HEARING DATE: May 7, 2015
ITEM NO.: 3
TIME: 10:40 am

TO: Placer County Planning Commission

FROM: Development Review Committee

DATE: May 7, 2015

SUBJECT: **NEFF RENTALS ELECTRIC FENCE**
APPEAL OF THE DESIGN/SITE REVIEW COMMITTEE'S DENIAL OF AN ELECTRIC FENCE (PLN15-00042)
SUPERVISORIAL DISTRICT 4 (UHLER)

COMMUNITY PLAN AREA: Granite Bay Community Plan

COMMUNITY PLAN DESIGNATION: Commercial

ZONING: CPD-Dc (Commercial Planned Development, combining Design Scenic Corridor)

ASSESSOR'S PARCEL NUMBER: 048-030-073-000

STAFF PLANNER: Sherri Conway, Senior Planner

LOCATION: The subject property comprises 1.7 acres and is located on the east side of Sierra College Blvd., approximately 0.50 miles north of Douglas Boulevard, in the Granite Bay area.

APPLICANT/APPELLANT: Carol Bausinger and Michael Pate, Electric Guard Dog LLC on behalf of Neff Rentals

PROPOSAL:
The appellant is appealing the March 10, 2015 decision of the Design/Site Review Committee to deny the request for the installation of an Electric Guard Dog Security System inside the existing perimeter fence at the Neff Rentals site on the east side of Sierra College Blvd, north of the intersection of Douglas Blvd. in Granite Bay.

CEQA COMPLIANCE:
For the reasons outlined below, staff's recommendation is for denial of the appeal and upholding the Design/Site Review Committee's action to deny the requested Design Review. Under Section 15270 of the California Environmental Quality Act (CEQA) Guidelines, CEQA does not apply to projects that a public agency disapproves.

PUBLIC NOTICES AND REFERRAL FOR COMMENTS:
Public notices were mailed to property owners of record within 300 feet of the project site. Community Development Resource Agency staff and the Departments of Public Works, Environmental Health, Air Pollution Control District and the Granite Bay Municipal Advisory Council (MAC) were transmitted copies of the project plans and application for review and comment. All County comments have been addressed and conditions have been incorporated into the staff report. No public comments have been received.

PROJECT DESCRIPTION:
On February 20, 2015, Electric Guard Dog, LLC submitted an application for a Design Review to allow the installation of a security system. The system is comprised of a low voltage (12V), battery powered (DC), 10-feet high electric fence that would be placed approximately 4-12 inches inside of the existing perimeter fence. The fence itself is comprised of 20, 12.5-guage, galvanized steel wires which are run horizontally to a height of ten feet. Brightly colored signage warnings would be placed approximately every 50 feet along the fence. The system would include audible sirens which would be activated by sensors upon a potential breach of the system security, such as cutting the wires. The alarm would send a signal to the property manager that a breach was occurring. Should the system continue to be compromised, a pulse of electricity would then be activated, delivering a shock for 4/10000 of a second.

SITE CHARACTERISTICS:
The subject property is located on the east side of Sierra College Blvd. within a Commercial Planned Development, combining Design Corridor (CPD-Dc) zone district. The project site is bordered to the north and south by commercial uses, including shopping centers and restaurants. The site is fully paved, and developed with one approximate 2,700 square foot building in the front portion of the site, currently used as an office and one approximate 4,200 square foot building used for storage situated along the south property line. The subject property is used primarily as a business providing rental of construction equipment. The majority of the site is used as outdoor storage for small and large rental equipment.

A variety of perimeter fencing currently surrounds the site. The west or front side of the property contains a six-foot high wrought iron fence and gate. The south side of the property contains a combination of wrought iron fencing towards the front of the property, that transitions to a chain link fence topped with barbed wire, that transitions at approximately the half-way point to a concrete masonry block wall that extends to the rear property line. The rear, east property boundary contains an eight-foot, slated chain link fence. The east (rear) property perimeter contains chain link fence with slats. The north side perimeter contains chain link and slated chain link fencing. It should be noted that in addition to the fencing on the subject property, there is six-foot high solid wood fencing along both the south perimeter on the Carl's Jr. Property line and along the north side along the Taco Bell perimeter.

EXISTING LAND USE AND ZONING:

Location	Zoning	Granite Bay Community Plan Land Use Designation	Existing Conditions and Improvements
Project Site	CPD-Dc (Commercial Planned Development, combining Design Scenic Corridor)	Commercial	Developed as Rental Yard
North	CPD-Dc (Commercial Planned Development, combining Design Scenic Corridor)	Commercial	Shopping Center/Fast Food Restaurant

South	CPD-Dc (Commercial Planned Development, combining Design Scenic Corridor)	Commercial	Fast Food Restaurant
East	CPD-Dc (Commercial Planned Development, combining Design Scenic Corridor)	Commercial	Vacant parcel/Cavitt Stallman South Road
West	City of Roseville	N/A	Sierra College Blvd./Commercial Properties

BACKGROUND:
The subject property has been developed and used as an outdoor rental storage yard over 40 years. The Placer County Planning Commission took action to approve LDA-867 (Land Development Agreement) on May 11, 1973, that allowed for an equipment rental business on the subject property. A Condition of Approval allowed a maximum six-foot high fence around the property perimeter.

On January 28,, 2015, Electric Guard Dog, LLC submitted an application for a Design Review to allow the installation of a security system (10-foot high, electric fence).

Decision of the Design/Site Review Committee (D/SRC)
On March 10, 2015, pursuant to Section 17.52.070 (D) (4) of the Placer County Zoning Ordinance, the Design/Site Review Committee took action to deny the application for a 10-foot high, electric fence at 8455 Sierra College Blvd. in Granite Bay, based on the following Findings:

1. The proposed fence is not consistent with Sections 4.1 and 4.2 of the Granite Bay Community Plan.
2. The proposed fence is not consistent with Section 7 of the Placer County Landscape Design Guidelines.
3. The proposed fence is not consistent with Sections 17.20.010(A), 17.52.070, and 17.54.030(b) (2) of the Placer County Zoning Ordinance.
4. The proposed fence is not consistent with the conditions established in the existing Conditional Use Permit LDA 867.
5. Such action was necessary to protect public health, safety, and/or welfare.

LETTER OF APPEAL:
On March 18, 2015, Carol Bausinger and Michael Pate, Electric Guard Dog LLC on behalf of Neff Rentals, filed an appeal of the D/SRC's denial of the electric fence. In the appeal letter, the Appellant provided the following responses to the D/SRC's reasons for denial of its application:

Community Plan Consistency
The Appellant states that the Electric Guard Dog fence is virtually invisible and unobtrusive to the human eye. It will not impair an adequate amount of light and air adjacent to the property, or substantially increase the congestion of the public streets. It does not increase the danger of fire, or endanger the public safety, or substantially diminish or impair the property values within the neighborhood. In reference to safety, included is the Webster Safety Document – a comprehensive electric security system report from the Renowned John G. Webster, Professor Emeritus of Biomedical Engineering of the University of Wisconsin, foremost expert on pulsed electricity. Safety of these devices is unparalleled as no deaths or serious injuries have occurred. With the inclusion of a perimeter buffer fence, for all electric security fences as specific in IEC 60335-2-76, the risk of accidental contact is substantially lowered.

It is installed completely inside the existing perimeter fence and therefore does not detract from the rural character of the area. It enhanced the community by effectively deterring crime and it is not expose to the public so there is no danger or nuisance.

Landscape Design Guidelines Consistency
The Appellant states that the security fence, which will be installed inside the existing perimeter fence, is not meant to be a "sound wall." It is not a buffer fence but is a security fence inside the perimeter fence. It is virtually invisible and unobtrusive to the human eye. It does not substantially diminish or impair the property values within the neighborhood.

The 10-foot height prevents the perpetrators from simply hurdling both the perimeter fence and Electric Fence as a single barrier in one continuous motion. They would be required to navigate two unequal barriers to access the property for purposes of criminal intent. At 10-feet, the fence is more imposing to someone thinking about scaling it. While 10-feet is optimal, having at least 2-feet of additional wiring extended higher would more than likely serve the purpose of meeting the height requirements.

