

Commonwealth of Kentucky
Kentucky Public Service Commission

To: Case File: No 2024-00311

From: Nataliya Williams, Resident at the address:
107 Kenilworth Ct., ap.c
Radcliff, KY. 40160
email:

Response For an Adjustment of Rates.

On December 6, 2024 served response for an adjustment of rates to Kentucky Public Service Commission on the Answer and Motion to Dismiss Kentucky Utilities Company written by the people with three years of the law school, the law school diplomas and the lawyer licenses and filed on 12/2/2024 with the Kentucky Public Service Commission.

I have not received the answer with the detail explanation supported by the law and regulations of the USA and Kentucky.

Which company generates electricity?
Which company purchase electricity?
Which company distribute electricity?
What other electrical company are doing in Kentucky and St. Louis, Mo.?

Pursuant to 807 KAR 5:001(9) "Paper" means, regardless of the medium on which it is recorded an application, petition or other initiating document, motion, complaint, answer, response, reply, notice, request for information, or other document that this administrative regulation or the commission directs or permits a party to file in a case and Kentucky Public Service Commission's order filed on 11/21/2024.

Robert M. Conroy is a vice president of the both companies: Kentucky Utilities and Louisville Gas and Electric Company. Robert M. Conroy and his employees of Kentucky Utilities are stealing my money and electricity without

stopping. On my every electrical bills indicated the address of the Kentucky Utilities a PPL Company P.O. Box 771670 St. Louis, Mo 63177-1670 where I have to send my payments for electricity.

Pursuant to 807 KAR 5:001(10)(b) Files a tariff or tariff sheet with the commission pursuant to KRS 278.180 and 807 KAR 5:011 that the commission has suspended and established a case to investigate or review;

I have not received the explanation supported by the law and regulations of the USA and Kentucky. Kentucky Utilities company P.S.C. No. 20 all the sheets, include the original sheet No. 1, 2. have to be delete completely due to no knowledge in electricity, no knowledge in financial activities and only illegal activities.

Nataliya Willicious
12/6/2024.

RECEIVED

DEC 27 2024

PUBLIC SERVICE
COMMISSION

Kentucky Utilities Company
One Quality Street
Lexington, Kentucky
www.lge-ku.com

**Rates, Terms, and Conditions for Furnishing
ELECTRIC SERVICE**


In all territory served as stated on Tariff Sheet No. 1.2 of this Book

**PUBLIC SERVICE COMMISSION
OF KENTUCKY**

DATE OF ISSUE: July 20, 2021

DATE EFFECTIVE: With Service Rendered
On and After July 1, 2021

ISSUED BY: /s/ Robert M. Conroy, Vice President
State Regulation and Rates
Lexington, Kentucky

KENTUCKY PUBLIC SERVICE COMMISSION
Linda C. Bridwell Executive Director 
EFFECTIVE 7/1/2021 PURSUANT TO 807 KAR 5:011 SECTION 9(1)

General Index Territory Served

KU generates and purchases electricity, and distributes and sells electricity at retail in the following counties:

Adair	Edmonson	Jessamine	Ohio
Anderson	Estill	Knox	Oldham
Ballard	Fayette	Larue	Owen
Baren	Fleming	Laurel	Pendleton
Bath	Franklin	Lee	Pulaski
Bel	Fulton	Lincoln	Robertson
Bourbon	Gallatin	Livingston	Rockcastle
Boyle	Garrard	Lyon	Rowan
Bracken	Grant	Madison	Russell
Bullitt	Grayson	Marion	Scott
Caldwell	Green	Mason	Shelby
Campbell	Hardin	McCracken	Spencer
Carlisle	Harlan	McCreary	Taylor
Carroll	Harrison	McLean	Trimble
Casey	Hart	Mercer	Union
Christian	Henderson	Montgomery	Washington
Clark	Henry	Muhlenberg	Webster
Clay	Hickman	Nelson	Whitley
Crittenden	Hopkins	Nicholas	Woodford
Daviess			

All references hereinafter to "territory served" shall be determined by the Counties listed above.

DATE OF ISSUE: July 20, 2021

DATE EFFECTIVE: With Service Rendered
On and After May 1, 2019

ISSUED BY: /s/ Robert M. Conroy, Vice President
State Regulation and Rates
Lexington, Kentucky

**Issued by Authority of an Order of the
Public Service Commission in Case No.
2018-00294 dated April 30, 2019**

**KENTUCKY
PUBLIC SERVICE COMMISSION**

Linda C. Bridwell
Executive Director



EFFECTIVE











7/1/2021

PURSUANT TO 807 KAR 5.011 SECTION 9 (1)

View Bills




107 Kenilworth Ct

Account:

Billed Date			Due Date	Billed Amount
	11/20/24	12/05/24		
	11/18/24	12/16/24		\$188.45
	10/18/24	11/14/24		\$146.52
	10/17/24	10/30/24		
	09/19/24	10/16/24		\$268.28
	09/18/24	10/01/24		
	08/20/24	09/16/24		\$151.73
	07/19/24	08/14/24		\$100.44
	06/19/24	07/17/24		\$356.03
	06/17/24	07/01/24		

1 to 10 of 18









Helpful Hints

-  - Billing Summary
-  - Disconnection Notice (PDF)
-  - Budget Billing Reminder (PDF)

View Bills




107 Kenilworth Ct

Account:

Billed Date Due Date Billed Amount			
	05/20/24	06/14/24	\$320.09
	05/15/24	05/29/24	
	04/17/24	05/14/24	\$149.17
	03/19/24	04/12/24	\$191.08
	03/18/24	03/29/24	
	02/20/24	03/15/24	\$143.37
	01/22/24	02/14/24	\$83.04
	12/19/23	01/17/24	\$60.38

11 to 18 of 18

Helpful Hints

-  - Billing Summary
-  - Disconnection Notice (PDF)
-  - Budget Billing Reminder (PDF)



a PPL company

BILLING SUMMARY

Previous Balance	146.52
Payment(s) Received	0.00
Balance as of 11/18/24	\$146.52
Current Electric Charges	39.57
Current Taxes and Fees	2.36
Total Current Charges as of 11/18/24	\$41.93
Total Amount Due	\$188.45

Mailed **11/19/24** for Account #

AMOUNT DUE
\$188.45

DUE DATE
12/16/24

App, online or phone payments made before 7 pm ET will be posted same

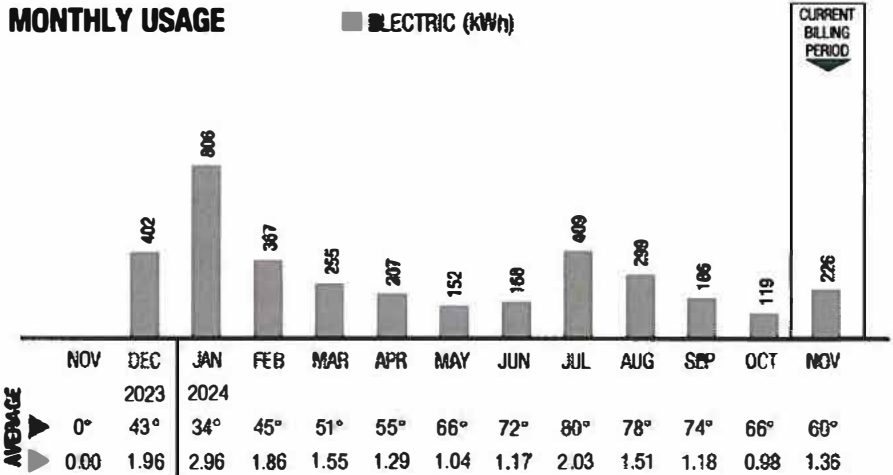
Account Name: **NATALIYA WILLIAMS**
Service Address: **107 Kenilworth Ct Apt C
RADCLIFF KY**

Payment Options (fees may apply)
Mobile app - LG&E KJ ODP mobile app
Online - lge-ku.com
Phone - (800) 981-0600, press 1-2-3

Customer Service:
For fastest service, use our mobile app, website
automated phone system (800) 981-0600
24 hours a day.
Phone reps available M-F, 7am - 7pm ET.

Next read will occur 12/17/24 - 12/19/24 (Meter Read Portion 13)

MONTHLY USAGE



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	60°	0°
Number of Days Billed	29	0
Avg. Electric Charges per Day	\$1.36	\$0.00
Avg. Electric Usage per Day (kWh)	7.79	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 12/16/24	\$188.45
After Due Date, Pay this Amount:	\$188.45
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # 9669995
Actual (R) kWh Reading on 11/15/24	1331
Actual (R) kWh Reading on 10/17/24	1105
Current kWh Usage	226
Meter Multiplier	1
Metered kWh Usage	226

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)	15.37	
Energy Charge (\$0.10533 x 226 kWh)	23.80	
Electric DSM (\$0.00165 x 226 kWh)	0.37	
Fuel Adjustment (\$-0.00389 x 226 kWh)	-0.88	
Environmental Surcharge (1.590% x \$38.66)	0.61	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$39.57	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$39.27)	1.18
Franchise Fee-Radcliff (3.00% x \$39.27)	1.18
Total Taxes and Fees	\$2.36

BILLING INFORMATION

Rate Schedules
 For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.

IMPORTANT INFORMATION

Late Payment Charge Waiver
 The Late Payment Charge waiver on this account will expire on 06/10/25.

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed e Receipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/Anderson.



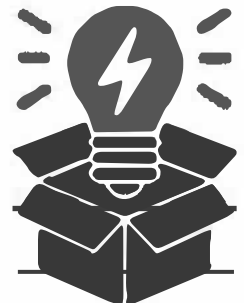
799366144580006371688320341787

OFFICE USE ONLY:
 MRU13241223, G000000
 P146.52
 PF:N eB:E

This barcode can be used at locations such as:

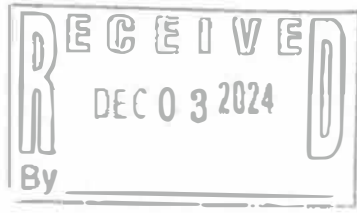


Give them something powerful



Looking for the perfect gift for that hard-to-buy-for person? Give them a Home Utility Gift (HUG) certificate. A Power HUG is a unique, convenient and practical gift for anyone.

ige-ku.com/hug



Mailed 11/21/24 for Account #

DELINQUENT AMOUNT DUE

\$146.52

FINAL PAY DATE

12/5/24

App, online or phone payments made before 7 pm ET will be posted s

Account Name: NATALIYA WILLIAMS
Service Address: 107 KENILWORTH CT APT C
RADCLIFF KY

Payment Options: Mobile app - LG&E KU ODP mobile app
(fees may apply) Online - lge-ku.com
Phone - (800) 981-0600, press 1-2-3

Customer Service: For fastest service, use our mobile app, w
automated phone system (800) 981-0600
24 hours a day.
Phone reps available M-F, 7am - 7pm ET.

DISCONNECTION NOTICE

Your account is past due. If the Delinquent Amount Due is not received by the Final Pay Date, your service will be subject to disconnection. Advanced Electric Meters may be remotely disconnected.

If disconnected: The ENTIRE Delinquent Amount Due must be paid and you must request reconnection through our mobile app, online My Account, or our automated phone system. For same day reconnection, requests must be made by 5 p.m. ET. Requests received after 5 p.m. ET will be reconnected next day. A reconnect fee and deposit may be required as a condition of reconnection. Advanced Electric Meters may be remotely reconnected and will not be charged a reconnection fee.

Unauthorized reconnection of service is punishable by law.

TO AVOID DISCONNECTION

Make your payment using our mobile app or one of the options listed above.
Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

Unpaid payment arrangements MUST be paid before a new arrangement can be established.

To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at 800-981-0600.

NEED ASSISTANCE?

You may be eligible to receive financial assistance to help you pay your bill.

Please see the back of this notice for community assistance agencies near you.

More information can be found at lge-ku.com/assistance-programs.

Final Pay Date 12/5/24

\$146.52

Total Amount Enclosed:

Account # 3500-1342-3776

Service Address: 107 KENILWORTH CT APT C

AB 01 001797 38262 H 9 A



NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116



a PPL company
PO Box 771670
St Louis, MO 63177-1670





a PPL company

BILLING SUMMARY

Previous Balance	268.28
Payment(s) Received	<u>-151.73</u>
Balance as of 10/18/24	\$116.55
Current Electric Charges	28.29
Current Taxes and Fees	<u>1.68</u>
Total Current Charges as of 10/18/24	\$29.97
Total Amount Due	\$146.52

Past due balance subject to disconnection. See IMPORTANT INFORMATION.

Mailed 10/21/24 for Account # :

AMOUNT DUE
\$146.52

DUE DATE
11/14/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
RADCLIFF KY

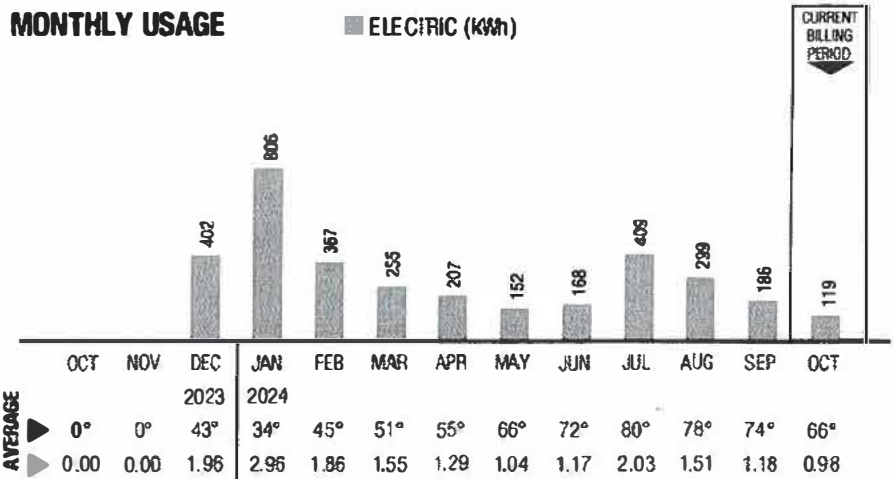
Payment Options (fees may apply) Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com
Phone - (800) 981-0600, press 1-2-3

Customer Service: For fastest service, use our mobile app, website
automated phone system (800) 981-0600
24 hours a day.
Phone reps available M-F, 7am - 7pm ET.

