to installation of the LED bulb.

Please read and understand all cautions and warnings, and installation steps before beginning the installation process.

## Cautions and Warnings - Ballast Bypass Retrofit

**WARNING:** Risk of fire or electric shock. LED Retrofit Kit installation requires knowledge of luminaires electrical systems. If not qualified, do not attempt installation. Contact a qualified electrician.

**WARNING:** Risk of fire or electric shock. Install this kit only in the luminaires that have the construction features and dimensions shown in the photographs and/or drawings and where the input rating of the retrofit kit does not exceed the input rating of the luminaire.

**WARNING:** Risk of fire or electric shock. The electrical rating of this product is 120-277 Vac, the installer must determine whether they have 120-277 Vac at the luminaire before installation.

**WARNING:** RISK OF FIRE OR ELECTRIC SHOCK. DO NOT ALTER, RELOCATE, OR REMOVE WIRING, LAMPHOLDERS, POWER SUPPLY, OR ANY OTHER ELECTRICAL COMPONENT.

THE RETROFIT ASSEMBLY IS ACCEPTED AS A COMPONENT OF A LUMINAIRE WHERE THE SUITABILITY OF THE COMBINATION SHALL BE DETERMINED BY UL OR AUTHORITIES HAVING JURISDICTION.

**WARNING:** To avoid potential fire or shock hazard, do not use this retrofit kit in luminaires employing shunted bi-pin lampholders. Note: Shunted lampholders are found only in fluorescent luminaires with Instant-Start ballasts. Instant-start ballasts can be identified by the words "Instant Start" or "I.S." marked on the ballast. This designation may be in the form of a statement pertaining to the ballast itself, or may be combined with the marking for the lamps with which the ballast is intended to be used, for example F40T12/IS. For more information, contact the LED luminaire retrofit kit manufacturer. See figure below.

**WARNING:** To prevent wiring damage or abrasion, do not expose wiring to edges of sheet metal or other sharp objects.

Do not make or alter any open holes in an enclosure of wiring or electrical components during kit installation.

Installers should not disconnect existing wires from lamp holder terminals to make new connections at lamp holder terminals. Instead installers should cut existing lamp holder leads away from the lamp holder and make new electrical connections to lamp holder lead wires by employing applicable connectors.

**NOTE:** If installing multiple LED T8 tubes into a single fixture, the maximum number of tubes per fixture is 4.

SUITABLE FOR DAMP LOCATIONS

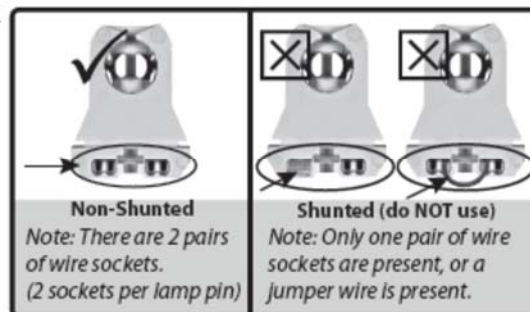
NOT FOR USE WITH DIMMERS.

SUITABLE FOR USE IN TOTALLY ENCLOSED LUMINAIRES.

THIS DEVICE IS NOT INTENDED FOR USE WITH EMERGENCY EXITS.

SUITABLE FOR 50°C AMBIENT.

**WARNING:** RISK OF ELECTRIC SHOCK - DISCONNECT POWER AT THE SOURCE BEFORE INSTALLATION.





# LED T8 Tube - Hybrid

Ballast-compatible & line voltage bypass retrofit

**THINKLUX**  
LIGHTING

## Wiring and Installation - Ballast Bypass Retrofit

1. Switch off power supply before installation. Remove diffuser (if applicable) and all fluorescent tube lamps from luminaire.

Identify which ballast and wiring setup is used in the luminaire as shown in Fig. 1 and Fig. 2.