Electric Guard Dog fencing is not chain link fencing and will be an integral part of the site. It is installed to run concurrently with the perimeter fence and is a security system with an audible alarm. It is comprised of 20, 12.5 gauge, galvanized steel wires which are usually run horizontally to the height of 10 feet.

Zoning Ordinance Consistency
The Appellant states that the Electric Guard Dog security fence installation is for the security of the business and its assets which are too large in size to store inside a building.

The Electric Guard Dog fence is virtually invisible and unobtrusive to the human eye. It will not impair an adequate supply of light and air adjacent to the property, or substantially increase the congestion of public streets. It does not increase the danger of fire, or endanger the public safety, or substantially diminish or impart the property values within the neighborhood.

RESPONSE TO APPEAL LETTER:
The following is a discussion of the D/SRC's basis for denial of the electric fence and a response to the Appellant's appeal letter:

Staff visited the site on several occasions and noted that there are a variety of existing fence types along the property perimeter, including six-foot high chain link, barbed wire, wood, wrought iron, and CMU block wall. Several sections of the existing fence were noted to be in disrepair and the lack of one consistent fencing type did not appear to provide a secure perimeter to the site.

There is already a sense of visual confusion on the property. The addition of a 10-foot high electric fence that would exceed the height of the existing fencing, contain warning signs every 50 feet and be visible from Sierra College Blvd. near a major intersection would seem to conflict with the design principles included in the Granite Bay Community Plan, and specifically to the Granite Bay community.

Finally, the location of the site, sandwiched between two fast food restaurants frequented by families with young children during the off hours of the rental company (including weekends), has the potential to create the risk of electric shock to unsuspecting children who may wander near the project site. Currently there are several places along the project perimeter where one can readily reach through the existing fencing and therefore be within reach/grasp of the proposed electric fence.

Staff met with the applicant to discuss the project and informed them that the proposal appeared to be inconsistent with Placer County policies and codes. The applicable sections of the Placer County policy documents, codes, and permits that pertain to the proposed project are noted below:

1. **Granite Bay Community Plan** – The Community Plan is the long range planning document designed to guide development in a manner that enhances the quality of life in the Granite Bay Community.
   a. Section 4.1 Goals, #8 states: Encourage high-quality designs which are attractive, safe, and functionally efficient.
   b. Section 4.2 Policies, #9, states: "Encourage the development of commercial project designs that do not detract from the rural character of the Granite Bay area."

2. **Placer County Landscape Design Guidelines** – The guidelines set forth in Section 7. Fencing and Screening Design include:
   a. The materials selected for fences and walls should be compatible with the architecture of associated buildings.
   b. Fences and walls should be between four and six (6) feet in height.
   c. Fencing should be designed as an integral part of the site where possible, rather than a separate fence. Chain link fencing is not permitted.

3. **Placer County Zoning Ordinance** – The Zoning Ordinance carries out the goals and objectives of the County General Plan and Community Plan. Specific sections relevant to the proposed project include:
   a. Section 17.20.010(A) Commercial Planned Development (CPD). The purpose of the CPD zone is to designate areas appropriate for mixed-use community shopping centers, office parks, and other similar developments, where excellence in site planning and building design are important objectives. Specific site standards for projects within the CPD-Dc district are typically set forth in a Conditional Use Permit.
   b. Section 17.52.070 Design Review. The purpose of the combing –Dc designation is to provide special regulation to protect and enhance the aesthetic character of lands and buildings within public view.

4. **Conditional Use Permit (LDA 867)** – A Use Permit for Equipment Rentals and Sales was approved in April 1973 on the project site. A Condition of Approval of LDA 867 allowed for a maximum six-foot high fence to surround the property perimeter.

Based on the above discussion of applicable codes and policies, a review of supporting documentation, field review of the site, a meeting with the property manager, a meeting with the applicant, comparison of the project proposal to other rental storage facilities, and evaluation of alternative security options, the D/SRC concluded the Design Review application failed to meet the requirements of Placer County codes and policy documents.

MUNICIPAL ADVISORY COUNCIL:
The proposed project was considered by the Granite Bay Municipal Advisory Council (MAC) on Wednesday, May 6, 2015. The recommendation of the MAC will be presented to the Planning at the hearing.

CONCLUSION:
In its analysis of the issues raised by the appellant, staff could find no validity in any of the assertions raised in the appeal. The majority of the issues raised are the same issues that were considered by the Design Site Review Committee. Given the state of disrepair and the variety of fencing and block walls surrounding the site, it does not appear that the owner has exhausted all other security options, including the installation of one consistent perimeter fence, security cameras, lighting and more traditional security systems. The Design Site Review Committee concluded that there are no special circumstances applicable to the property or comparable properties, that the granting of the approval of the installation of the electric fence would constitute a grant of special privileges, that the project could adversely affect public health or safety.

RECOMMENDATION:

The Development Review Committee (DRC) recommends that the Planning Commission deny the Appeal and uphold the Design/Site Review Committee's decision to deny the request for a 10-foot high, electric fence, subject to following findings.

FINDINGS:

CEQA:

Pursuant to Section 15270 of the CEQA Guidelines, CEQA does not apply to projects that a public agency disapproves.

DESIGN/SITE REVIEW:

1. The proposed project is not consistent with applicable policies and requirements of the Granite Bay Community Plan, including Section 4.1, Goal No. 8, and Section 4.2, Policy No. 9; and is not consistent with applicable Policies of Section 7 of the Placer County Landscape Guidelines.
2. The proposed project is not consistent with all applicable provisions of the Placer County Zoning Ordinance, including Section 17.20.010(A) Commercial Planned Development (CPD) and Section 17.52.070 Design Review.
3. The proposed project would authorize a use that is not otherwise allowed in the zone district, CPD-Dc.
4. The proposed project fails to meet the conditions set forth in Conditional Use Permit LDA 867, including a maximum six-foot high perimeter fence.

Respectfully submitted,

Sherri Conway, Senior Planner

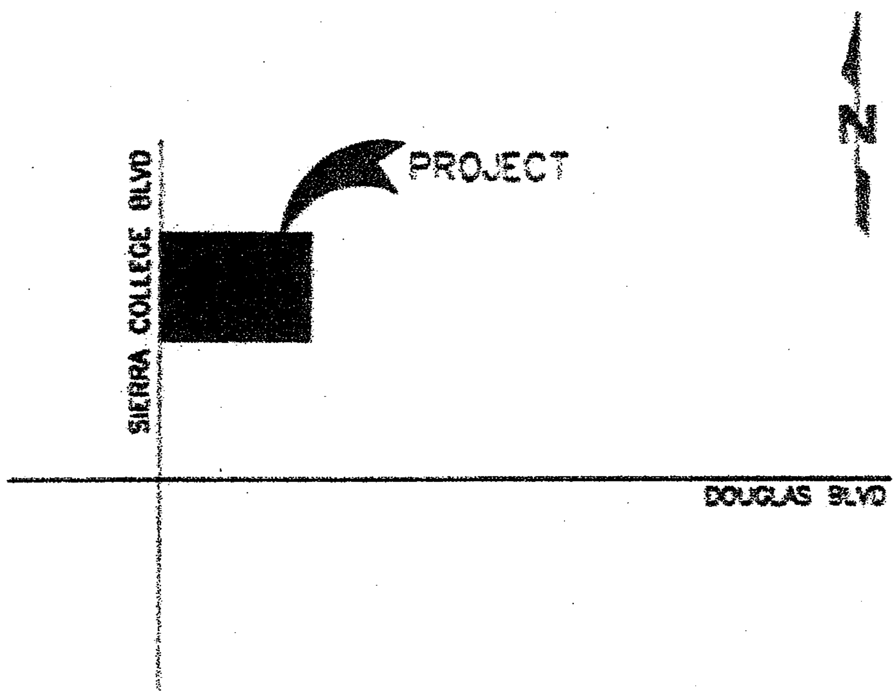
ATTACHMENTS:

Attachment A - Vicinity Map
Attachment B - Site Plan
Attachment C - March 10, 2015 PLN15-00042 Denial Letter
Attachment D - Appeal
Attachment E - University of Wisconsin Paper
Attachment F - MET Laboratories, Inc. Report

cc: Carol Bausinger/Michael Pate, Electric Guard Dog, LLC – Applicant/Appellant
Phil Frantz - Engineering and Surveying Division
Laura Rath - Environmental Health Services
Air Pollution Control District
Andy Fisher - Parks Department
Karin Schwab – County Counsel
Michael Johnson - CDRA Director
EJ Ivaldi – Deputy Director

DEVELOPER

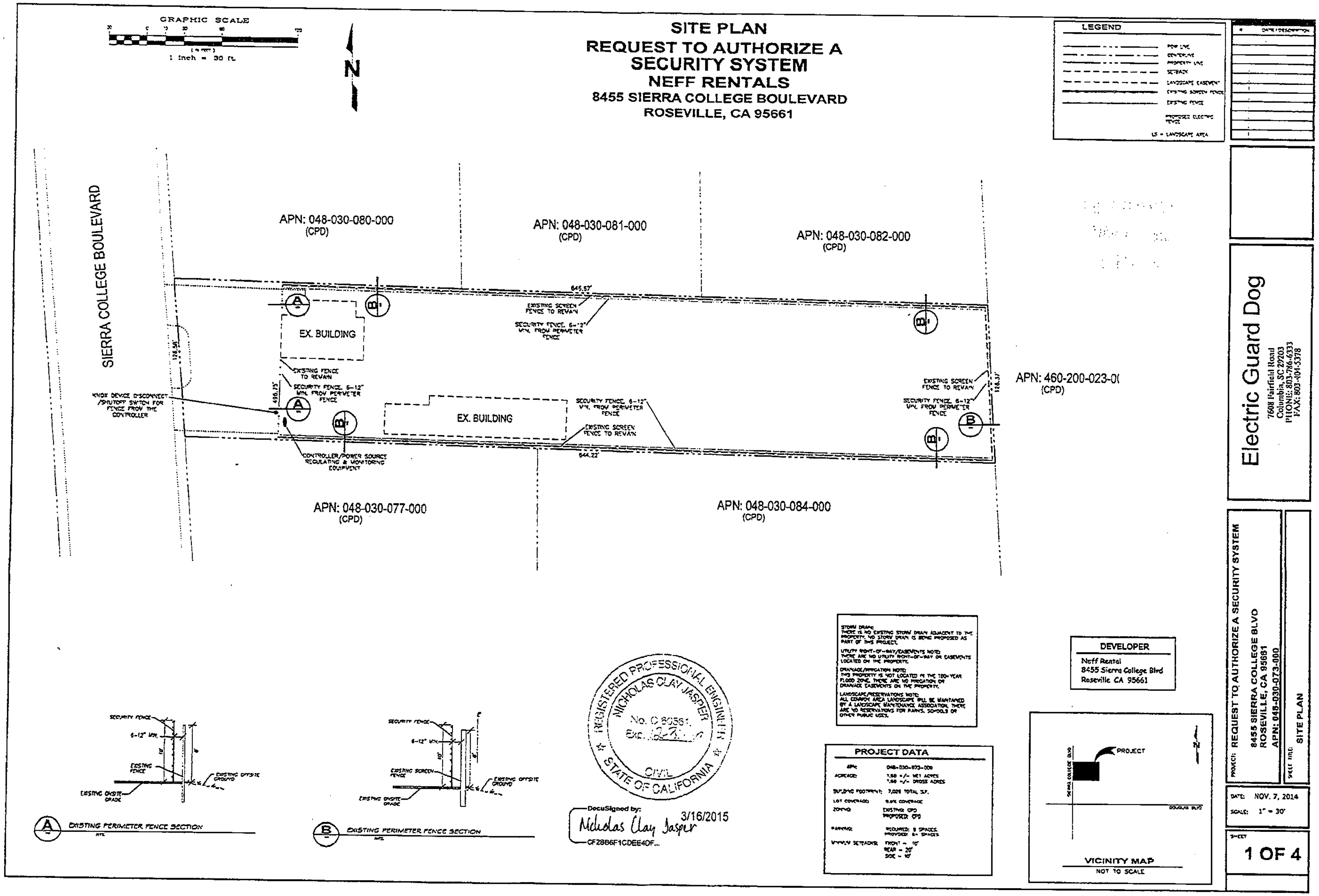
Neff Rental
8455 Sierra College Blvd
Roseville CA 95661



VICINITY MAP

NOT TO SCALE

ATTACHMENT A



ATTACHMENT B

COUNTY OF PLACER
Community Development/Resource Agency
Michael J. Johnson, Agency Director

PLANNING SERVICES DIVISION

EJ Ivaldi
Deputy Planning Director

March 10, 2015

Carol Bausinger
Electric Guard Dog LLC
121 Executive Center Drive, Suite 230
Columbia, South Carolina 29210

RE: PLN15-00042 Design/Site Review Application
Neff Rentals, 8455 Sierra College Blvd., Granite Bay

Dear Ms. Bausinger,

Placer County Planning Services has received your application, which proposes the installation of a 10-foot high, 12 Volt/DC battery operated, solar-powered, low voltage/pulsed, electric fence inside the existing perimeter fence at the Neff Rentals site on Sierra College Blvd in Granite Bay.

The fence is 10-feet high and would be placed approximately 4-12 inches inside of the existing perimeter fence. The proposed fence itself is comprised of 20 galvanized steel wires which run horizontally to a height of ten feet. Signage warnings would be placed approximately every 50 feet. In addition, the system would include audible sirens which would be activated by sensors. Finally, a pulse of voltage would be activated should the system be compromised.

The project site is located on the east side of Sierra College Blvd. within a Commercial Planned Development, combining Design Corridor (CPD-Dc) zone district. The project site is bordered to the north and south by commercial uses, including shopping centers and restaurants.

The applicable sections of the Placer County policy documents, codes, and permits that pertain to the proposed project are listed below:

1. **Granite Bay Community Plan** – The Community Plan is the long range planning document designed to guide development in a manner that enhances the quality of life in the Granite Bay Community.
    a. Section 4.1 Goals, #8 states: Encourage high-quality designs which are attractive, safe, and functionally efficient.
    b. Section 4.2 Policies, #9, states: "Encourage the development of commercial project designs that do not detract from the rural character of the Granite Bay area."

3091 County Center Drive, Suite 140 / Auburn, California 95603 / (530) 745-3000 / Fax (530) 745-3080
Internet Address: http://www.placer.ca.gov/planning / email: planning@placer.ca.gov

ATTACHMENT C

2. **Placer County Landscape Design Guidelines** – The guidelines set forth in Section 7. Fencing and Screening Design include:
    a. The materials selected for fences and walls should be compatible with the architecture of associated buildings.
    b. Fences and walls should be between four and six (6) feet in height.
    c. Fencing should be designed as an integral part of the site where possible, rather than a separate fence. Chain link fencing is not permitted.

3. **Placer County Zoning Ordinance** – The Zoning Ordinance carries out the goals and objectives of the County General Plan and Community Plan. Specific sections relevant to the proposed project include:
    a. Section 17.20.010(A) Commercial Planned Development (CPD). The purpose of the CPD zone is to designate areas appropriate for mixed-use community shopping centers, office parks, and other similar developments, where excellence is site planning and building design are important objectives. Specific site standards for projects within the CPD-Dc district are typically set forth in a Conditional Use Permit.
    b. Section 17.52.070 Design Review. The purpose of the combing –Dc designation is to provide special regulation to protect and enhance the aesthetic character of lands and buildings within public view.
    c. Section 17.54.030(B) (2) of the County Zoning Ordinance states, A fence can be a maximum of six feet within a required side or rear setback.

4. **Conditional Use Permit (LDA 867)** – A Use Permit for Equipment Rentals and Sales was approved in April 1973 on the project site. A Condition of Approval of LDA 867 allowed for a maximum six-foot high fence to surround the property perimeter.