Next read will occur 11/15/24 - 11/19/24 (Meter Read Portion 13)

MONTHLY USAGE

ELECTRIC (kWh)



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	66°	0°
Number of Days Billed	29	0
Avg. Electric Charges per Day	\$0.98	\$0.00
Avg. Electric Usage per Day (kWh)	4.10	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 11/14/24	\$146.52
After Due Date, Pay this Amount:	\$146.52
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # 5309995
Actual (R) kWh Reading on 10/17/24	1105
Actual (R) kWh Reading on 9/18/24	986
Current kWh Usage	119
Meter Multiplier	1
Metered kWh Usage	119

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)	15.37	
Energy Charge (\$0.10533 x 119 kWh)	12.53	
Electric DSM (\$0.00165 x 119 kWh)	0.20	
Fuel Adjustment (\$-0.00415 x 119 kWh)	-0.49	
Environmental Surcharge (1.380% x \$27.61)	0.38	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$28.29	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$27.99)	0.84
Franchise Fee-Radcliff (3.00% x \$27.99)	0.84
Total Taxes and Fees	\$1.68

BILLING INFORMATION

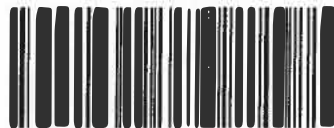
Rate Schedules
 For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.

IMPORTANT INFORMATION

Past Due Balance Subject to Disconnection - Immediate Action Required
 The due date shown above applies only to the current charges. To avoid disconnection, the ENTIRE past due balance must be paid in full. You may be eligible for a new payment arrangement if previous arrangements have been paid in full. Use our mobile app, online My Account or our automated phone system for payments and/or arrangements.

Late Payment Charge Waiver
 The Late Payment Charge waiver on this account will expire on 06/10/25.

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/ereceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/imperson.



799386144580006371688320341787

OFFICE USE ONLY:
 MR U13241223, G000000
 P268.28
 PE:NEB:E

This barcode can be used at locations such as:



No more waiting on a truck



If your meter has already been upgraded to an advanced electric meter, you now have the extra benefit of remote electric service turn-on and turn-off - removing the burden of waiting for a utility truck to visit your home.

ige-ku.com/connect



a PPL company

Mailed **10/18/24** for Account #

DELINQUENT AMOUNT DUE

\$116.55

FINAL PAY DATE

10/30/24

App, online or phone payments made before 7 pm ET will be posted same day

Account Name: **NATALIYA WILLIAMS**

Service Address: **107 KENILWORTH CT APT C
RADCLIFF KY**

Payment Options
(fees may apply) **Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com**

Phone - (800) 981-0600, press 1-2-3

Customer Service: **For fastest service, use our mobile app, website
automated phone system (800)981-0600
24 hours a day.**

Phone reps available M-F, 7am - 7pm ET.

DISCONNECTION NOTICE

Your account is past due. If the Delinquent Amount Due is not received by the **Final Pay Date**, your service will be subject to disconnection. Advanced Electric Meters may be remotely disconnected.

If disconnected: The ENTIRE Delinquent Amount Due must be paid and you must request reconnection through our mobile app, online My Account, or our automated phone system. For same day reconnection, requests must be made by 5 p.m. ET. Requests received after 5 p.m. ET will be reconnected next day. A reconnect fee and deposit may be required as a condition of reconnection. Advanced Electric Meters may be remotely reconnected and will not be charged a reconnection fee.

Unauthorized reconnection of service is punishable by law.



NEED ASSISTANCE?

You may be eligible to receive financial assistance to help you pay your bill.

Please see the back of this notice for community assistance agencies near you.

More information can be found at lge-ku.com/assistance-programs.



TO AVOID DISCONNECTION

Make your payment using our mobile app or one of the options listed above.

Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

Unpaid payment arrangements MUST be paid before a new arrangement can be established.

To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at 800-981-0600.

Final Pay Date **10/30/24**

\$116.55

Total Amount Enclosed:

Account # **3500-1342-3776**

Service Address: **107 KENILWORTH CT APT C**



a PPL company

PO Box 771670

St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

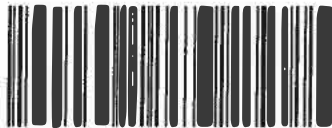


CUSTOMER ASSISTANCE (Continued)

Hardin County

Central KY CAA
233 Ring Road Career Center
Elizabethtown, KY 42701
(502) 764-2222

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/receipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at lge-ku.com/inperson.



799366144580006371688320341787

OFFICE USE ONLY:
MRU13241, G000000
PF: N eB: E

This barcode can be used at locations such as:



DOLLAR GENERAL





a PPL company

BILLING SUMMARY

Previous Balance	151.73
Payment(s) Received	0.00
Balance as of 9/19/24	\$151.73
Current Electric Charges	35.45
Current Taxes and Fees	2.10
Total Current Charges as of 9/19/24	\$37.55
Other Charges (See Other Charges on back)	79.00
Total Amount Due	\$268.28

Past due balance subject to disconnection. See IMPORTANT INFORMATION.

Mailed 9/20/24 for Account #

AMOUNT DUE
\$268.28

DUE DATE
10/16/24

App, online or phone payments made before 7 pm ET will be posted same day

Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
RADCLIFF KY

Payment Options (fees may apply)
Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com
Phone - (800)981-0600, press 1-2-3

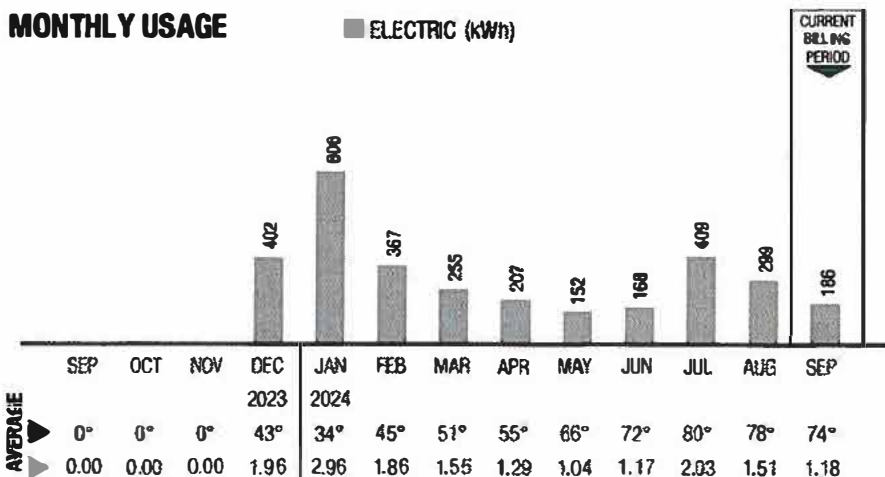
Customer Service: For fastest service, use our mobile app, website, automated phone system (800) 981-0600 24 hours a day.
Phone reps available M-F, 7 am - 7 pm ET.

Next read will occur 10/17/24 - 10/21/24 (Meter Read Portion 13)

BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	74°	0°
Number of Days Billed	30	0
Avg. Electric Charges per Day	\$1.18	\$0.00
Avg. Electric Usage per Day (kWh)	6.20	0.00

MONTHLY USAGE



Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 10/16/24	\$268.28
After Due Date, Pay this Amount:	\$268.28
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # 536995
Actual (R) kWh Reading on 9/18/24	986
Actual (R) kWh Reading on 8/19/24	800
Current kWh Usage	186
Meter Multiplier	1
Metered kWh Usage	<u>186</u>

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 30 Days)	15.90	
Energy Charge (\$0.10209 x 186 kWh)	18.99	
Electric DSM (\$0.00165 x 186 kWh)	0.31	
Fuel Adjustment (\$-0.00485 x 186 kWh)	-0.90	
Environmental Surcharge (2.490% x \$34.30)	0.85	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$35.45	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$35.15)	1.05
Franchise Fee-Raddiff (3.00% x \$35.15)	1.05
Total Taxes and Fees	\$2.10

Other Charges	
Meter Testing Debit	79.00
Total Other Charges Due	\$79.00

BILLING INFORMATION

Rate Schedules
 For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.

Want to pay cash? Visit checkreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/inperson.



799366144580006371688320341787

OFFICE USE ONLY:
 MRU13241223, G000000
 P151.73
 PF:NEB:E

This barcode can be used at locations such as:



**MORE WAYS
 TO EARN
 MONEY AND
 SAVE ENERGY**

Sign up for programs at ige-ku.com/save.

IMPORTANT INFORMATION

Past Due Balance Subject to Disconnection - Immediate Action Required

The due date shown above applies only to the current charges. To avoid disconnection, the ENTIRE past due balance must be paid in full. You may be eligible for a new payment arrangement if previous arrangements have been paid in full. Use our mobile app, online My Account or our automated phone system for payments and/or arrangements.

Late Payment Charge Waiver

The Late Payment Charge waiver on this account will expire on 06/10/25.



a PPL company

Mailed **9/19/24** for Account :

DELINQUENT AMOUNT DUE

\$151.73

FINAL PAY DATE

10/1/24

App, online or phone payments made before 7 pm ET will be posted same day.

Account Name: NATALIYA WILLIAMS

Service Address: 107 KENILWORTH CT APT C
RADCLIFF KY

Payment Options
(fees may apply) Mobile app - LG&E KU OOP mobile app
Online - lge-ku.com

Customer Service: Phone - (800) 981-0600, press 1-2-3
For fastest service, use our mobile app, website
automated phone system (800) 981-0600
24 hours a day.

Phone reps available M-F, 7am - 7pm ET.

DISCONNECTION NOTICE

Your account is past due. If the Delinquent Amount Due is not received by the **Final Pay Date**, your service will be subject to disconnection. Advanced Electric Meters may be remotely disconnected.

If disconnected: The **ENTIRE** Delinquent Amount Due must be paid and you must request reconnection through our mobile app, online My Account, or our automated phone system. For same day reconnection, requests must be made by 5 p.m. ET. Requests received after 5 p.m. ET will be reconnected next day. A reconnect fee and deposit may be required as a condition of reconnection. Advanced Electric Meters may be remotely reconnected and will not be charged a reconnection fee.

Unauthorized reconnection of service is punishable by law.



NEED ASSISTANCE?

You may be eligible to receive financial assistance to help you pay your bill.

Please see the back of this notice for community assistance agencies near you.

More information can be found at lge-ku.com/assistance-programs.



TO AVOID DISCONNECTION

Make your payment using our mobile app or one of the options listed above.

Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

Unpaid payment arrangements **MUST** be paid before a new arrangement can be established.

To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at 800-981-0600.

Final Pay Date **10/1/24**

\$151.73

Total Amount Enclosed:

Account # **3500-1342-3776**

Service Address: 107 KENILWORTH CT APT C



a PPL company

P O Box 771670

St. Louis, MO 63177-1670

NATALIYA WILLIAMS

107 KENILWORTH CT APT C

RADCLIFF, KY 40160-8116



CUSTOMER ASSISTANCE (Continued)

Hardin County

Central KY CAA
233 Ring Road Career Center
Elizabethtown, KY 42701
(502) 764-2222

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/receipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at tge-ku.com/inperson.



79936614458006371688320341787

OFFICE USE ONLY:
MRU13241, G000000
PF:N eB:E

This barcode can be used at locations such as:



DOLLAR GENERAL





a PPL company

BILLING SUMMARY

Previous Balance	100.44
Payment(s) Received	0.00
Balance as of 8/20/24	\$100.44
Current Electric Charges	48.41
Current Taxes and Fees	2.88
Total Current Charges as of 8/20/24	\$51.29
Total Amount Due	\$151.73

Mailed **8/21/24** for Account

AMOUNT DUE
\$151.73

DUE DATE
9/16/24

App, online or phone payments made before 7 pm ET will be posted same

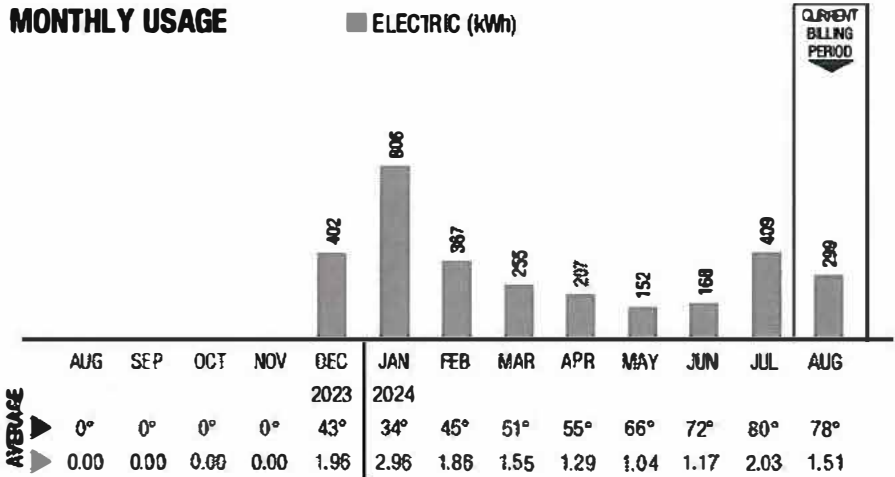
Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
Payment Options (fees may apply):
 Mobile app - LG&E KJ ODP mobile app
 Online - lge-ku.com
 Phone - (800)981-0600, press 1-2-3
Customer Service: For fastest service, use our mobile app, website or automated phone system (800) 981-0600 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 9/18/24 - 9/20/24 (Meter Read Portion 13)

BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	78°	0°
Number of Days Billed	32	0
Avg. Electric Charges per Day	\$1.51	\$0.00
Avg. Electric Usage per Day (kWh)	9.34	0.00

MONTHLY USAGE



Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 9/16/24	\$151.73
After Due Date, Pay this Amount:	\$151.73
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # 5360995
Actual (R) kWh Reading on 8/19/24	800
Actual (R) kWh Reading on 7/18/24	501
Current kWh Usage	299
Meter Multiplier	1
Metered kWh Usage	299

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 32 Days)	16.96	
Energy Charge (\$0.10209 x 299 kWh)	30.52	
Electric DSM (\$0.00165 x 299 kWh)	0.49	
Fuel Adjustment (\$-0.00395 x 299 kWh)	-1.18	
Environmental Surcharge (2.820% x \$46.79)	1.32	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$48.41	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$48.11)	1.44
Franchise Fee-Radcliff (3.00% x \$48.11)	1.44
Total Taxes and Fees	\$2.88

BILLING INFORMATION

Rate Schedules
 For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.