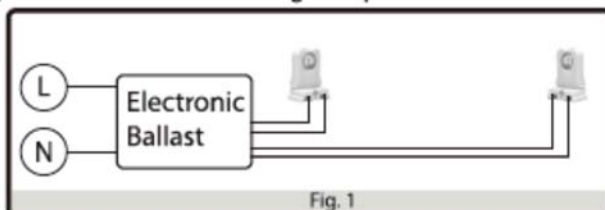


Fig. 1

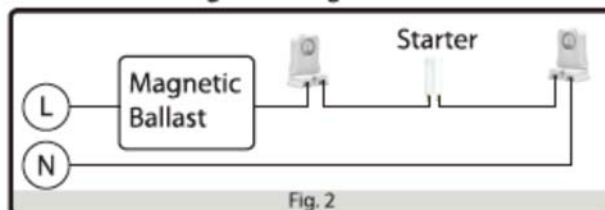


Fig. 2

2. Cut all wires leading into and out of the ballast and starter (if applicable), as shown in Fig. 3 and Fig. 4.

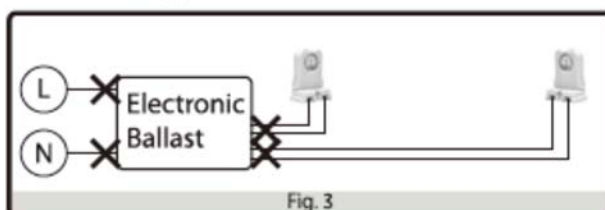


Fig. 3

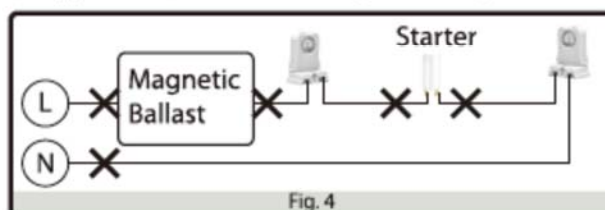


Fig. 4

3. Connect the input supply lines to the lampholder as shown in Fig. 5.

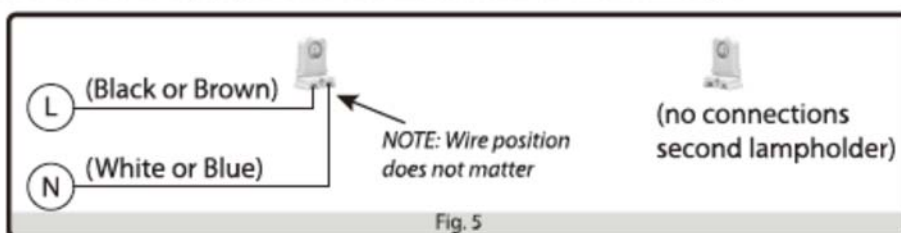


Fig. 5

4. Apply the retrofit warning label on fixture in a location that will be readily visible during normal maintenance.

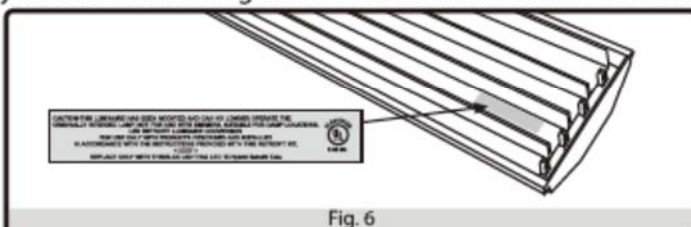


Fig. 6

5. Locate the end of the LED T8 Tube where the LIVE END label is printed and ensure that this end of the tube is plugged into the LIVE lampholder socket as shown in Fig. 6. Turn the bulb in the direction such that the heat sink strip faces up into the fixture.



Fig. 7

## High Pressure Sodium LED Replacement Bulb (100-175 Watt HPS Equivalent)



Ansi Code	57938
Case Quantity	1
Input Voltage	120-277
Order Code	45HID/830/277V/EX39
Rated Life	50,000
UPC	672713579380
Wattage	45 Watts
Base Type	Mogul (E39)
Color Temperature	3000K
Lumen	5040
Select the Wattage you want to replace	100-150 Watt
Manufacturer	Green Creative

## LED HID REPLACEMENT LAMP INSTALLATION GUIDE INSTALLATION STEPS / GUIDE D'INSTALLATION – ETAPES D'INSTALLATION

- 1) Read all WARNINGS before continuing this section.
- 2) Ensure fixture is 120-277V.
- 3) Make sure POWER IS TURNED OFF AT THE SOURCE.
- 4) Remove lens if applicable, remove cover and lamp.
- 5) Before rewiring, check the ballast type and refer to the relevant diagram.
- 6) Before rewiring, please check the number of lamps per fixture and refer to the relevant diagram.
- 7) If fixture is new without ballast, please refer to Cf. Diagram 1.
- 8) If fixture ballast type is electronic, please refer to Cf. Diagram 2.
- 9) If fixture ballast type is magnetic please refer to Cf. Diagram 3.
- 10) Install lamp into the wired lampholder.
- 11) Visibly affix "Modification Sticker" and reinstall housing cover and lens if applicable.
- 12) Return power back to source and installation is now complete.

- 1) Lire tous les points d'ATTENTION.
- 2) Vérifier que le luminaire soit bien en 120-277V.
- 3) Assurez-vous que le COURANT SOIT COUPÉ À LA SOURCE.
- 4) Retirez l'optique et capot du luminaire (si nécessaire) et retirez les lampes.
- 5) Vérifier le type de ballast et se référer au diagramme ("diagram") approprié avant tout câblage.
- 6) Vérifier le nombre de lampe par luminaire et se référer au diagramme ("diagram") approprié avant tout câblage.
- 7) Pour un luminaire sans ballast, se référer au "Cf. Diagram 1."
- 8) Pour un luminaire avec ballast électronique, se référer au "Cf. Diagram 2."
- 9) Pour un luminaire avec ballast magnétique, se référer au "Cf. Diagram 3."
- 10) Installer la lampe dans la douille.
- 11) Coller l'autocollant de modification du luminaire de manière visible et réinstaller l'optique si nécessaire.
- 12) Refermer le luminaire et remettre le courant, l'installation est terminée.