Consequently, the Design/Site Review Committee is taking action to deny the application for a 10-foot high, electric fence at 8455 Sierra College Blvd. in Granite Bay, based on the following Findings:

1. The proposed fence is not consistent with Sections 4.1 and 4.2 of the Granite Bay Community Plan.
2. The proposed fence is not consistent with Section 7 of the Placer County Landscape Design Guidelines.
3. The proposed fence is not consistent with Sections 17.20.010(A), 17.52.070, and 17.54.030(b) (2) of the Placer County Zoning Ordinance.
4. The proposed fence is not consistent with the conditions established in the existing Conditional Use Permit LDA 867.

Should you elect to appeal the denial of this Design Review application (PLN15-00042), such appeal must be made in writing within ten (10) calendar days of the date of this letter, along with the current filing fee of $546. Appeal forms are available at: http://www.placer.ca.gov/departments/communitydevelopment/planning/applicationfeesandforms. If no appeal is made, the denial will be considered complete.

Should you have any questions or concerns, please contact Sherri Conway at 530-745-3031 or email: sconway@placer.ca.gov.

Sincerely,

Sherri Conway, Senior Planner

cc: George Rosasco, Supervising Planner
Sharon Boswell, ESD
Laura Rath, HHS
Huey Nham, Facility Services
Mike Ritter, South Placer Fire

(5/14/15 Tentative PC Hearing) (Staff Reports due 4/23/15)

PLACER COUNTY PLANNING SERVICES DIVISION

AUBURN OFFICE
3091 County Center Dr, Auburn, CA 95603
530-745-3000/FAX 530-745-3080
Website : www.placer.ca.gov
E-mail : planning@placer.ca.gov

TAHOE OFFICE
775 North Lake Blvd., Tahoe City, CA 96146
PO Box 1909, Tahoe City, CA 96145
530-581-6280/FAX 530-581-6282

RECEIVED
MAR 18 2015
CDRA

PLANNING APPEALS

(June 11th is 90 day PC H)

The specific regulations regarding appeal procedures may be found in the Placer County Code, Chapters 16 (Subdivision), 17 (Planning and Zoning), and 18 (Environmental Review Ordinance).

-----OFFICE USE ONLY-----

Last Day to Appeal 3/24/15 (5 pm)
Letter ______
Oral Testimony ______
Zoning CPD-DC
Maps: 7-full size and 1 reduced for Planning Commission items

Appeal Fee $ 546
Date Appeal Filed 3/18/15
Receipt # ______
Received by MAIL / ED B
Geographic Area ______

-----TO BE COMPLETED BY THE APPLICANT-----

1. Project name NEFF RENTALS / PLN15-00042
2. Appellant(s) ELECTRIC GUARD DOG LLC/MICHAEL PATE
   Address 121 EXECUTIVE CENTER DR STE 230 COLUMBIA SC 29210
   Telephone Number 803-404-6189
   Fax Number
   City State Zip Code
3. Assessor's Parcel Number(s): 048-030-073-000
4. Application being appealed (check all those that apply) — Application Number
   ____ Administrative Approval
   ____ Use Permit
   ____ Parcel Map
   ____ General Plan Amendment
   ____ Specific Plan
   ____ Environmental Review
   ____ Minor Boundary Line Adjustment
   ____ Tentative Map
   ____ Variance
   _X_ Design Review — PLN15-00042
   ____ Rezoning
   ____ Rafting Permit
   ____ Planning Director Interpretation ______ *(date)*
   ____ Other: ______
5. Whose decision is being appealed: DESIGN/SITE REVIEW COMMITTEE (see reverse)
6. Appeal to be heard by: PLANNING COMMISSION (see reverse)
7. Reason for appeal (attach additional sheet if necessary and be specific):

PLEASE SEE ATTACHED.

(If you are appealing a project condition only, please state the conditi

T:\PLN\Application and Brochure Master

cc: ESD, George Rosasco, ...
Planner: Sherri Conway
ESD: Rebecca Taber
Environmental Health
Parks: Andy Fisher
Air Quality: Lisa Carnahan
DPW: ~~Amber Conboy~~
Facility Services: Heather Knudson
Air Pollution Control District

11

ATTACHMENT D

Note: Applicants may be required to submit additional project plans/maps.

Signature of Appellant(s) ______________________ ______________________

______________________ ______________________

PLACER COUNTY ZONING ORDINANCE SECTION 17.60.110

Rulings made by the below are considered by the Planning Commission:

- Planning Director (interpretations)
- Zoning Administrator
- Design/Site Review Committee
- Parcel Review Committee - other than road improvements which should be appealed to the Director of Public Works
- Environmental Review Committee

Rulings made by the Planning Commission are appealed directly to the Board of Supervisors.

Rulings made by the Development Review Committee are appealed to the hearing body having original jurisdiction

Note: An appeal must be filed within 10 calendar days of the date of the decision. Appeals filed more than 10 days after the decision shall not be accepted by the Planning Division.

For exact specifications on an appeal, please refer to Section 17.60.110 of the Placer County Code.

The Electric Guard Dog

The #1 Theft Deterrent Service in the U.S.

121 Executive Center Drive • Suite 230

Columbia, SC 29210

Phone: (803) 404-6189 | Fax: (803) 404-5378

March 16, 2015

RECEIVED
MAR 18 2015
CDRA

Placer County
Attn: Sherri Conway
Planning Services
3091 County Center Drive
Auburn CA 95603

RE: Neff Rentals, Electric Guard Dog Security Fence
8455 Sierra College Blvd.
PLN15-00042

Dear Ms. Conway:

Electric Guard Dog, LLC has received the Design/Site Review Committee's denial and is hereby submitting for an appeal to the decision. In response to the denial findings, please see the comments below and also take a few moments to visit our website at www.electricguarddog.com.

Consequently, the Design/Site Review Committee is taking action to deny the application for a 10-foot high, electric fence at 8455 Sierra College Blvd. in Granite Bay, based on the following findings:

1. The proposed fence is not consistent with Sections 4.1 and 4.2 of the Granite Bay Community Plan.
   a. Section 4.1 Goals, #8 states: "Encourage high-quality designs which are attractive, safe, and functionally efficient."
      i. **Response:** The Electric Guard Dog fence is virtually invisible and unobtrusive to the human eye. It will not impair an adequate supply of light and air adjacent to the property, or substantially increase the congestion of the public streets. It does not increase the danger of fire, or endanger the public safety, or substantially diminish or impair the property values within the neighborhood. Examples of installations are included.
      ii. **Response:** In reference to safety, included is the Webster Safety Document – a comprehensive electric security system report from the renowned John G. Webster, Professor Emeritus of Biomedical Engineering of the University of Wisconsin, foremost expert on pulsed electricity. Safety of these devices is unparalleled as no deaths or serious injuries have occurred. With the inclusion of a perimeter buffer fence, for all electric security fences as specified in IEC 60335-2-76, the risk of accidental contact is substantially lowered.

   b. Section 4.2 Policies, #9, states: "Encourage the development of commercial project designs that do not detract from the rural character of the Granite Bay area."
      i. **Response:** It is installed completely inside the existing perimeter fence and therefore does not detract from the rural character of the area. It enhances the community by effectively deterring crime and it is not exposed to the public so there is no danger or nuisance.

2. The proposed fence is not consistent with Section 7 of the Placer County Landscape Design Guidelines.
    a. The materials selected for fences and walls should be compatible with the architecture of associated buildings.
        i. **Response:** The security fence, which will be installed inside the existing perimeter fence, is not meant to be a 'sound wall'. It is not a buffer fence but is a security fence inside the perimeter fence. It is virtually invisible and unobtrusive to the human eye. It does not substantially diminish or impair the property values within the neighborhood. Examples of installations are included.

    b. Fences and walls should be between four and six (6) feet in height.
        i. **Response:** 10-feet height prevents the perpetrators from simply hurdling both the perimeter fence and Electric Fence as a single barrier in one continuous motion. They would be required to navigate two unequal barriers to access the property for purposes of criminal intent. At 10-feet, the fence is more imposing to someone thinking about scaling it. While 10-feet is optimal, having at least 2-feet of additional wiring extended higher would more than likely serve the purpose of meeting the height requirements.

    c. Fencing should be designed as an integral part of the site where possible, rather than a separate fence. Chain link fencing is not permitted.
        i. **Response:** Electric Guard Dog fencing is not chain link fencing and will be an integral part of the site. It is installed to run concurrently with the perimeter fence and is a security system with an audible alarm. It is comprised of 20, 12.5 gauge, galvanized steel wires which are usually run horizontally to the height of 10'.