IMPORTANT INFORMATION

Late Payment Charge Waiver
 The Late Payment Charge waiver on this account will expire on 06/10/25.

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/imperson.



79936614458006371688320341787

OFFICE USE ONLY:
 MRU13241223, G000000
 P100.44
 PF.N eBE

This barcode can be used at locations such as:



No more waiting on a truck



If your meter has already been upgraded to an advanced electric meter, you now have the extra benefit of remote electric service turn-on and turn-off - removing the burden of waiting for a utility truck to visit your home.

ige-ku.com/connect



a PPL company

BILLING SUMMARY

Previous Balance	356.03
Payment(s) Received	-320.09
Balance as of 7/19/24	\$35.94
Current Electric Charges	60.86
Current Taxes and Fees	3.64
Total Current Charges as of 7/19/24	\$64.50
Total Amount Due	\$100.44

Mailed 7/22/24 for Account # 3500-1342-3776

AMOUNT DUE
\$100.44

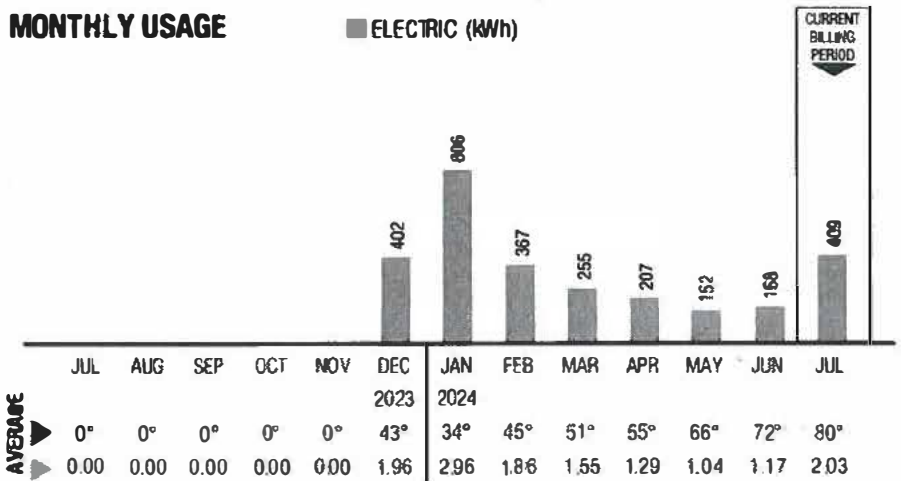
DUE DATE
8/14/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS
 Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
 Payment Options (fees may apply):
 Mobile app - LG&E KU OOP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
 Customer Service: For fastest service, use our mobile app, website
 automated phone system (800) 981-0600
 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 8/19/24 - 8/21/24 (Meter Read Portion 13)

MONTHLY USAGE



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	80°	0°
Number of Days Billed	30	0
Avg. Electric Charges per Day	\$2.03	\$0.00
Avg. Electric Usage per Day (kWh)	13.63	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 8/14/24	\$100.44
After Due Date, Pay this Amount:	\$100.44
WinterCare Donation:	
Total Amount Enclosed:	

Account # 3500-1342-3776
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # 536905
Actual (R) kWh Reading on 7/18/24	501
Actual (R) kWh Reading on 6/18/24	92
Current kWh Usage	409
Meter Multiplier	1
Metered kWh Usage	409

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric	
Basic Service Charge (\$0.53 x 30 Days)	15.90		
Energy Charge (\$0.10209 x 409 kWh)	41.75		
Electric DSM (\$0.00165 x 409 kWh)	0.67		
Fuel Adjustment (\$0.00135 x 409 kWh)	0.55		
Environmental Surcharge (2.870% x \$58.87)	1.69		
Home Energy Assistance Fund Charge	0.30		
Total Charges	\$60.86		

Taxes & Fees	
Rate Increase For Sched Tax (3.00% x \$60.56)	1.82
Franchise Fee-Raddiff (3.00% x \$60.56)	1.82
Total Taxes and Fees	\$3.64

BILLING INFORMATION

Rate Schedules
 For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.

IMPORTANT INFORMATION

Late Payment Charge Waiver
 The Late Payment Charge waiver on this account will expire on 06/10/25.

IMPORTANT INFORMATION (continued)

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/inperson.



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OFFICE USE ONLY:
 MRU13241223, G000000
 P356.03
 PF:N eB:E

This barcode can be used at locations such as:



DOLLAR GENERAL



**MORE WAYS
 TO EARN
 MONEY AND
 SAVE ENERGY**

Sign up for programs at ige-ku.com/save.

IMPORTANT INFORMATION (continued)**Service Deposit Receipt - Please retain for your records.**

Deposit Receipt Number: 168002191489
Total Deposit Amount On Hand: \$160.00
Deposit Completion Date: June 25, 2024

The deposits for service on this account have been paid in full. The deposit will be held a minimum of one (1) year and will earn interest at the rate prescribed by law.

After one (1) year, the deposit and interest earned will be applied to your account provided a satisfactory payment history has been established. Satisfactory payment is defined as having received no disconnect notices, no service disconnections for nonpayment, no payments returned for insufficient funds, no defaulted payment arrangements, and no energy theft or diversion.

If the criteria for satisfactory payment history is not met after one (1) year, your account will continue to be reviewed each month. Interest earned will be applied annually to your account if your deposit is held longer than 12 months; no refund or credit will be applied if your bill is delinquent on the anniversary date of the deposit. When the satisfactory payment criteria outlined above has been met for the most recent 12-month period, the deposit and interest earned will be applied to your account.

The Kentucky Public Service Commission requires that, upon customer request, deposits held for more than 18 months shall be recalculated based on a review of the customer's actual usage. The deposit amount should represent 2/12 of an annual bill. If the deposit on hand differs from the calculated amount by more than \$10.00, we will refund any amount that was over collected. In addition, we may also collect any underpayment of a deposit based on the review of the actual usage. We are not required to refund any amount that was over collected if your account is delinquent by more than one billing period.

If service is discontinued and no new service is needed, the deposit plus interest earned will be applied to your account and any remaining balance will be refunded to you by check.

Mailed 6/20/24 for Account #



a PPL company

BILLING SUMMARY

Previous Balance	320.09
Payment(s) Received	0.00
Balance as of 6/19/24	\$320.09
Current Electric Charges	33.92
Current Taxes and Fees	2.02
Total Current Charges as of 6/19/24	\$35.94
Total Amount Due	\$356.03
Pending Pledges	-20.00
Total Pending Balance	\$156.03

Past due balance subject to disconnection.

AMOUNT DUE
\$156.03

DUE DATE
7/17/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS
 Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
 Payment Options (fees may apply): Mobile app - LG&E KU OOP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
 Customer Service: For fastest service, use our mobile app, website, automated phone system (800) 981-0600 24 hours a day
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 7/18/24 7/22/24 (Meter Read Portion 13)

	Meter Number	Previous Read Date	Previous Reading	Current Read Date	Current Reading	Read Code*	Meter Multiplier	Usage kWh	Demand (kW)
kWh	W152528	5/20/24	61904	8/3/24	61980	R	1	76	
kWh	5369995	6/4/24	0	6/18/24	92	R	1	92	
Total Usage								168	

CURRENT ELECTRIC CHARGES		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)		15.37
Energy Charge (\$0.09699 x 59 kWh)		5.72
Energy Charge (\$0.10209 x 109 kWh)		11.13
Electric DSM (\$0.00165 x 168 kWh)		0.28
Fuel Adjustment (\$0.00126 x 168 kWh)		0.21
Environmental Surcharge (2.780% x \$32.71)		0.91
Home Energy Assistance Fund Charge		0.30
Total Charges		\$33.92

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due **7/17/24** **\$156.03**
 After Due Date, Per: (Per Amount) **\$156.03**
 Winter-Care Donation:
 Total Amount Enclosed:

Account # **3500-1342-3776**
 Service Address: 107 Kenilworth Ct Apt C



a PPL company
 PO Box 771870
 St Louis, MO 63177-1670

NATALIYA WILLIAMS
 107 KENILWORTH CT APT C
 RADCLIFF, KY 40160-8116

IMPORTANT INFORMATION**Past Due Balance Subject to Disconnection - Immediate Action Required**

The due date shown above applies only to the current charges. To avoid disconnection, the ENTIRE past due balance must be paid in full. You may be eligible for a new payment arrangement if previous arrangements have been paid in full. Use our mobile app, online My Account or our automated phone system for payments and/or arrangements.

Late Payment Charge Waiver

The Late Payment Charge waiver on this account will expire on 06/10/25.

Pending Pledges

There is a pending pledge on this account. We had not received the pledge payment by the time this bill was prepared. Pledges made on a customer's account are reflected as "pending" until the pledge payment is received or the pledge is canceled. When the pledge payment is received, the amount of the pledge will be reflected in the "Payments" section of the next bill. If the pledge payment is not received within 40 days from the date the pledge is made, the pledge is canceled and the total amount of the pledge is added to the next bill.

Late payment fees will be applied to the current charges if the current amount due, including the amount of the pending pledge is not received by the payment due date on this bill.

The total amount of this bill includes an unpaid balance, which may lead to a disconnection of service. Please contact us if you have any questions or to discuss payment arrangements.



a PPL company

Mailed **6/18/24** for Account #

DELINQUENT AMOUNT DUE

\$120.09

FINAL PAY DATE

7/1/24

App, online or phone payments made before 7 pm ET will be posted same day.

Account Name: NATALIYA WILLIAMS

Service Address: 107 KENILWORTH CT APT C
RADCLIFF KY

Payment Options
(fees may apply) Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com
Phone - (800) 981-0600, press 1-2-3

Customer Service: For fastest service, use our mobile app, web, automated phone system (800) 981-0600 24 hours a day.
Phone reps available M-F, 7am - 7pm ET.



DISCONNECTION NOTICE

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If disconnected: The **ENTIRE** Delinquent Amount Due must be paid and you must request reconnection through our mobile app, online My Account, or our automated phone system. For same day reconnection, requests must be made by 5 p.m. ET. Requests received after 5 p.m. ET will be reconnected next day. A reconnect fee and deposit may be required as a condition of reconnection.

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NEED ASSISTANCE?

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More information can be found at lge-ku.com/assistance-programs.



TO AVOID DISCONNECTION

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Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

Unpaid payment arrangements **MUST** be paid before a new arrangement can be established.

To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at **800-981-0600**.

Delinquent Amount Due **7/1/24**

\$120.09

Total Amount Enclosed: *



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

Account # **3500-1342-3776**

Service Address: 107 KENILWORTH CT APT C

AB 01 002780 38122 H 11 A



NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116



a PPL company

BILLING SUMMARY

Previous Balance	149.17
Payment(s) Received	<u>0.00</u>
Balance as of 5/20/24	\$149.17
Current Electric Charges	34.36
Current Taxes and Fees	<u>2.04</u>
Total Current Charges as of 5/20/24	\$36.40
Other Charges (See Other Charges on back)	<u>134.52</u>
Total Amount Due	\$320.09

Past due balance subject to disconnection. See IMPORTANT INFORMATION.