Diagram 1 – New fixture without ballast wiring.



Diagram 2 – Electronic ballast fixture wiring modification

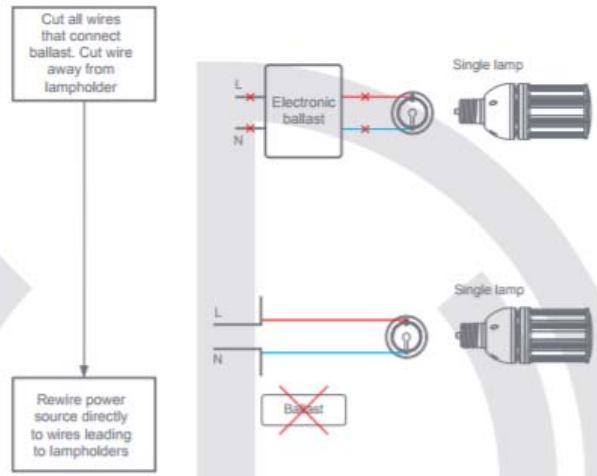
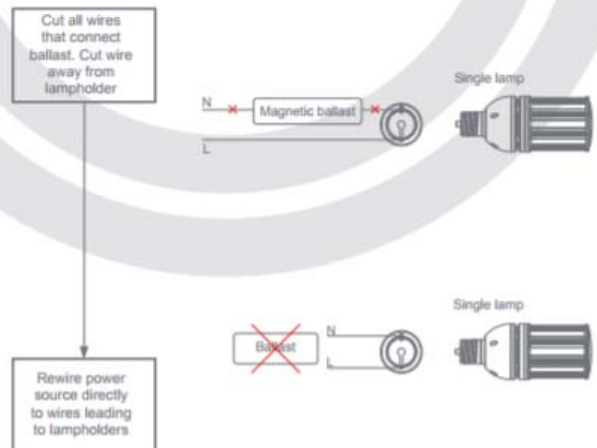


Diagram 3 – Magnetic ballast fixture wiring modification



# LED Standard Light Bulb

## ULTRA LED™ A-line Lamps

Omnidirectional



### Key Features & Benefits

- Dimmable down to 10%\*
- Long life: up to 15,000 hours (L<sub>70</sub>)
- UV and IR free
- Mercury and lead free
- RoHS compliant
- Available in 2700K, 3000K, 3500K and 5000K color temperatures
- Suitable for indoor/outdoor environments
- Reduces energy consumption up to 85%
- Last up to 20 times longer than incandescent lamps
- No warm-up time, instant-on with full light output and stable color

\* Performance may vary depending on dimmer used in application. Please refer to Dimmer Compatibility List (RETRO-DIM) for a list of compatible dimmers or visit [www.SYLVANIA.com/LED Retrofit](http://www.SYLVANIA.com/LED Retrofit)



Rated up to 15,000 hours at 70% lumen maintenance, SYLVANIA ULTRA LED A-line omnidirectional lamps offer years of service and reduce energy and maintenance costs. SYLVANIA ULTRA LED lamps are environmentally preferred products. They are RoHS compliant and contain no mercury, lead or other hazardous materials. They emit no UV or IR radiation. A CRI of 80 ensures good color definition and 2700K, 3000K, 3500K and 5000K color temperatures, these lamps can be used in many applications in both homes and businesses.

### Product Offering

Ordering Abbreviation	Wattage	Color Temperature	Typical Lumens
LED5.5W A19	5.5	2700K, 3000K, 3500K & 5000K	450
LED9W A19	9	2700K, 3000K, 3500K & 5000K	800
LED12W A19	12	2700K, 3500K & 5000K	1100
LED16W A21	16	2700K, 3500K & 5000K	1600
LED25W A21	25	2700K	2550

### Energy Savings

Basic Product Description	LED Life (hrs.)	LED Lumens	Similar Incandescent	Incandescent Life (hrs.)	Incandescent Lumens	Watts Saved	Energy Savings*	LED Life vs. Incandescent
LED5.5A19	15,000	450	40W A19	1500	465	34.5	\$56	10x
LED9A19	15,000	800	60W A19	1000	850	51	\$84	15x
LED12A19	15,000	1100	75W A19	750	1170	63	\$103	20x
LED16A21	15,000	1600	100W A19	750	1600	84	\$138	20x
LED25A21	15,000	2550	150W A21	750	2670	125	\$165	20x

\*Energy savings over life of lamp calculated at \$0.11/kWh



# Vapor Barrier Materials

## Vapor Barrier Sheeting SilverBack 12 mil Reinforced Poly Sheeting



## Caulk to Seal Vapor Barrier to Concrete Footing Titebond Weathermaster Sealant



## Vapor Barrier Waterproof Seam Tape Part Number WST-180