3. The proposed fence is not consistent with Sections 17.20.010(A), 17.52.070, and 17.54.030(b) (2) of the Placer County Zoning Ordinance.
    a. Section 17.20.010(A) Commercial Planned Development (CPD). The purpose of the CPD zone is to designate areas appropriate for mixed-use community shopping centers, office parks, and other similar developments, where excellence is site planning and building design are important objectives. Specific site standards for projects within the CPD-Dc district are typically set forth in a Conditional Use Permit.
        i. **Response:** The business occupying the property is a Commercial use providing rentals of construction equipment to numerous businesses throughout Placer County. The Electric Guard Dog security fence installation is for the security of the business and its assets which are too large in size to store inside a building.
    b. Section 17.52.070 Design Review. The purpose of the combing –Dc designation is to provide special regulation to protect and enhance the aesthetic character of lands and buildings within public view.
        i. **Response:** The Electric Guard Dog fence is virtually invisible and unobtrusive to the human eye. It will not impair an adequate supply of light and air adjacent to the property, or substantially increase the congestion of the public streets. It does not increase the danger of fire, or endanger the public safety, or substantially diminish or impair the property values within the neighborhood. Examples of installations are included.

    c. Section 17.54.030(B) (2) of the County Zoning Ordinance states that a fence can be a maximum of six feet within a required side or rear setback.
        i. **Response:** this particular section of the Ordinance does not apply to the zone for this property.

B. Height Limits for Fencing and Landscaping. The following height limits for fencing and landscaping apply to sites in the RA, RF, RM, RS, C1, HS, and INP districts. No fence, earth berm or hedge of any kind shall be constructed or grown to a height greater than the following, except where a greater height is required by state or federal law:

1. Within the Front Setback. Three feet, except that open wire, chain link, wood rail, or other similar types of fencing (consisting of only such materials as do not conflict with vehicle sight distance, as determined by the department of public works) may be constructed to a height of six feet in the residential agricultural (RA) and residential forest (RF) districts, and to a height of four feet in the residential single-family (RS) and residential multifamily (RM) districts where the site and surrounding parcels are at least one acre in size.

2. Within the Side or Rear Setback. A maximum of six feet within a required side or rear setback.

4. The proposed fence is not consistent with the conditions established in the existing LDA 867.) – A Land Development Agreement for Equipment Rentals and Sales was approved in April 1973 on the project site. A Condition of Approval of LDA 867 allowed for a maximum six-foot high fence to surround the property perimeter.
    i. **Response:** The Electric Guard Dog security fence is not a perimeter fence. It is installed inside the existing perimeter fence.

In addition to the responses provide above, enclosed are the following:

a. Check in the amount of $546.00
b. 7 sets of site plans and 1 reduced set
c. 7 sets of structural calculations
d. 7 sets of Photos of Electric Guard Dog installations
e. 7 sets of the Webster Safety Document
f. 7 sets of the MetLabs Report – Nationally Recognized Testing Laboratory

Based upon the schedule for the Planning Commission, Electric Guard Dog would anticipate being on the April 9th agenda. Our Director Michael Pate will attend along with a representative from Neff Rentals. Please advise at your earliest convenience.

Sincerely,

Carol Bausinger
Compliance Manager
The Electric Guard Dog
The #1 Theft Deterrent Service in the U.S.
Perimeter Security that Stops Crime Before it Happens

THE UNIVERSITY of WISCONSIN MADISON

Safety of electric security fences

John G. Webster
Professor Emeritus of Biomedical Engineering
University of Wisconsin-Madison
Madison WI 53706

Electric current shocks us, not voltage

Most of us can remember receiving an electric shock; it can happen during a regular day. How can that happen and when? Walking across a carpet during dry weather, then touching a doorknob and feeling a spark that jumps to the doorknob is a very common way. Placing a finger inside of a lamp socket that inadvertently was turned on is yet another. Touching the spark plug in a car or lawn mower has happened to many people as well. But why are we all still alive after receiving these electric shocks during a regular day? *We are still alive because even though the voltage is high, not enough electric current flowed through our heart.*

Even when the voltage is high, when the current flows for only a very short duration we can not be electrocuted. Furthermore, it is even hard to get electrocuted in the home because the power line voltage of 120 volts can't drive enough continuous current through the high resistance of our dry skin. Kitchens and bathrooms fall in a different category; they are dangerous places because our skin may be wet. When our skin is wet, our skin resistance is low and permits a large electric current to flow through the body as shown in Figure 1. A large enough current can cause ventricular fibrillation. During ventricular fibrillation the pumping action of the heart ceases and death occurs within minutes unless treated. In the United States, approximately 1000 deaths per year occur in accidents that involve cord-connected appliances in kitchens, bathrooms, and other wet locations.

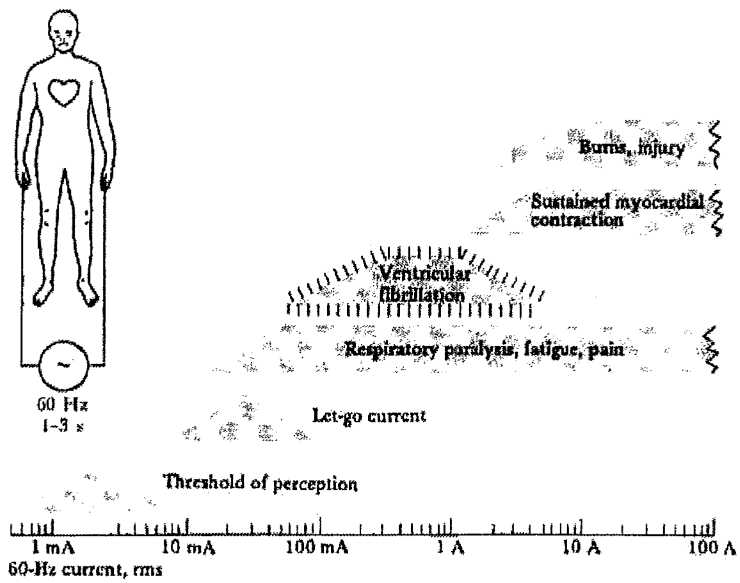


Figure 1 Physiological effects of electricity. Threshold or estimated mean values are given for each effect in a 70 kg human for a 1- to 3 s exposure to 60 Hz current applied via copper wires grasped by the hands. From W. A. Olson, Electrical Safety, in J. G. Webster (ed.), *Medical Instrumentation Application and Design*, 3rd. ed., New York: John Wiley & Sons, 1998.

Department of Biomedical Engineering
2130 Engineering Centers Building University of Wisconsin–Madison 1550 Engineering Drive Madison, Wisconsin 53706–1609
608/263–4660 Fax: 608/265–9239 Email: bme@engr.wisc.edu http://www.bme.wisc.edu/

ATTACHMENT E

Short duration pulses are safer than continuous electric current

Figure 2 shows that shock durations longer than 1 second are the most dangerous. Note that as the shock duration is shortened to 0.2 seconds, it requires much more electric current to cause ventricular fibrillation. Electric security fences have taken advantage of this fact by shortening their shock duration to an even shorter duration of about 0.0003 seconds. Therefore, electric security fences are safe and do not lead to ventricular fibrillation due to the short 0.0003 second shock duration. .