Mailed 5/21/24 for Account :

AMOUNT DUE
\$320.09

DUE DATE
6/14/24

App, online or phone payments made before 7 pm ET will be posted same

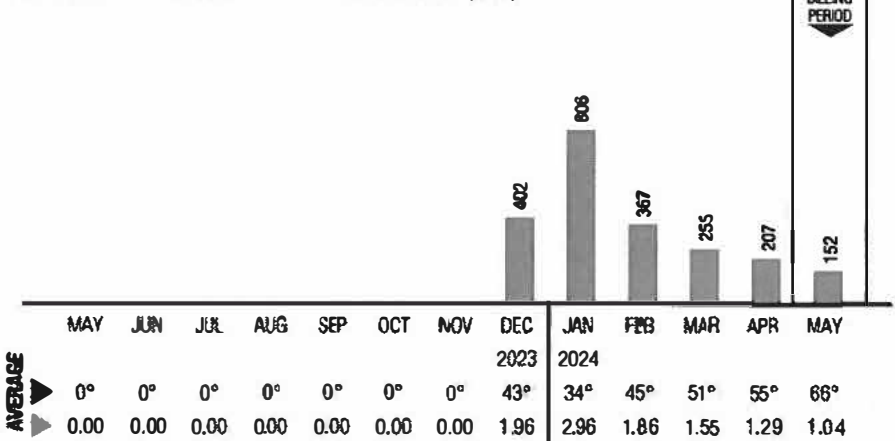
Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
Payment Options (fees may apply): Mobile app - LG&E KU OOP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
Customer Service: For fastest service, use our mobile app, website
 automated phone system (800) 981-0600
 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 6/18/24 - 6/21/24 (Meter Read Portion 13)

BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	66°	0°
Number of Days Billed	33	0
Avg. Electric Charges per Day	\$1.04	\$0.00
Avg. Electric Usage per Day (kWh)	4.61	0.00

MONTHLY USAGE



Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 6/14/24	\$320.09
After Due Date, Pay this Amount:	\$321.18
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W152528
Verified (V) kWh Reading on 5/20/24	61904
Verified (V) kWh Reading on 4/17/24	61752
Current kWh Usage	152
Meter Multiplier	1
Metered kWh Usage	152

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 33 Days)	17.49	
Energy Charge (\$0.09699 x 152 kWh)	14.74	
Electric DSM (\$0.00165 x 152 kWh)	0.25	
Fuel Adjustment (\$0.00462 x 152 kWh)	0.70	
Environmental Surcharge (2.640% x \$33.18)	0.88	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$34.36	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$34.06)	1.02
Franchise Fee-Radcliff (3.00% x \$34.06)	1.02
Total Taxes and Fees	\$2.04

Other Charges	
Late Payment Charge	1.18
Removal from Instalment Plan	133.34
Total Other Charges Due	\$134.52

BILLING INFORMATION

Late Payment Charge	
Late Charge to be Assessed After Due Date	\$1.09
Rate Schedules	
For a copy of your rate schedule, visit lge-ku.com/rates or call our Customer Service Department.	

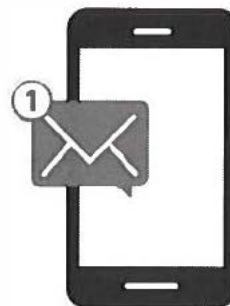
Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at lge-ku.com/inperson.



799366144580006371688320341787

OFFICE USE ONLY:
MRU13241223, G000000
P149.17
PF:YeBP

This barcode can be used at locations such as:



**Simplify
your life**

Who needs more paper? Simplify your life with our convenient paperless billing option. You'll receive your utility bill through a safe and secure email every month.

lge-ku.com/paperless

IMPORTANT INFORMATION

Past Due Balance Subject to Disconnection - Immediate Action Required

The due date shown above applies only to the current charges. To avoid disconnection, the ENTIRE past due balance must be paid in full. You may be eligible for a new payment arrangement if previous arrangements have been paid in full. Use our mobile app, online My Account or our automated phone system for payments and/or arrangements.



Mailed 5/16/24 for Account

DELINQUENT AMOUNT DUE
\$283.69

FINAL PAY DATE
5/29/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS

Service Address: 107 KENILWORTH CT APT C
RADCLIFF KY

Payment Options Mobile app - LG&E KU OOP mobile app

(fees may apply)

Online - lge-ku.com

Phone - (800) 981-0600, press 1-2-3

Customer Service:

For fastest service, use our mobile app, website, automated phone system (800) 981-0600 24 hours a day.

Phone reps available M-F, 7am - 7pm ET.

DISCONNECTION NOTICE

Your account is past due. If the Delinquent Due Amount is not received by the **Final Pay Date**, your service will be subject to disconnection. Please refer to the information on this notice for details to help you avoid disconnection.

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Unauthorized reconnection of service is punishable by law.

NEED ASSISTANCE?

You may be eligible to receive financial assistance to help you pay your bill.

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More information can be found at lge-ku.com/assistance-programs.

TO AVOID DISCONNECTION

Make your payment using our mobile app or one of the options listed above.

Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

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To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at **800-981-0600**.

Delinquent Amount Due **5/29/24** **\$283.69**

Total Amount Enclosed:

Account # **3500-1342-3776**

Service Address: 107 KENILWORTH CT APT C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116



CUSTOMER ASSISTANCE (Continued)

Hardin County

Central KY CAA

233 Ring Road Career Center
Elizabethtown, KY 42701
(502) 764-2222

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at lge-ku.com/inperson.



799366144580006371608320341787

OFFICE USE ONLY:
MRUI3241, G000000
FF:N eB:P

This barcode can be used at locations such as:





a PPL company

BILLING SUMMARY

Previous Balance	191.08
Payment(s) Received	-145.09
Balance as of 4/17/24	\$45.98
Current Electric Charges	37.30
Current Taxes and Fees	2.22
Total Current Charges as of 4/17/24	\$39.52
Other Charges (See Other Charges on back)	63.66
Total Amount Due	\$149.17

Mailed 4/18/24 for Account

AMOUNT DUE
\$149.17

DUE DATE
5/14/24

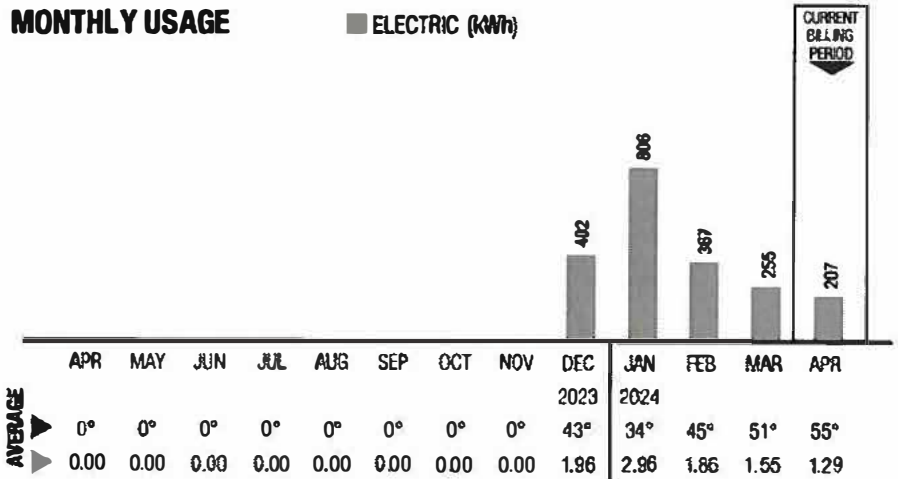
App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
Payment Options (fees may apply) Mobile app - LG&E KU ODP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
Customer Service: For fastest service, use our mobile app, website
 automated phone system (800) 981-0600
 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 5/17/24 - 5/21/24 (Meter Read Portion 13)

MONTHLY USAGE

■ ELECTRIC (kWh)



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	55°	0°
Number of Days Billed	29	0
■ Avg. Electric Charges per Day	\$1.29	\$0.00
Avg. Electric Usage per Day (kWh)	7.14	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 5/14/24	\$149.17
After Due Date, Pay this Amount:	\$150.35
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W152928
Verified (V) kWh Reading on 4/17/24	61752
Verified (V) kWh Reading on 3/19/24	61545
Current kWh Usage	207
Meter Multiplier	1
Metered kWh Usage	207

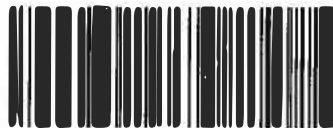
CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)	15.37	
Energy Charge (\$0.09699 x 207 kWh)	20.08	
Electric DSM (\$0.00132 x 114 kWh)	0.15	
Electric DSM (\$0.00165 x 93 kWh)	0.15	
Fuel Adjustment (\$0.00188 x 207 kWh)	0.39	
Environmental Surcharge (2.390% x \$36.14)	0.86	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$37.30	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$37.00)	1.11
Franchise Fee-Radcliff (3.00% x \$37.00)	1.11
Total Taxes and Fees	\$2.22

Other Charges	
Cash Deposit Request	160.00
Reconnect Charges	37.00
Inst Plan-Deposit Monthly	26.66
Transfer to Installment Plan	-160.00
Total Other Charges Due	\$63.66

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/receipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at lge-ku.com/inperson.



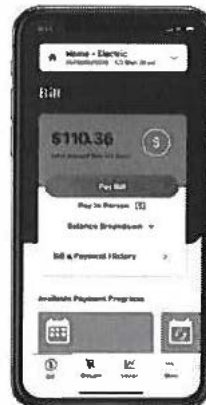
799366144580006371688320341787

OFFICE USE ONLY:
MRU13241223, G000000
P191.08
PF:Y eB:P

This barcode can be used at locations such as:



Account access on-the-go



Our powerful mobile app helps you view and pay your bill, track and report power outages –and more!

lge-ku.com/app



BILLING INFORMATION**Late Payment Charge**

Late Charge to be Assessed After Due Date \$1.18

Rate SchedulesFor a copy of your rate schedule, visit ge-ku.com/rates or call our Customer Service Department.**IMPORTANT INFORMATION****Installment Payment Plan**

Our records indicate there is a payment arrangement for this account. You can avoid service disconnection by ensuring we receive payment by the date(s) established in your arrangement.

Late payment charges will be applied if we do not receive payment for the current charges by the payment due date on this bill. This is the case even if you have made payment arrangements.

Payment Plan Balance

The remaining balance on your payment/installment plan after this month's payment: \$133.34



a PPL company

BILLING SUMMARY

Previous Balance	143.37
Payment(s) Received	0.00
Balance as of 3/19/24	\$143.37
Current Electric Charges	43.41
Current Taxes and Fees	2.58
Total Current Charges as of 3/19/24	\$45.99
Other Charges (See Other Charges on back)	1.72
Total Amount Due	\$191.08

Past due balance subject to disconnection. See IMPORTANT INFORMATION.

Mailed 3/20/24 for Account

AMOUNT DUE
\$191.08

DUE DATE
4/12/24

App, online or phone payments made before 7 pm ET will be posted same day.

Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
Payment Options (fees may apply): Mobile app - LG&E KU ODP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
Customer Service: For fastest service, use our mobile app, website, automated phone system (800) 981-0600 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

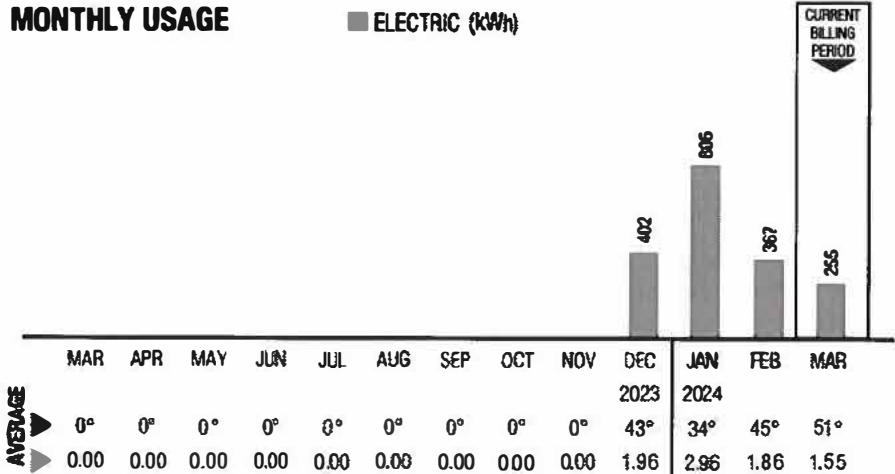
Next read will occur 4/17/24 - 4/19/24 (Meter Read Portion 13)

BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	51°	0°
Number of Days Billed	28	0
Avg. Electric Charges per Day	\$1.55	\$0.00
Avg. Electric Usage per Day (kWh)	9.11	0.00

MONTHLY USAGE

■ ELECTRIC (kWh)



Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 4/12/24	\$191.08
After Due Date, Pay this Amount:	\$192.46
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W152528
Verified (V) kWh Reading on 3/19/24	61545
Actual (R) kWh Reading on 2/20/24	61290
Current kWh Usage	255
Meter Multiplier	1
Metered kWh Usage	255

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 28 Days)	14.84	
Energy Charge (\$0.09699 x 255 kWh)	24.73	
Electric DSM (\$0.00132 x 255 kWh)	0.34	
Fuel Adjustment (\$0.00857 x 255 kWh)	2.19	
Environmental Surcharge (2.410% x \$42.10)	1.01	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$43.41	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$43.11)	1.29
Franchise Fee-Radcliff (3.00% x \$43.11)	1.29
Total Taxes and Fees	\$2.98

Other Charges	
Late Payment Charge	1.72
Total Other Charges Due	\$1.72

BILLING INFORMATION

Late Payment Charge	
Late Charge to be Assessed After Due Date	\$1.38
Rate Schedules	
For a copy of your rate schedule, visit lge-ku.com/rates or call our Customer Service Department.	

Want to pay cash? Visit checkmapay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at lge-ku.com/inperson.



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OFFICE USE ONLY:
MRU13241223, G000000
P143.37
PF:YeB:P

This barcode can be used at locations such as:



LG&E and KU will never call and ask for credit or debit card numbers or other personal information.

lge-ku.com/safety/scams

IMPORTANT INFORMATION

Past Due Balance Subject to Disconnection - Immediate Action Required

The due date shown above applies only to the current charges. To avoid disconnection, the ENTIRE past due balance must be paid in full. You may be eligible for a new payment arrangement if previous arrangements have been paid in full. Use our mobile app, online MyAccount or our automated phone system for payments and/or arrangements.



a PPL company

Mailed **3/19/24** for Account :

DELINQUENT AMOUNT DUE

\$145.09

FINAL PAY DATE

3/29/24

App, online or phone payments made before 7 pm ET will be posted same day.

Account Name: NATALIYA WILLIAMS

Service Address: 107 KENILWORTH CT APT C
RADCLIFF KY

Payment Options
(fees may apply)
Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com


Customer Service: Phone - (800) 981-0600, press 1-2-3
For fastest service, use our mobile app, website
automated phone system (800) 981-0600
24 hours a day.
Phone reps available M-F, 7am - 7pm ET.

DISCONNECTION NOTICE

Your account is past due. If the Delinquent Due Amount is not received by the **Final Pay Date**, your service will be subject to disconnection. Please refer to the information on this notice for details to help you avoid disconnection.

If disconnected: The **ENTIRE** Delinquent Amount Due must be paid and you must request reconnection through our mobile app, online My Account, or our automated phone system. For same day reconnection, requests must be made by 5 p.m. ET. Requests received after 5 p.m. ET will be reconnected next day. A reconnect fee and deposit may be required as a condition of reconnection.


Unauthorized reconnection of service is punishable by law.

 NEED ASSISTANCE?

You may be eligible to receive financial assistance to help you pay your bill.

Please see the back of this notice for community assistance agencies near you.

More information can be found at lge-ku.com/assistance-programs.

 TO AVOID DISCONNECTION

Make your payment using our mobile app or one of the options listed above.

Avoid disconnection by paying the entire Delinquent Amount Due; OR by making a Partial Payment AND setting up a Payment Arrangement on the remaining balance before the Final Pay Date on this notice.

Payment Arrangements on eligible past due balances can be made through our mobile app, online via My Account, or by phone (press 1-2-2-1).

Unpaid payment arrangements **MUST** be paid before a new arrangement can be established.

To avoid future disconnection, pay the agreed-upon payment arrangement amount in addition to the current bill each month by the due date.

The Final Pay Date will not change upon receipt of future bills. If your service is disconnected and you disagree with the reason of termination, call us at **800-981-0600**.

Delinquent Amount Due **3/29/24** **\$145.09**

Total Amount Enclosed:

Account # **3600-1342-3776**
Service Address: 107 KENILWORTH CT APT C

KU
a PPL company
PO Box 771670
St. Louis, MO 631 77-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116



CUSTOMER ASSISTANCE (Continued)

Hardin County

Central KY CAA

233 Ring Road Career Center

Elizabethtown, KY 42701

(502) 764-2222

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/receipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at fee-ku.com/inperson.



79936614458006371688320341787

OFFICE USE ONLY:
MRU13241, G000000
PF:NEB:P

This barcode can be used at locations such as:





a PPL company

BILLING SUMMARY

Previous Balance	83.04
Payment(s) Received	<u>0.00</u>
Balance as of 2/20/24	\$83.04
Current Electric Charges	53.91
Current Taxes and Fees	<u>3.22</u>
Total Current Charges as of 2/20/24	\$57.13
Other Charges (See Other Charges on back)	<u>3.20</u>
Total Amount Due	\$143.37

Mailed 2/21/24 for Account :

AMOUNT DUE
\$143.37

DUE DATE
3/15/24

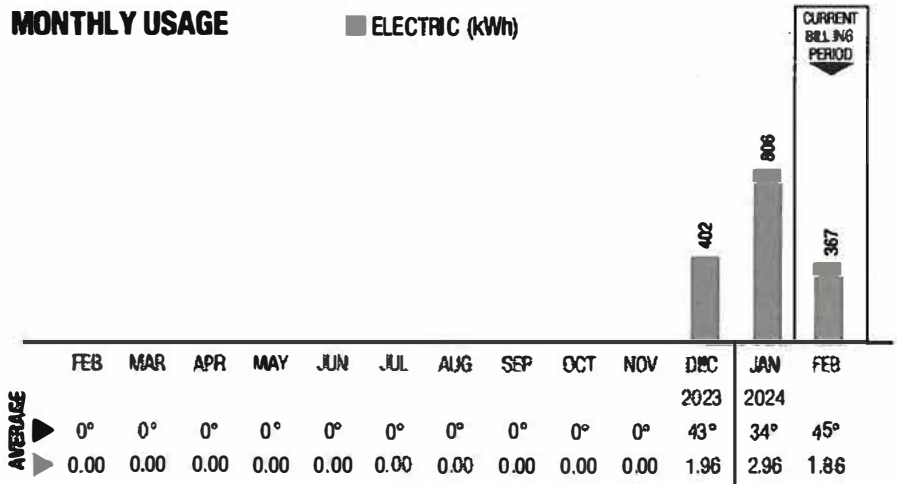
App, online or phone payments made before 7 pm ET will be posted same

Account Name: **NATALIYA WILLIAMS**
Service Address: **107 Kenilworth Ct Apt C
RADCLIFF KY**
Payment Options (fees may apply): **Mobile app - LG&E KU GOP mobile app
Online - lge-ku.com
Phone - (800) 981-0600, press 1-2-3**
Customer Service: **For fastest service, use our mobile app, website
automated phone system (800) 981-0600
24 hours a day.
Phone reps available M-F, 7am - 7pm ET.**

Next read will occur 3/18/24 - 3/20/24 (Meter Read Portion 13)

MONTHLY USAGE

■ ELECTRIC (kWh)



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	45°	0°
Number of Days Billed	29	0
■ Avg. Electric Charges per Day	\$1.86	\$0.00
Avg. Electric Usage per Day (kWh)	12.66	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 3/15/24	\$143.37
After Due Date, Pay this Amount:	\$145.09
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 771670
St. Louis, MO 63177-1670

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W150528
Actual (R) kWh Reading on 2/20/24	6 1290
Actual (R) kWh Reading on 1/22/24	60 923
Current kWh Usage	367
Meter Multiplier	1
Metered kWh Usage	367

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)	15.37	
Energy Charge (\$0.09699 x 367 kWh)	35.60	
Electric DSM (\$0.00132 x 367 kWh)	0.48	
Fuel Adjustment (\$0.00176 x 367 kWh)	0.65	
Environmental Surcharge (2.890% x \$52.10)	1.51	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$53.91	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$53.61)	1.61
Franchise Fee-Radcliff (3.00% x \$53.61)	1.61
Total Taxes and Fees	\$3.22

Other Charges	
Late Payment Charge	3.20
Total Other Charges Due	\$3.20

BILLING INFORMATION

Late Payment Charge	
Late Charge to be Assessed After Due Date	\$1.72
Rate Schedules	
For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.	

Want to pay cash? Visit checktopay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pav/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pav/receipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/inperson.



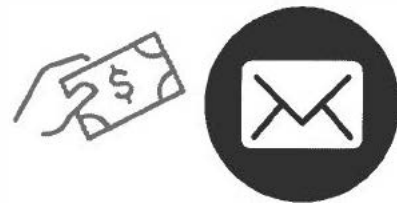
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OFFICE USE ONLY:
MRU13241223, G000000
P83.04
PF:Y eB:P

This barcode can be used at locations such as:



Our mailing address has changed!



Mail payments to
P.O. Box 771670, St. Louis, MO 63177
as noted on your bill stub.



a PPL company

BILLING SUMMARY

Previous Balance	60.38
Payment(s) Received	0.00
Balance as of 1/22/24	\$60.38
Current Electric Charges	100.61
Current Taxes and Fees	6.02
Total Current Charges as of 1/22/24	\$106.63
Other Charges (See Other Charges on back)	-83.97
Total Amount Due	\$83.04

Mailed 1/23/24 for Account

AMOUNT DUE

\$83.04

DUE DATE

2/14/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS

Service Address: 107 Kenilworth Ct Apt C
RADCLIFF KY

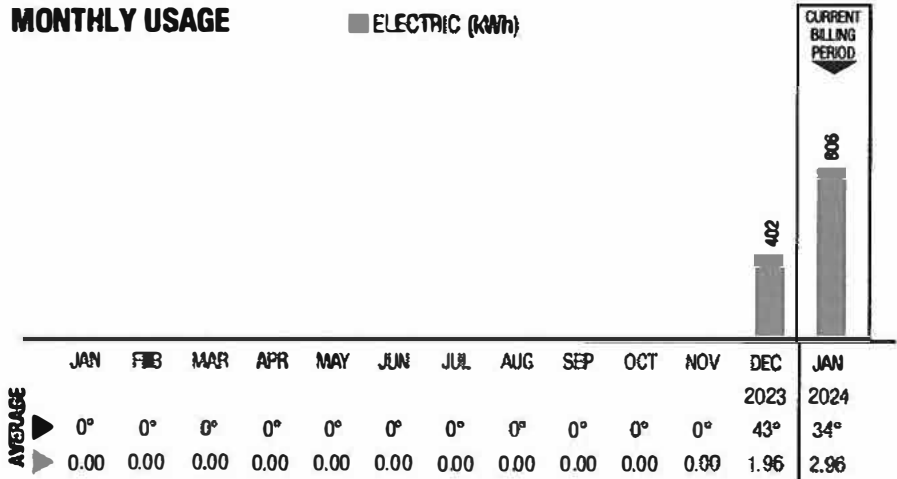
Payment Options (fees may apply)
Mobile app - LG&E KU ODP mobile app
Online - lge-ku.com

Customer Service: Phone - (800) 981-0600, press 1-2-3
For fastest service, use our mobile app, website, automated phone system (800) 981-0600 24 hours a day.
Phone reps available M-F, 7am - 7pm ET.

Next read will occur 2/16/24 - 2/21/24 (Meter Read Portion 13)

MONTHLY USAGE

■ ELECTRIC (kWh)



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	34°	39°
Number of Days Billed	34	0
Avg. Electric Charges per Day	\$2.96	\$0.00
Avg. Electric Usage per Day (kWh)	23.71	0.00

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 2/14/24	\$83.04
After Due Date, Pay this Amount:	\$86.24
WinterCare Donation:	
Total Amount Enclosed:	

Account # 3500-1342-3776

Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 25212
Lehigh Valley, PA 18002-5212

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W152928
Actual (R) kWh Reading on 1/22/24	60923
Actual (R) kWh Reading on 12/19/23	60117
Current kWh Usage	806
Meter Multiplier	1
Metered kWh Usage	806

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 34 Days)	18.02	
Energy Charge (\$0.09699 x 806 kWh)	78.17	
Electric DSM (\$0.00076 x 229 kWh)	0.17	
Electric DSM (\$0.00132 x 577 kWh)	0.76	
Fuel Adjustment (\$0.00021 x 806 kWh)	0.17	
Environmental Surcharge (3.100% x \$97.29)	3.02	
Home Energy Assistance Fund Charge	0.30	
Total Charges	\$100.61	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$100.31)	3.01
Franchise Fee-Radcliff (3.00% x \$100.31)	3.01
Total Taxes and Fees	\$6.02

Other Charges	
Transferred Balance	-83.97
Total Other Charges Due	-\$83.97

BILLING INFORMATION

Late Payment Charge	
Late Charge to be Assessed After Due Date	\$3.20
Rate Schedules	
For a copy of your rate schedule, visit ge-ku.com/rates or call our Customer Service Department.	

Want to pay cash? Visit checkfriday.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/ereceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ge-ku.com/finperson.



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OFFICE USE ONLY:
MR U13241223, G000000
P60.38
PF:Y eB:P

This barcode can be used at locations such as:



COLD WEATHER TIPS



Replace furnace filters every 30 days or so. Use the day you receive your bill from us as a reminder!

Visit ge-ku.com/tips for more cold weather tips.



a PPL company

BILLING SUMMARY

Previous Balance	0.00
Payment(s) Received	0.00
Balance as of 12/19/23	\$0.00
Current Electric Charges	56.98
Current Taxes and Fees	3.40
Total Current Charges as of 12/19/23	\$60.38
Total Amount Due	\$60.38

This is your initial bill, please refer to our Welcome Home Checklist at lge-ku.com/welcome.

Mailed 12/20/23 for Account

AMOUNT DUE
\$60.38

DUE DATE
1/17/24

App, online or phone payments made before 7 pm ET will be posted same

Account Name: NATALIYA WILLIAMS
Service Address: 107 Kenilworth Ct Apt C
 RADCLIFF KY
Payment Options (fees may apply):
 Mobile app - LG&E KU ODP mobile app
 Online - lge-ku.com
 Phone - (800) 981-0600, press 1-2-3
Customer Service: For fastest service, use our mobile app, website
 automated phone system (800) 981-0600
 24 hours a day.
 Phone reps available M-F, 7am - 7pm ET.

Next read will occur 1/18/24 - 1/22/24 (Meter Read Portion 13)

MONTHLY USAGE

■ ELECTRIC (kWh)



BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	43°	0°
Number of Days Billed	29	0
■ Avg. Electric Charges per Day	\$1.96	\$0.00
Avg. Electric Usage per Day (kWh)	13.86	0.00

	DEC 2022	JAN 2023	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
AVERAGE	0°	0°	0°	0°	0°	0°	0°	0°	0°	0°	0°	0°	43°
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96

Please return only this portion with your payment. Make checks payable to KU and write your account number on your check.

Amount Due 1/17/24	\$60.38
After Due Date, Pay this Amount:	\$62.19
WinterCare Donation:	
Total Amount Enclosed:	

Account # **3500-1342-3776**
Service Address: 107 Kenilworth Ct Apt C



a PPL company
PO Box 25212
Lehigh Valley, PA 18002-5212

NATALIYA WILLIAMS
107 KENILWORTH CT APT C
RADCLIFF, KY 40160-8116

CURRENT USAGE

⚡ ELECTRIC	
Meter Reading Information	Meter # W150528
Actual (R) kWh Reading on 12/19/23	60117
Verified (V) kWh Reading on 11/21/23	59715
Current kWh Usage	402
Meter Multiplier	1
Metered kWh Usage	402

CURRENT CHARGES

⚡ ELECTRIC		Rate: Residential Service - All Electric
Basic Service Charge (\$0.53 x 29 Days)	15.37	
Energy Charge (\$0.09699 x 402 kWh)	38.99	
Electric DSM (\$0.00076 x 402 kWh)	0.31	
Fuel Adjustment (\$0.00095 x 402 kWh)	0.38	
Environmental Surcharge (2.960% x \$55.05)	1.63	
Home Energy Assistance Fund Charge	0.30	
Total Charges	956.98	

Taxes & Fees	
Rate Increase For School Tax (3.00% x \$56.68)	1.70
Franchise Fee-Radcliff (3.00% x \$56.68)	1.70
Total Taxes and Fees	\$3.40

BILLING INFORMATION

Late Payment Charge	
Late Charge to be Assessed After Due Date	\$1.81
Rate Schedules	
For a copy of your rate schedule, visit ige-ku.com/rates or call our Customer Service Department.	