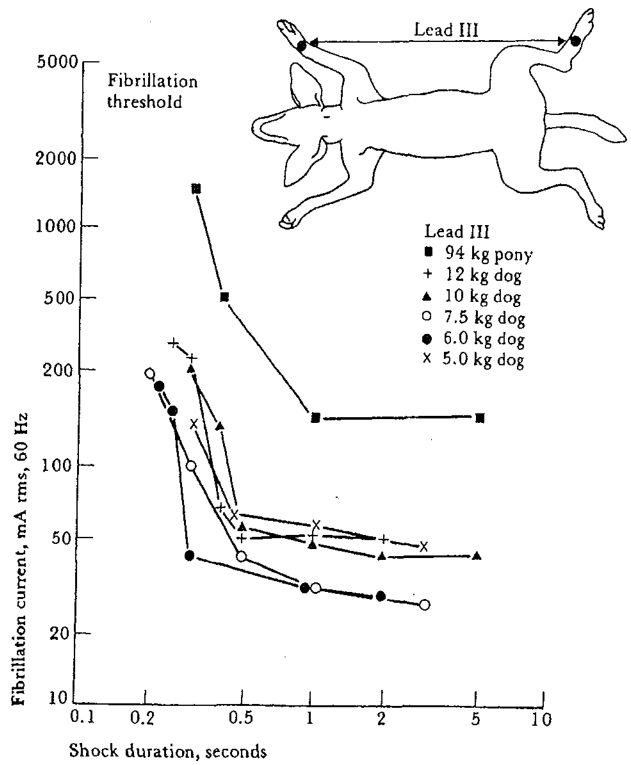


Figure 2 Thresholds for ventricular fibrillation in animals for 60-Hz ac current. Duration of current (0.2 to 5 s) and weight of animal body were varied. Fibrillation current versus shock duration for a 70 kg human is about 100 milliamperes for 5 second shock duration. It increases to about 800 milliamperes for 0.3 second shock duration. From L. A. Geddes, *IEEE Trans. Biomed. Eng.*, 1973, 20, 465–468.

Electricity near the heart is most dangerous

There are four situations where electricity may be applied close to the heart. (1) Figure 3(b) shows when a catheter tube is threaded through a vein into the heart, any accidental current is focused within the heart and a small current can cause ventricular fibrillation. (2) Cardiac pacemakers also pass electric current inside the heart, but the current is kept so small that ventricular fibrillation does not occur. (3) A Taser weapon may rarely shoot a dart between the ribs very close to the heart and apply a 0.0001 second pulse, but this has not been shown to cause ventricular fibrillation. Typically when a person takes an overdose of drugs, he creates a disturbance, police are called, the person refuses to obey, the police Taser him, afterwards he dies of a drug overdose, and the newspapers report, "Man dies after Taser shot." (4) A defibrillator applies a 0.005 second, 40 ampere electric current. This causes massive heart contraction that can change ventricular fibrillation to normal rhythm and save a life.

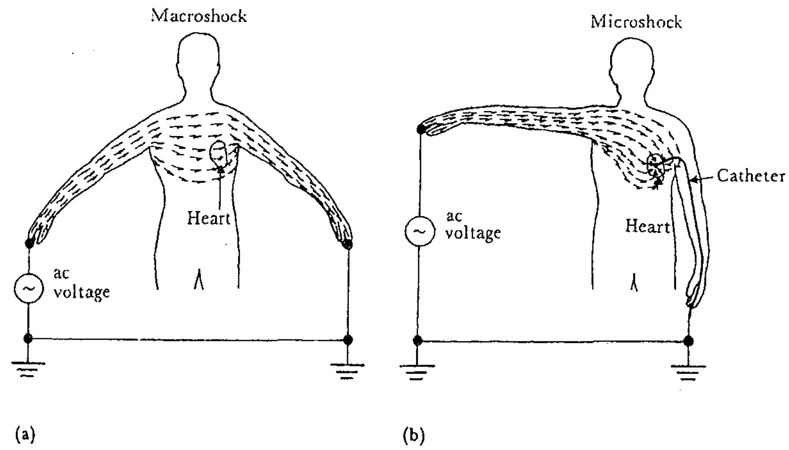


Figure 3 Effect of entry points on current distribution. (a) *Macroshock,* externally applied current spreads throughout the body, (b) *Microshock,* all the current applied through an intracardiac catheter flows through the heart. From F. J. Weibell, "Electrical Safety in the Hospital," *Annals of Biomedical Engineering,* 1974, 2, 126–148.

When comparing an electric security fence to the above examples, we know that an electric security fence is similar to Figure 3(a). Why do we know that? If a person contacts an electric fence, electric current is concentrated in the limbs and causes a deterrent shock; when it continues to pass through the torso, it spreads out and becomes more diffuse. Therefore as shown in Figure 3(a) and in Figure 2 electric security fences are safe because the deterrent shock spreads out and becomes more diffuse and is of a very short duration.

Only power lines cause ventricular fibrillation

Table 1 shows that short duration electric pulses, even though applied near the heart do not cause ventricular fibrillation. In contrast, the continuous current from power lines kills 1000 persons per year.

Table 1 Only power lines cause ventricular fibrillation

	Duration of pulse in seconds	Current in amperes	Likely to be applied near heart?	Caused ventricular fibrillation?
Power lines	Continuous	0.1	No	1000 per year
Electric security fence	0.0003 0.8 times/sec	10	No	No
Taser	0.0001 19 times/sec	2	May be	No
Cardiac pacemaker	0.001 1 time/sec	0.005	Yes	No
Defibrillator	0.005 1 time	40	Yes	Cures ventricular fibrillation
Spark plug	0.00002 1 time	0.2	No	No
Doorknob	0.00002 1 time	0.2	No	No

Sentry Security Systems, LLC position on the relationship of security fences to codes and standards

Electric fencing is used safely throughout the world, with applications for both animal control and commercial security. In a commercial security setting, security fences deter crime and help apprehend criminals. The mere presence of a security fence discourages unlawful entry, theft and the destruction of property. Additionally, it is easier to apprehend the determined criminal because the owner and police are notified instantaneously when the criminal distorts or breaks the fence. Security fences also protect the people who work at a site, providing business owners and employees significant peace of mind.

The security fence sold by Sentry Security Systems is powered by a 12 volt DC marine (or similar) battery. The National Electric Code does not cover battery powered products such as smoke alarms. Therefore, the security fence sold by Sentry Security Systems is not covered by the NEC.

There is in fact no US standard that addresses security fences whether main or battery powered. UL 69 addresses animal control fences but not security fences. There is, however, a good international standard - IEC 60335-2-76 - that addresses security fences. This standard is attached for your information.

We respectfully request that you determine that, as a battery powered device, security fences do not fall under the National Electric Code.

19

Safety of electric fence energizers

Amit J. Nimunkar1 and John G. Webster1

1Department of Biomedical Engineering, University of Wisconsin, 1550 Engineering Drive, Madison, WI 53706 USA.
E-mail: Webster@engr.wisc.edu (John G. Webster) Tel 608-263-1574, Fax 608-265-9239

Abstract

The strength–duration curve for tissue excitation can be modeled by a parallel resistor–capacitor circuit that has a time constant. We tested five electric fence energizers to determine their current-versus-time waveforms. We estimated their safety characteristics using the existing IEC standard and propose a new standard. The investigator would discharge the device into a passive resistor–capacitor circuit and measure the resulting maximum voltage. If the maximum voltage does not exceed a limit, the device passes the test.

Key words: strength–duration curve, cardiac stimulation, ventricular fibrillation, electric safety, electric fence energizers, standards.

1. Introduction

The vast majority of work on electric safety has been done using power line frequencies such as 60 Hz. Thus most standards for electric safety apply to continuous 60 Hz current applied hand to hand. A separate class of electric devices applies electric current as single or a train of short pulses, such as are found in electric fence energizers (EFEs). A standard that specifically applies to EFEs is IEC (2006). To estimate the ventricular fibrillation (VF) risk of EFEs, we use the excitation behavior of excitable cells. Geddes and Baker (1989) presented the cell membrane excitation model (Analytical Strength–Duration Curve model) by a lumped parallel resistance–capacitance (*RC*) circuit. This model determines the cell excitation thresholds for varying rectangular pulse durations by assigning the strength–duration rheobase currents, chronaxie, and time constants (Geddes and Baker, 1989). Though this model was originally developed based on the experimental results of rectangular pulses, the effectiveness of applying this model for other waveforms has been discussed (IEC 1987, Jones and Geddes 1977). The charge–duration curve, derived from the strength–duration curve, has been shown in sound agreement with various experimental results for irregular waveforms. This permits calculating the VF excitation threshold of EFEs with various nonrectangular waveforms. We present measurements on electric fence energizers and discuss their possibility of inducing VF.