Want to pay cash? Visit checkfreepay.com/en/payment-locator to find locations near you. By accepting or using this barcode to make a payment, you agree to the full terms and conditions, available at vanilladirect.com/pay/terms. After successful payment using this barcode, you may retrieve your full detailed eReceipt at vanilladirect.com/pay/eReceipt. There is a limit of \$500 at some locations. Customer Fee: \$1.95. Learn more at ige-ku.com/inperson.



799366144580006371688320341787

OFFICE USE ONLY:
MRU13241223, G000000
PF:YeB:P

This barcode can be used at locations such as:



WinterCare Assistance Fund



Help your neighbors stay warm with KU's WinterCare program. KU matches customers' donations. Make your donation TODAY!

ige-ku.com/wintercare

Lecture 3

Continue 1

STRUCTURE OF EXTERNAL ELECTRICAL NETWORKS

When using a voltage of 380 V, losses are reduced of electricity several times (compared to voltage 220), and there is also a 2-fold saving of metal.

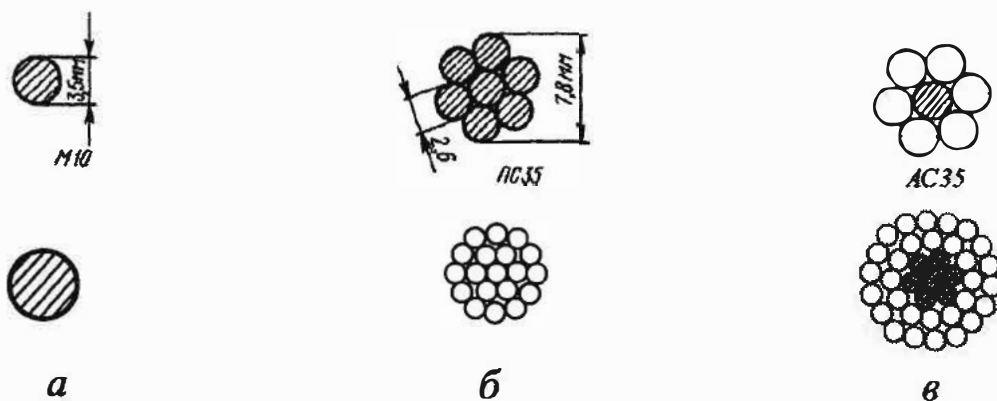
Distribution networks are operated with a voltage of 6 and 10 kV. Voltage 6 kV is used only when expanding existing networks. **The power supply networks** are operated with a voltage of 35 and 110 kV. For transformations use substations with a voltage of 10(6)/0.4 kV and 35/0.4 kV, and for powering large objects - 110/35/10 kV

3.2 Construction of external wires and cables electrical networks.

In electrical networks as a material for current-conducting cores of wires and cables use copper and aluminum. It is also used for wires of overhead lines steel. **Copper** is used for insulated wires inside premises and only in certain cases (on the coast of the seas, in the area chemical plants) for wires of overhead lines. **Aluminum** used for the manufacture of wires for both internal and for external electrical networks. For overhead lines power transmissions are currently mostly used uninsulated (bare) wires. The following requirements apply to non-insulated wires: high electrical conductivity; high mechanical strength; flexibility and plasticity; high chemical resistance; low density; low cost. Electrical and mechanical characteristics of **copper, aluminum** and **steels** differ significantly from each other. **Copper** has high electrical conductivity. For solid (no annealed) copper specific conductivity $\gamma = 54 \cdot 10^6 \text{ Cm/m}$. Mechanical the strength of copper is also high. Temporary resistance to tearing of solid copper, that is, the force at which destruction occurs 50 material, $\sigma = 390 \text{ MPa}$. Copper density $\rho = 8940 \text{ kg/m}$

3. copper wires are well resistant to the chemical action of various substances. They differ in that, being in the air, they are covered with a thin layer a film of oxides that protects them from further destruction. **Aluminum** has lower conductivity compared to copper. For solid aluminum, specific conductivity $\gamma = 32 \cdot 10^6$ S/m. He has lower mechanical characteristics compared to copper. Temporary resistance at breaking $\sigma = 80...160$ MPa. Density of aluminum is much smaller than that of copper, and is only $\rho = 2700$ kg/m³ (very easy). Just like copper, aluminum does not corrode in the open air, being covered with a film of oxides. **Steel** has a much lower conductivity than aluminum and copper, in addition, its conductivity depends on the strength of the alternating current, which flows along the wire. At a very low current, the conductivity of steel $\gamma = 7.5 \cdot 10^6$ C/m. The mechanical strength of steel wires is significant. Temporary resistance during breaking of single-wire steel wires $\sigma = 370$ MPa, and multi-wire $\sigma = 650...700$ MPa. Steel density $\rho = 7850$ kg/m³. Unlike wires made of non-ferrous metals steel wires, being oxidized, are covered with rust that does not protects them from further destruction. Therefore, they are made either from galvanized wire, or with an additive of copper. Today, the use of steel and aluminum is common wires, in which the inner wires are made of steel, and the outer ones are made of aluminum Steel wires carry a mechanical load, aluminum - electrical and mechanical load. Bimetallic wires are also used. They have steel the core is electrolytically covered with a thick layer of copper or aluminum, which significantly increases the electrical conductivity of the wire. **Non-insulated wires for overhead lines perform single-wire and multi-wire (Figure 3.7).** Single-wire wires are made only with a copper section up to 10 mm² and steel with a diameter

лініях мідь не використовують. Алюмінієві однодротові проводи для повітряних ліній електропередачі застосовувати не можна.



a – однодротовий; *б* – багатодрововий; *в* – сталєалюмінієвий

Рисунок 3.7 – Конструкція неізолюваних проводів

Багатодровові проводи виготовляють із усіх перерахованих вище металів. Їх виконують з дротів однакового перерізу. Число дротів зазвичай дорівнює 7, 12, 19, 37 або 61. При такому числі дротів вони краще за все розташовуються навколо одного центрального дроту. Багатодровові проводи мають більшу механічну міцність і більшу гнучкість в порівнянні з однодротовими, тому саме їх широко застосовують в повітряних електричних мережах.

Неізолювані проводи позначають (маркують) наступним чином: літерами М, А, Ап, АС, АпС та ПС позначають матеріал проводу, а цифрами – його переріз в міліметрах квадратних. Наприклад, А25 (Ап25) означає алюмінієвий провід перерізом 25 мм², ПС25 – провід сталевий перерізом 25 мм².

Провід марки А виготовляють із твердого алюмінію марки АТ, а провід Ап із твердого алюмінію підвищеної міцності АТп.

Однодротові сталеві проводи позначають наступним чином: ПСТ3.5, ПСТ4, ПСТ5, де цифри відповідають діаметру проводу в міліметрах.

Сталєалюмінієві проводи в залежності від марки алюмінієвих дротів маркують відповідно АС та АпС.

Якщо міждротовий простір алюмінієвого або сталєалюмінієвого проводу, за виключенням зовнішньої поверхні, заповнений

of up to 5 mm, but currently in air 51 copper lines are not used. Aluminum single-wire wires cannot be used for overhead power lines.

a – single-wire; b - multi-wire;  – steel and aluminum

Figure 3.7 – Construction of non-insulated wires

Multi-wire wires are made from all of the above metals. They are made of wires of the same cross-section. Numeric of wires is usually equal to 7, 12, 19, 37 or 61.

With this number of wires they are best located around one central one wire Multi-wire wires have greater mechanical strength and greater flexibility compared to single-wire, that is why they are wide used in overhead electrical networks. Non-insulated wires are marked as follows as follows: the letters M, A, An, AC, AnC and PS denote the material wire, and numbers - its cross-section in square millimeters. For example, A25 (An25) means an aluminum wire cross-section 25 mm², PS25 – steel wire with a section of 25 mm². A grade wire is made of solid grade aluminum AT, and the Ap wire is made of solid aluminum of increased strength ATp. Single-wire steel wires are designated as follows as follows: PST3.5, PST4, PST5, where the numbers correspond to the diameter wire in millimeters. Steel-aluminum wires depending on the brand aluminum wires are labeled AS and ApS, respectively. If the interwire space is aluminum or steel-aluminum the wire, except for the outer surface, is filled AS35 52 with a neutral lubricant of increased heat resistance, then up to the mark the letters KP are added to the wire (AKP, ApKP, ASKP, ApSKP). For marking wires with neutral grease only the interwire space of the steel core is filled, including its surface, add the letters KC (ACKC, AnCKC). If the steel core, in addition to the neutral lubricant, insulated with two strips of polyethylene terephthalate film, then in the letter K is added to the designation of the wire (ASK, ApSK).

нейтральним мастилом підвищеної термостійкості, то до марки проводу додають літери КП (АКП, АпКП, АСКП, АпСКП).

Для маркування проводів, у яких нейтральним мастилом заповнений лише міждротовий простір сталюого осердя, включно із його поверхнею, додають літери КС (АСКС, АпКС).

Якщо сталюе осердя окрім нейтрального мастила, ізолюване двома стрічками поліетилентерефталатної плівки, то в позначення проводу додають літеру К (АСК, АпСК).

З метою підвищення надійності електропостачання при передачі електроенергії на значні відстані та при розподіленні її в силових і освітлювальних мережах використовують ізолювані проводи із алюмінієвими жилами, скручені в загальний джгут із сталюю несучою жнлою або без неї, з ізоляцією із зшитого поліетилену. Такі повітряні кабелі мають великі перспективи для застосування в сільських та мережах в приватному секторі міст.

Самоутримні ізолювані проводи (СП) використовують для ліній електропередачі напругою 0,38, 0,66 та 10 кВ при температурі від -50°C до $+50^{\circ}\text{C}$. При використанні СП знижуються експлуатаційні витрати, відсутнє утворення ожеледі на проводах, можлива робота лінії при перехрещенні проводів, виключена можливість короткого замикання між проводами.

СП-1 (СП-1А) – самоутримний ізолюваний провід, алюмінієві жили ізолювані світлостабілізованим термопластичним поліетиленом, скручені навколо неізолюваного (ізолюваного) сталюалюмінієвого тросу. Провід призначений для повітряних ліній електропередачі напругою до 1 кВ (рисунок 3.8).



а – СП-1; б – СП-1А

Рисунок 3.8 – Самоутримні ізолювані проводи

In order to increase the reliability of electricity supply at transmission of electricity over considerable distances and when distributing it in power and lighting networks require isolation conducts with aluminum cores, twisted into a common harness with steel core or without it, with cross-linked insulation polyethylene. such aerial cables have great prospects for application in rural and networks in the private sector of cities. Self-supporting insulated wires (SIP) are used for power transmission lines with a voltage of 0.38, 0.66 and 10 kV at temperature from -50 C to $+50\text{ C}$ When using SIP operating costs are reduced, there is no ice formation on the wires, the line may work when the wires are crossed, the possibility of a short circuit between the wires is excluded. **SIP-1 (SIP-1A)** is a self-supporting insulated wire, aluminum cores are insulated with light-stabilized thermoplastic polyethylene, twisted around non-insulated (insulated) steel-aluminum cable. **The wire is intended for air power transmission lines with a voltage of up to 1 kV (Figure 3.8).**

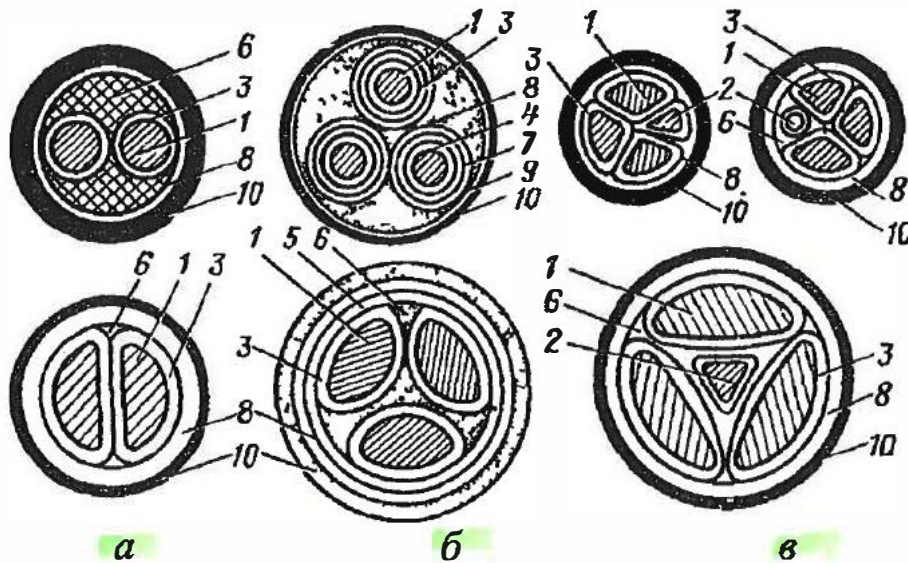
SIP-3 is a single-core self-supporting wire made of compacted aluminum alloy wires with steel wire inside, insulated with cross-linked light-stabilized polyethylene. SIP-3 designed for overhead power lines with a voltage of 6...20 kV.

SAPt (SAPssh) - a wire with aluminum cores from insulation from light-stabilized thermoplastic (t) or cross-linked polyethylene for overhead lines with a voltage of 0.38 kV.