2. Mathematical background and calculation procedures

Based on the cell membrane excitation model (Weiss–Lapique model), Geddes and Baker (1989) developed a lumped *RC* model (analytical strength–duration curve) to describe the membrane excitation behavior. This model has been widely used in various fields in electrophysiology to calculate the excitation threshold. Figure 1 shows the normalized strength–duration curve for current (I), charge (Q) and energy (U). The expression of charge is also known as the charge–duration curve which is important for short duration stimulations.

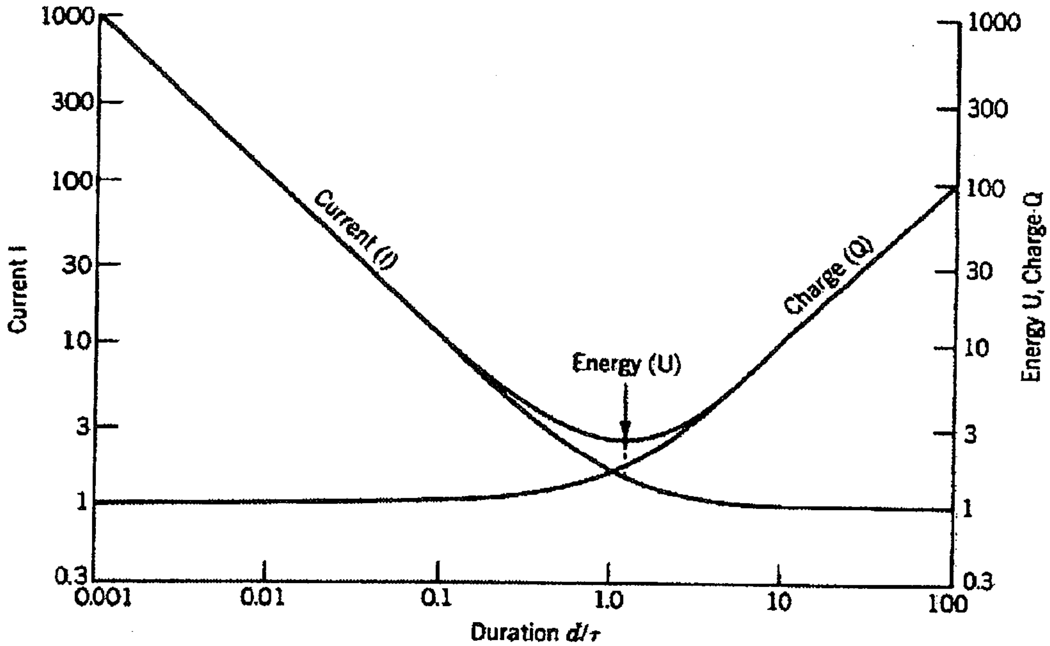


Figure 1. Normalized analytical strength–duration curve for current I, charge Q, and energy U. The x axis shows the normalized duration of d/τ. Note that for $d << \tau$, Q is constant and the most appropriate variable for estimating cell excitation. (from Geddes and Baker, 1989).

The equation for the strength–duration curve is (Geddes and Baker, 1989),

$$\Delta v = IR(1 - e^{-\frac{t}{\tau}}), \tag{1}$$

where I is a step current intensity, R is the shunt resistance, Δv is the depolarization potential threshold which is about 20 mV for myocardial cells, τ is the RC time constant, and t is the time I is applied.

If we let the stimulation duration go to infinity, the threshold current is defined as the rheobase current ($I = b$). If we substitute I in equation (1) by b and define the threshold current $I_d = \Delta v/R$ for the stimulation with duration d. Equation (1) becomes,

$$I_d = \frac{b}{1 - e^{-\frac{d}{\tau}}}. \tag{2}$$

We can calculate the threshold charge (Q_d) by integrating equation (2) and it becomes,

$$Q_{\mathrm{d}} = I_{\mathrm{d}} d = \frac{bd}{1 - e^{-\frac{d}{\tau}}}, \tag{3}$$

For short duration stimulation ($d << \tau$) with duration shorter than 0.1 times the RC time constant, equation (3) can be approximated by equation (4) and it yields equation (5),

$$1 - e^{-\frac{d}{\tau}} \approx \frac{d}{\tau}, \tag{4}$$

$$Q_{\mathrm{d}} = b\tau \tag{5}$$

Equation (5) suggests that the charge excitation threshold for short duration stimulation is constant and equals the product of the RC time constant τ and the rheobase b. Geddes and Bourland (1985) showed that the charge–duration curve for single rectangular, trapezoidal, half sinusoid and critically damped waveforms had a good agreement for short duration stimulations. Therefore we used the same model to estimate thresholds for stimulation sources where I was not constant, under the same stimulation setting.

Cardiac cell excitation has been intensively studied at the 60 Hz power line frequency because most accidental electrocutions occur with 60 Hz current, which has a longer duration relative to the cardiac cell time constant of about 2 ms. However, EFEs operate with pulse durations much shorter than the time constant.

3. Methods

Figure 2 shows our experimental test set-up. The EFEs under test consist of Gallagher Group Ltd PowerPlus B600 (EFE1), Gallagher Group Ltd PowerPlus B280 (EFE2), Speedrite HPB (EFE3), Intellishock 20B (EFE4) and Blitzer 8902 (EFE5) EFEs. The short duration electrical pulses from these EFEs are passed though a series of eleven 47 Ω (ARCOL D4.29, HS50 47 R F) resistors which measure 518 Ω, which represents approximately the internal resistance of the human body. It is further connected to two 18 Ω (RH 10 207 DALE 10 W 3%) resistors connected in parallel which measure 9.08 Ω. This is used as the sensing resistor across which the oscilloscope measures the output voltage. For these very short pulses it is important to use noninductive resistors because the same current flowing through a resistor that has substantial inductance will measure a larger current than a resistor that is noninductive. To reduce electromagnetic interference, a faraday cage, covered with aluminum foil, was connected to ground. This diverted the electromagnetic interference to ground. The data were collected in EXCEL format from a disk in the Agilent 54621 oscilloscope. The calculations for different parameters presented in Table 1 and the Figures 3–5 were plotted using MATLAB.

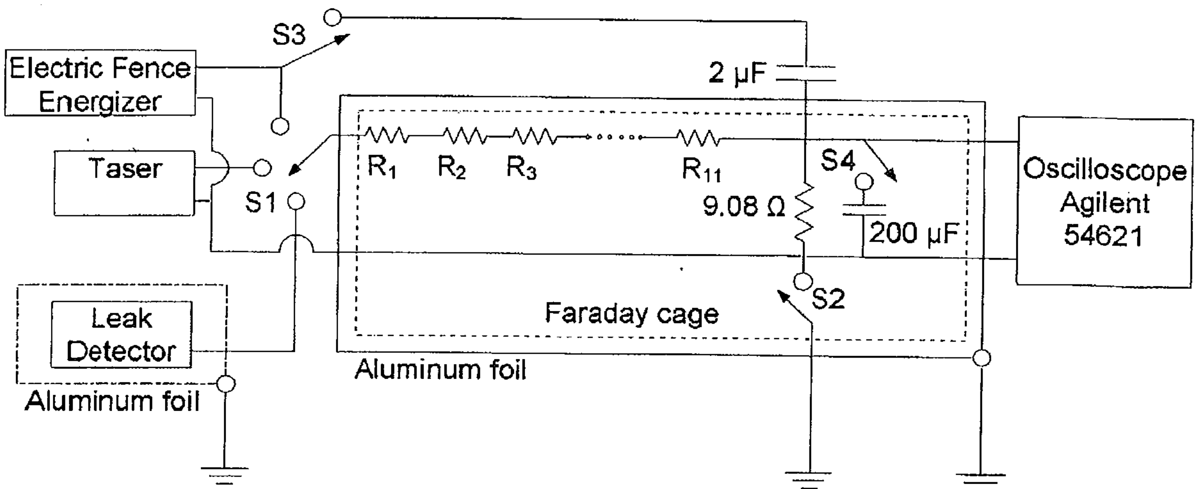


Figure 2. The EFE is selected by S1. The current flows through a string of 47 Ω resistors R_1–R_{11} (total 518 Ω) which approximates the internal body resistance of 500 Ω. The 9.08 Ω yields a low voltage that is measured by the oscilloscope.