CACIIr (CACIIcw) - a wire with aluminum cores from insulation from light-stabilized thermoplastic or cross-linked polyethylene for overhead lines with a voltage of 0.38 kV with a supporting core.

гумовою ізоляцією прокладають у закритих приміщеннях або застосовують для живлення мобільних пересувних споживачів.

Найбільш поширеними є три- та чотирижильні кабелі із паперовою ізоляцією. Для напруги до 10 кВ їх виготовляють із поясною ізоляцією та в загальній для усіх жил свинцевій оболонці, для напруги 20 та 35 кВ кабелі виготовляють із окремо освинцьованими жилами (рисунок 3.9).



a – двожильні кабелі із круглими і сегментними жилами; *б* – трижильні кабелі з окремо освинцьованими жилами та з поясною ізоляцією; *в* – чотирижильні кабелі з нульовою жилою секторної, круглої і трикутної форми; 1 – струмопровідна жила; 2 – нульова жила; 3 – ізоляція жили; 4 – екран на струмопровідній жилі; 5 – поясна ізоляція; 6 – наповнювач; 7 – екрани на ізоляції жили; 8 – оболонка; 9 – бронепокриття; 10 – зовнішнє захисне покриття

Рисунок 3.9 – Поперечні перерізи силових кабелів

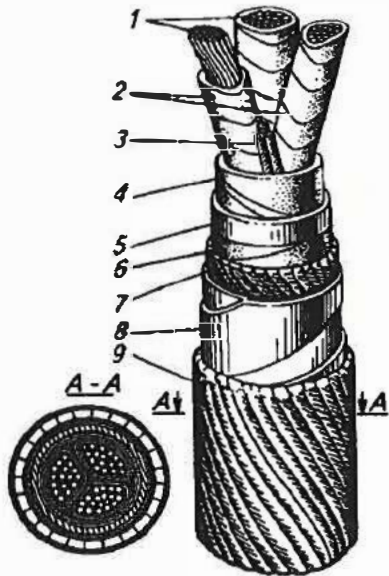
Кабелі напругою до 6 кВ та перерізом жил до 16 мм² виготовляють із круглими жилами. При більш високій напрузі та більших перерізах вони мають секторні жили.

На рисунку 3.10 зображено кабель із секторними жилами на напругу 3...10 кВ. Кожна струмопровідна жила кабелю ізолювана кабельним папером, який просочений масою, до складу якої входять трансформаторне масло та каніфоль. Крім того, всі жили разом ізолювані просоченим кабельним папером

A cable is an insulated wire that is placed in sealed lead (aluminum, polyvinyl chloride) shell. It can be laid in the air, in the ground and in the water. The following are typical for electric cable lines advantages compared to air: longer service life and lack of supports; higher operational reliability due to the absence of influence such atmospheric phenomena as wind, ice, lightning surges, etc.; absence of poles and wires that clutter the streets and fields; reduction of danger to people and animals in case of occurrence accidents on the line. But cable lines also have a number of disadvantages, including the following can be attributed: higher cost of networks compared to aerial ones and the need for additional consumption of non-ferrous metals (lead, aluminum); the need for more qualified employees' construction and maintenance of cable lines; the difficulty of determining the damaged area. But despite the listed disadvantages of cable lines, they need to be more widely applied. Electric cables of general purpose are made with paper impregnated or with rubber insulation. Cables from 54 laid with rubber insulation in closed rooms or used for powering mobile consumers. The most common are three- and four-core cables with paper insulation. For voltage up to 10 kV, they are made of belt insulation and lead common for all cores sheath, for voltage 20 and 35 kV cables are made separately leaded wires (Figure 3.9)

a – two-core cables with round and segmental cores; b - three-core cables with individually leaded cores and with a belt isolation; c – four-core cables with a sector zero core, round and triangular; 1 – conductive core; 2 is zero vein; 3 – wire insulation; 4 – screen on the conductive core; 5 – belt insulation; 6 – filler; 7 – screen on the insulation of the core; 8 – shell; 9 – armor plating; 10 – external protective coating

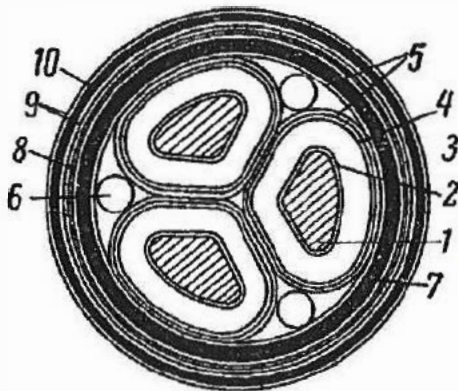
(поясна ізоляція). Для забезпечення герметичності кабелю на поясну ізоляцію накладають свинцеву оболонку без швів. Від механічних пошкоджень кабель захищають бронею із сталеві стрічки. Для захисту від хімічних впливів кабель покривають асфальтованим джутом. Випускають також кабелі, у яких оболонка із свинцю замінена оболонкою із алюмінію або пластмаси.



1 – алюмінієві або мідні струмопровідні жили; 2 і 4 – фазна і поясна паперова ізоляція; 3 – джутові заповнювачі; 5 – свинцева оболонка; 6 – паперова стрічка; 7 – прошарок із джуту; 8 – сталева стрічкова броня; 9 – джутове покриття

Рисунок 3.10 – Конструкція трижильного кабелю напругою 3...10 кВ із секторними жилами і поясною ізоляцією

Для напруги 10 і 35 кВ також виготовляють газонаповнені кабелі із спільною свинцевою оболонкою на всі жили (рисунок 3.11). Повітряні включення в ізоляції, по мірі їхнього утворення, заповнюються азотом під тиском. Постійність тиску забезпечується тим, що витік газу компенсуються неперервним підкачуванням.



1 – струмопровідна жила; 2 – екран із напівпровідного паперу; 3 – збіднено-просочена фазна паперова ізоляція; 4 – металізований папір; 5 – тканинна стрічка з дротом; 6 – сталевий гнучкий газопроникний лланг; 7 – свинцева оболонка; 8 – мідна стрічка; 9 – захисний шар; 10 – сталева стрічкова броня і джутовий покрив

Рисунок 3.11 – Газонаповнений кабель напругою 35 кВ

Figure 3.9 – Cross sections of power cables.

Cables with a voltage of up to 6 kV and a wire cross-section of up to 16 mm² are made with round cores. At a higher voltage and in larger sections, they have sector veins.

Figure 3.10 shows a cable with sector cores at a voltage of 3...10 kV. Each current-carrying core of the cable insulated with cable paper, which is impregnated with mass, to which includes transformer oil and rosin. Except moreover, all wires were isolated together with impregnated cable paper 55 (belt insulation).

To ensure the tightness of the cable on belt insulation is applied with a lead sheath without seams. From against mechanical damage, the cable is protected by steel armor ribbons to protect against chemical influences, the cable is covered asphalted jute. Cables with a sheath made of lead is replaced by a shell made of aluminum or plastic.

1 aluminum or copper conductive wires; 2 and 4 –phase and belt paper insulation; 3 – jute fillers; 5 – lead shell; 6 – paper tape; 7 – layer from jute; 8 – steel strip armor; 9 – jute covering. Figure 3.10 – Construction of a three-wire cable with voltage 3...10 kV with sector cores and belt insulation.

For voltages of 10 and 35 kV, gas-filled ones are also made cables with a common lead sheath for all cores (**Fig 3.11**). Air inclusions in the insulation, as they form, are filled with nitrogen under pressure. Constant pressure is ensured due to the fact that gas leakage is compensated by continuous pumping.

1-conductive core; 2 - screen with semiconductor paper; 3 – depleted phase paper insulation; 4 – metallized paper; 5 – fabric tape with wire; 6 – steel flexible gas permeable hose; 7 – lead shell; 8 – copper tape; 9 – protective

layer; 10 – steel tape armor and jute covering. Figure 3.11 – Gas-filled cable with a voltage of 35 kV.

Cables are made for a voltage of 110 kV and above single-core. The core is made of copper. Inside the cable there is a tape rolled up in the form of a spiral. She is under pressure circulates cable oil that provides high-quality insulation and cable cooling (Figure 3.12).

1 - conductive core; 2 – central oil-conducting channel; 3 – layer of paper insulation; 4 – lead shell; 5 – brass ribbons; 6 - anti-corrosion bituminous coverings; 7 – steel wires; 8 – copper wires; 9 – fabric, impregnated with bitumen.

Figure 3.12 – Medium pressure oil-filled cable with a voltage of 110 kV.

Cables are marked in the same way as insulated wires. For example, SB3×70 is a three-core cable with copper cores (letter A is missing), with a core cross-section of 70 mm², with paper belt insulation (B), in a lead shell (C), armored tape, with jute asphalt coating. When the insulation is made of rubber, in the cable brand add the letter R. When instead of a lead sheath is used sheath made of polyvinyl chloride, then in the marking of the cable the letter C replaced by the letter B, and if made of aluminum, then by the letter A. Cables are laid indoors and outdoors. Most a common way of laying the cable is directly in the ground, in trenches. Under this condition, the heat transfer of the cable is the best and the allowable electrical load increases significantly. When laying cables outdoors, in 57 special units and channels to serve them more conveniently than with laying in the trenches, but at the same time the heat transfer deteriorates.

Cable channels are used in the workshop and off-site laying of cables. This method allows provide inspection and repair of cable lines in the process operation, as well as laying a new one or replacing the existing one cable without earthworks. It also provides reliable protection against mechanical damage. Laying cables in blocks is recommended in places intersection with railways and roads, in conditions limited space on the track (with a large number of others underground communications and constructions), in the event of a spill aggressive liquids in places where cable routes pass, etc.

3.3 Insulators of overhead power lines

For trouble-free operation of electrical equipment, it is necessary ensure reliable insulation of current conductors between themselves and relative to each other land Insulation resistance is determined by the breakdown voltage. Insulators used for fastening electrical equipment is divided into supporting and through. Insulators used for fastening wires overhead lines and buses of open distribution devices (VRP) are called linear. According to their purpose, pin and hanging linear are distinguished insulators Linear insulators are made from glass and porcelain. Recently, insulators made of polymeric materials have been used. The main purpose of insulators of overhead lines is isolate wires from supports and other supporting structures. In most cases, insulators can withstand significant mechanical loads load. The material of the insulators must be satisfactory 58 listed requirements and, in addition, be adapted to outdoor work under the influence of changing temperatures, precipitation, sun, etc. One of the materials that satisfies the above requirements, there is porcelain, so overhead line insulators are manufactured mainly made of porcelain. Insulators of air lines of all types are also

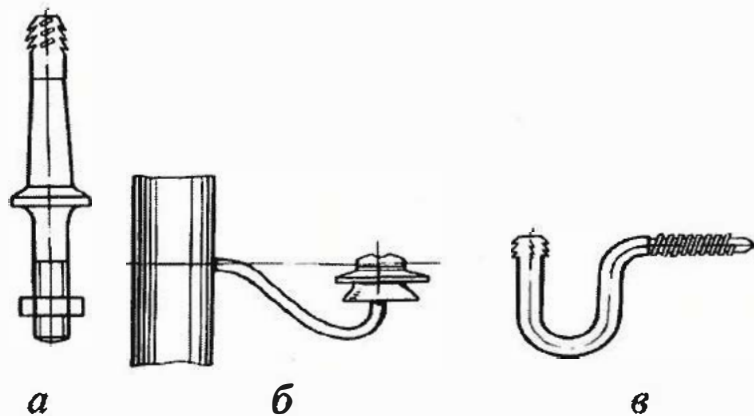
перерахованим вимогам і, крім того, бути пристосованим до роботи на відкритому повітрі під впливом змінних температур, опадів, сонця і т.д. Одним із матеріалів, що задовольняє наведеним вимогам, є фарфор, тому ізолятори повітряних ліній виготовляють головним чином із фарфору.

Ізолятори повітряних ліній всіх типів виготовляють також із скла. Механічна міцність таких ізоляторів вища, а розміри і маса менші, ніж у фарфорових. При електричному пробі скляні ізолятори руйнуються, що значно спрощує контроль за їх станом.

Ізолятори повітряних ліній в залежності від способу кріплення їх на опорі розділяють на штирові та підвісні.

Штирові ізолятори кріплять на штирях (рисунок 3.13) або на крюках і застосовують в електричних мережах при напрузі до 35 кВ включно.

Низьковольтні ізолятори майже завжди кріплять на крюках. Ізолятори високої напруги в лініях з невеликими прольотами і проводами малих і середніх перерізів кріплять також на крюках, а з великими прольотами і перерізами – на штирях, що укріплюються на траверсах (поперечинах).

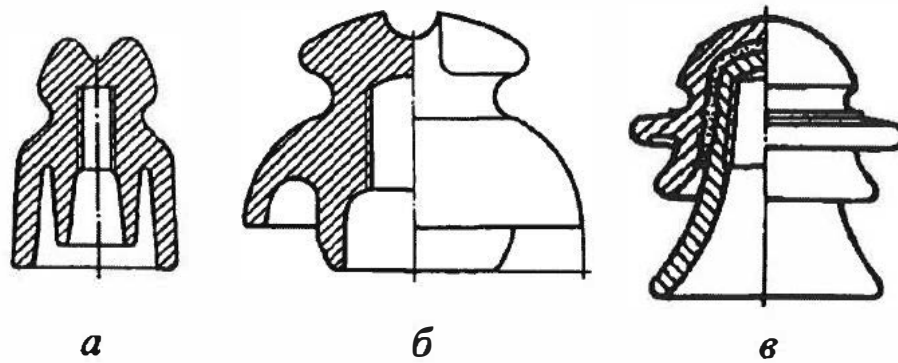


a – штир; *б* – крюк високої напруги; *в* – крюк низької напруги

Рисунок 3.13 – Арматура повітряних ліній електропередачі

На лініях низької напруги застосовують штирові ізолятори (рисунок 3.14, *a*) різних типорозмірів: фарфорові ТФ-16, ТФ-20, РФО-16; скляні НС-16, НС-18. На прямих ділянках провід кріплять до головки ізолятора, а на поворотах лінії – до шийки.

Для ліній напругою 10 кВ застосовують штирові ізолятори: фарфорові ШФ10-Г та скляні ШС10-А і ШС10-Г (рисунок 3.14, б). Для напруги 20 і 35 кВ застосовують штирові ізолятори ШД-35, ШЖБ-35, ШФ-20, ШФ-35 (рисунок 3.14, в). Крім того, для ліній напругою 35 кВ також застосовують підвісні ізолятори.



a – типу ТФ; *б* – типу ШФ10; *в* – типу ШФ35

Рисунок 3.14 – Штирові ізолятори

На повітряних лініях напругою 35 кВ та вище, а в деяких випадках і 10 кВ, використовують підвісні ізолятори (рисунок 3.15). Ізолятори кріплять один під одним, при цьому утворюється гірлянда ізоляторів. Кількість ізоляторів в гірлянді залежить від напруги лінії та від матеріалу опор. У повітряних лініях електропередачі, що виконані на металевих або залізобетонних опорах, в гірляндах підвісних ізоляторів на 10 кВ повинен бути один ізолятор, на 35 кВ – 3, на 110 кВ – 7, на 150 кВ – 9.

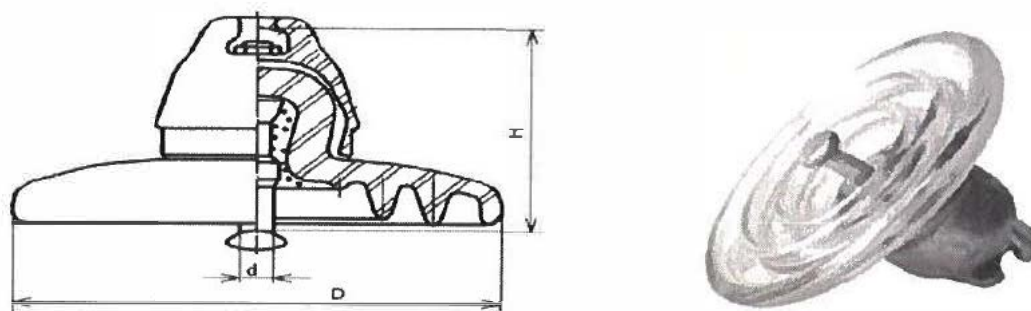


Рисунок 3.15 – Підвісний ізолятор типу ПС

На лініях застосовують підвісні фарфорові ізолятори типу ПФ класів 70, 160, 200 та скляні типу ПС класів 40, 70, 120, 160, 210 та 300. Клас ізолятора відповідає мінімальному руйнівному навантаженню в кілоньютонах (кН).

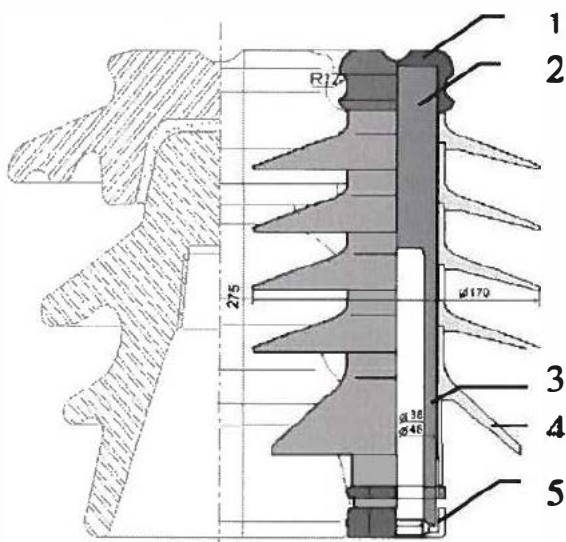
made from glass. The mechanical strength of such insulators is higher, and the dimensions and weight smaller than porcelain ones. In the case of electrical breakdowns of glass insulators are destroyed, which greatly simplifies the control of their condition. Insulators of air lines depending on the method their mounting on the support is divided into **pin** and **hanging**. **Pin insulators** are fixed on pins (**Figure 3.13**) or on hooks and are used in electrical networks at a voltage of 35 kV inclusive. Low-voltage insulators are almost always fixed on hooks. High voltage insulators in lines with short spans and wires of small and medium sections are also attached to hooks, and with large spans and sections - on pins that are strengthened on traverses (crossbars). **a – pin; b – high voltage hook; c – low voltage hook** **Figure 3.13 – Armature of overhead power lines**

Pin insulators are used on low voltage lines (Figure 3.14, a) of different sizes: porcelain TF-16, TF-20, RFO-16; glass NS-16, NS-18. On straight sections of the wire attached to the head of the insulator, and at the turns of the line - to the neck.

Pin insulators are used for 10 kV lines: porcelain ShF10-G and glass ShS10-A and ShS10-G (**Figure 3.14, b**). For voltages of 20 and 35 kV, pin insulators ShD-35 is used, ShZhB-35, ShF-20, ShF-35 (**Figure 3.14, c**). In addition, for lines with a voltage of 35 kV, suspended insulators are also used. **a – TF type; b – type SHF10; c – type SHF35** **Figure 3.14 – Pin insulators**

On overhead lines with a voltage of 35 kV and above, and in some cases and 10 kV, use suspended insulators (**Fig 3.15**). Insulators are fastened one under the other, thus forming a garland of insulators.

Останнім часом для ліній електропередач, взамін скляних та фарфорових ізоляторів, застосовують підвісні та штирові ізолятори в полімерному корпусі. Відомі наступні ізолятори в полімерному корпусі: штирові – ШПУ10, ШПУ20, ШПУ35 (рисунок 3.16); підвісні – ЛК70/10, ЛК70/20, ЛК70/35 (рисунок 3.17) та ін. В загальному вигляді такі ізолятори складаються із склопластикового стержня або трубки 2, який покритий ребристою захисною оболонкою із кремнійорганічної гуми 4.



1 – алюмінієвий оголовок для кріплення проводу;
 2 – композитний силовий склопластиковий стержень;
 3 – композитна силова склопластиковая трубка;
 4 – кремнійорганічна захисна оболонка;
 5 – система кріплення

Рисунок 3.16 – Штировий ізолятор в полімерному корпусі ШПУ-35 УХЛІ в порівнянні з ізолятором ШФ-35

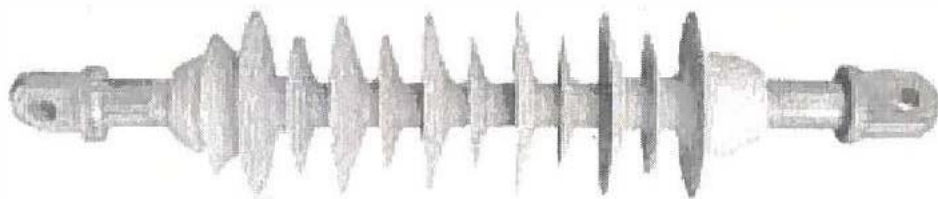


Рисунок 3.17 – Підвісний лінійний ізолятор в полімерному корпусі типу ЛК

3.4 Опори повітряних ліній електропередачі

Опори повітряних ліній підтримують проводи на необхідній відстані один від одного, від поверхні землі та від проволів інших ліній.

The number of insulators in the garland depends on line voltage and from the material of the supports. In the air lines power transmissions made on metal or reinforced concrete supports, in garlands of suspended insulators for 10 kV should be one insulator, 3 for 35 kV, 7 for 110 kV, 9 for 150 kV.

Figure 3.15 – Suspended insulator of the PS type Suspended porcelain type insulators are used on the lines PF classes 70, 160, 200 and glass type PS classes 40, 70, 120, 160, 210 and 300. The insulator class corresponds to the minimum destructive load in kilonewtons (kN).

Recently, for power lines, instead of glass and porcelain insulators, suspended and pin ones are used insulators in a polymer case. The following insulators are known in polymer body: pin - ShPU10, ShPU20, ShPU35 (**Figure 3.16**); suspended - LK70/10, LK70/20, LK70/35 (**figure 3.17**) and others. In general, such insulators consist of scoplactic rod or tube 2, which is covered with ribbed a protective shell made of organic silicon rubber 4.

1 – aluminum head for attaching the wire; 2 – composite power fiberglass rod; 3 – composite power fiberglass tube; 4 – organosilicon protective shell; 5 – fastening system **Figure 3.16 – Pin insulator in a polymer case ShPU-35 UHL1 in comparison with the ShF-35 insulator** **Figure 3.17 – Suspended linear insulator in polymer housing type LC.**

3.4 Supports of overhead power lines.

I provided the great example of the company Evrofovard in Ukraine that experts in the electric poles.

3.5 Active and inductive resistance of wires. The wires of electric lines have active resistance alternating current. Its value is slightly different from ohmic

direct current resistance. However, this difference is insignificant and in it is neglected in practical engineering calculations. Active resistance of wires made of non-ferrous metals - copper and of aluminum depends on the ambient temperature, current passing through the wire and its frequency. In practical in calculations, these changes are neglected and considered active resistance constant, which is equal to the ohmic resistance.

Active wire resistance per unit length (1000 m) determined by the expression:

$$r_0 = \frac{1000 \cdot \rho}{F} \quad (3.2)$$

Where: r_0 is the resistance of one kilometer of wire, Ohm/km;

ρ – specific resistance of the wire material, Ohm·m;

F is the nominal cross-section of the wire, mm²

Active resistance of a wire of a given length: $r = r_0 \cdot l$ (3.3)

where l is the length of the wire, m. The value of r_0 is calculated according to expression (3.2), but it is more convenient use the already calculated data given in corresponding tables.

The active resistance of steel wires is much higher than theirs ohmic resistance, which is caused by a sharply detected surface effect and energy losses on hysteresis and eddy currents in steel. Active resistance of steel wires significantly depends on of the current flowing through them, so calculations are not possible use a constant value of specific conductance like this made for wires made of non-ferrous metals. The value of active resistances of steel wires should be taken from tables or from curves which built according to these tables (Figure 3.20, a).

a – active resistance; b – internal inductive resistance

Figure 3.20 – Curves of resistance of steel multi-wire wires from the strength of the current flowing through them

The inductive resistance of the wires is due to the alternating magnetic by the field outside and inside the wires through which alternating current flows.

It is known from the basics of electrical engineering that inductive resistance

wire is equal to:
$$X_0 = \omega \left(4,6 \lg \frac{D_{sr}}{R} + 0,5 \mu \right) \cdot 10^{-4} \quad (3.4)$$

Assuming that $\omega = 2\pi f = 314$ and $R = d / 2$ we have:

$$X_0 = 0,145 \lg \frac{2 D_{sr}}{d} + 0,0157 \mu \quad (3.5)$$

where D_{sr} is the average distance between the wires, mm; d – wire diameter, mm; μ is the relative magnetic permeability of the wire material.

The first part of expression (3.5) depends on the magnetic field outside the wire and is called the external inductive resistance X_0' . The second part of the expression is determined by the magnetic field inside the wire, it is called internal inductive resistance X_0'' . Then expression (3.5) can be written:

$$X_0 = X_0' + X_0'' \quad (3.6)$$

The external inductive resistance of the wire does not depend on of the material of the wire, and from its diameter and from the distance between wires. The external inductive resistance of the wire increases with by increasing the distance between the wires. For wires made of non-magnetic materials (copper and aluminum) relative magnetic permeability is close to 1, so their internal inductive resistance X_0'' is very small and, in most cases, are neglected in calculations, therefore for wires made of non-ferrous metals:

$$X_0 = X_0' \quad (3.7)$$

For approximate calculations of aerial networks, which

made of wires from non-ferrous metals can be accepted: for lines with voltage up to 1 kV $x_0 = 0.35 \text{ Ohm/km}$; for lines with a voltage of 6, 10, 20 and 35 kV $x_0 = 0.4 \text{ Ohm/km}$; for lines with a voltage of 110 kV $x_0 = 0.45 \text{ Ohm/km}$. For cable lines $x_0 = 0.08 \text{ Ohm/km}$, therefore in cable lines in networks with a voltage of up to 20 kV, it is neglected. For steel wires, internal and external inductive the resistances are proportional, so neglect the internal inductive resistance during calculations it is not possible. The value of specific inductive resistances (internal and external) for different types of wires are given in tables created based on research data.

Questions for self-control 1. What network is called a feeder? 2. Which network is called a distribution network? 3. What is the nominal voltage? 4. What nominal voltages are set for generators and transformers? 5. List the standard voltage values of electrical installations alternating current with a frequency of 50 Hz. 6. Name the main ways of performing neutral in networks with a voltage of 0.38 ... 110 kV, their main advantages and disadvantages. 7. What is the difference between TN-S and TN-C power supply systems? 8. Construction of bare wires. 9. Construction of insulated wires. 10. Describe the construction of different grades of steel and aluminum uninsulated wires. 11. Construction of cables. 12. What is the difference between a cable and an insulated wire? 13. List the methods of laying cables. Advantages and disadvantages. 14. Types of insulators for overhead lines with a voltage of 0.38...35 kV. 15. List the requirements for PL insulators. 16. Glass and porcelain insulators. Main advantages and disadvantages. 17. What material are PL supports made of? Types of supports. 18. Active and inductive resistance depends on what wires of power lines? 19. What is the internal and external inductive resistance of a wire? 20. Why it is necessary to take into account when calculating

internal reactance of steel wires?

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