3.1. Determination of current

EFEs are used in conjunction with fences wires to form animal control fences and security fences. We tested five EFEs (EFE1–EFE5) using the experimental set-up in Figure 2 and obtained the output currents shown in Figure 3.

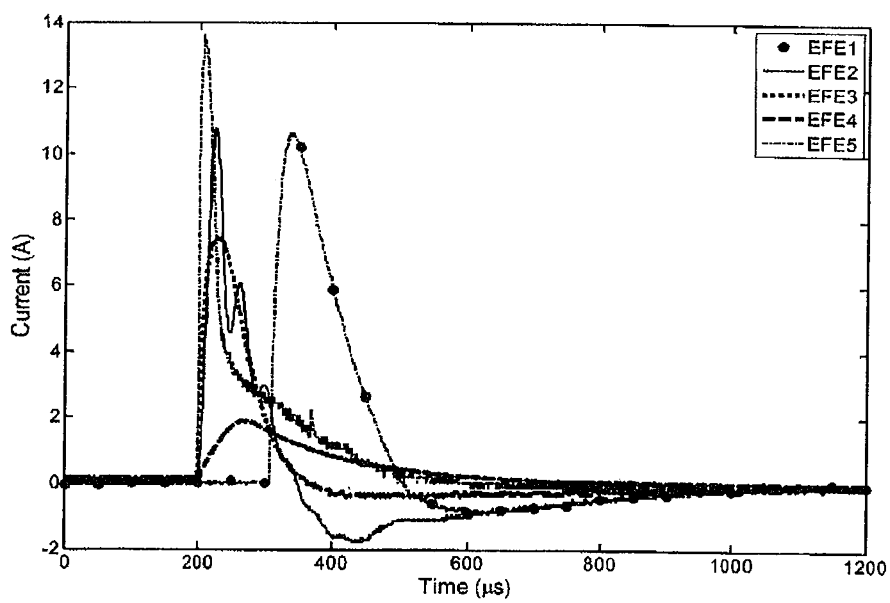


Figure 3. The output current waveform for five EFEs. EFE1 yields about 7.75 A for 151 μs = 1170 μC, EFE2 yields about 3.34 A for 345 μs = 1150 μC, EFE3 yields about 5.69 A for 91 μs =

518 μC, EFE4 yields about 1.25 A for 252 μs = 315 μC and EFE5 yields about 5.7 A for 137 μs = 781 μC.

4. Results

Table 1 shows the approximate results for the rms current, power, duration and charge for all the EFEs.

Table 1 Approximate results for all EFEs.

EFEs Parameters	Units	EFE1	EFE2	EFE3	EFE4	ECF5
A. (IEC)						
Total Energy	A^2ms	7.94	4.04	3.10	0.42	4.69
95% Energy Duration	μs	129	346	91	253	138
I_{rms}	A	7.65	3.33	5.69	1.25	5.69
IEC Standard I_{rms}	A	13.0	6.21	16.8	7.85	7.37
Pass IEC Standard	Yes/No	Yes	Yes	Yes	Yes	Yes
B. Proposed standard						
Voltage	V	3.88	2.91	NAv	NAv	NAv
Duration	μs	233	132			
Current	A	3.33	4.41			
Charge	μC	776	582			

NA- not applicable, NAv- not available

IEC (2006) defines in 3.116 "impulse duration: duration of that part of the impulse that contains 95% of the overall energy and is the shortest interval of integration of $I^2(t)$ that gives 95% of the integration of $I^2(t)$ over the total impulse. $I(t)$ is the impulse current as a function of time." In 3.117 it defines "output current: r.m.s. value of the output current per impulse calculated over the impulse duration." In 3.118 it defines "standard load: load consisting of a non-inductive resistor of 500 Ω ± 2.5 Ω and a variable resistor that is adjusted so as to maximize the energy per impulse or output current in the 500 Ω resistor, as applicable." In 22.108, "Energizer output characteristics shall be such that – the impulse repetition rate shall not exceed 1 Hz; – the impulse duration of the impulse in the 500 Ω component of the standard load shall not exceed 10 ms; – for energy limited energizers the energy/impulse in the 500 Ω component of the standard load shall not exceed 5 J; The energy/impulse is the energy measured in the impulse over the impulse duration. – for current limited energizers the output current in the 500 Ω component of the standard load shall not exceed for an impulse duration of greater than 0.1 ms, the value specified by the characteristic limit line detailed in Figure 102; an impulse duration of not greater than 0.1 ms, 15 700 mA. The equation of the line relating impulse duration (ms) to output current (mA) for 1 000 mA < output current < 15 700 mA, is given by impulse duration = $41.885 \times 10^3 \times (\text{output current})^{-1.34}$." We used these definitions and calculated the total energy, the shortest duration where 95% of the total energy occurs, the rms current for that duration from Figure 3 for the EFEs (EFE1–EFE5). Similarly we calculated the output current using the relationship impulse duration = $41.885 \times 10^3 \times (\text{output current})^{-1.34}$, provided by the IEC for all the EFEs (EFE1–EFE5). Table 1 lists these under the heading "A. (IEC)". Table 1 shows that all the EFEs pass the IEC standard.

5. Proposed new standard

IEC (2006) uses the rms current for the shortest duration where 95% of the total energy occurs as the standard to determine if the EFE is safe for use. Geddes and Baker (1989) have shown that for pulses shorter than the cardiac cell time constant of 2 ms, the electric charge is the quantity that excites the cells. We propose a simple experimental set-up shown in Figure 2 to determine the maximum amount of charge that would flow from the EFEs and cause cardiac cell excitation. The cardiac cell is modeled as an *RC* circuit in Fig. 2 with $R = 9.08\ \Omega$ and $C = 200\ \mu F$ (GECONOL 9757511FC 200 μF ±10% 250 VPK) with the *RC* time constant of 1.82 ms. For the EFEs (EFE1 and EFE2) the switches S1 and S4 are closed. This allows the 200 μF capacitor to charge rapidly (about 100 μs) and discharge fairly slowly ($\tau = RC = 1.82$ ms). Figures 4 and 5 show the voltage vs time waveforms for the different EFEs. The test was not performed for electric fence energizers EFE3–EFE5.

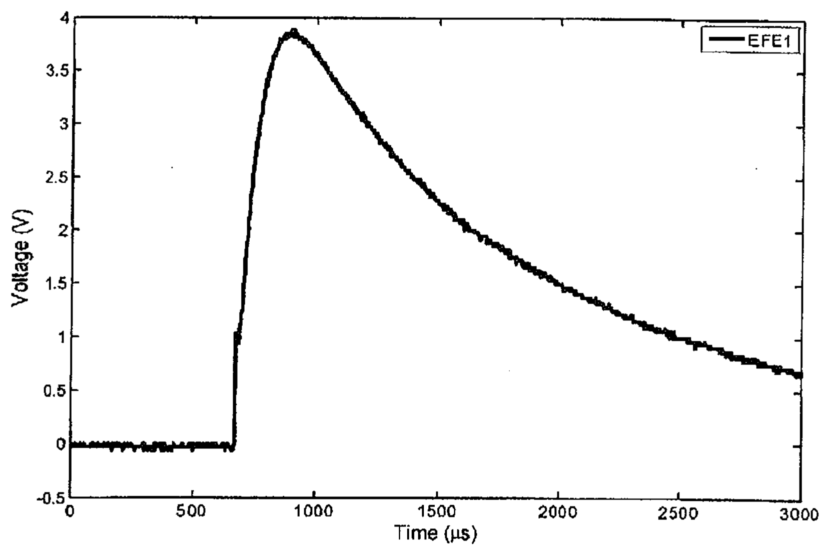


Figure 4. Output voltage waveform for EFE1. The maximal charge that flows through the cardiac cell model is given by $Q = CV = 200\ \mu F \times 3.88\ V = 775\ \mu C$, the current during which the capacitor charges to maximal value is given by $I = CV/T = (200\ \mu F \times 3.88\ V)/233\ \mu s = 3.33$ A.

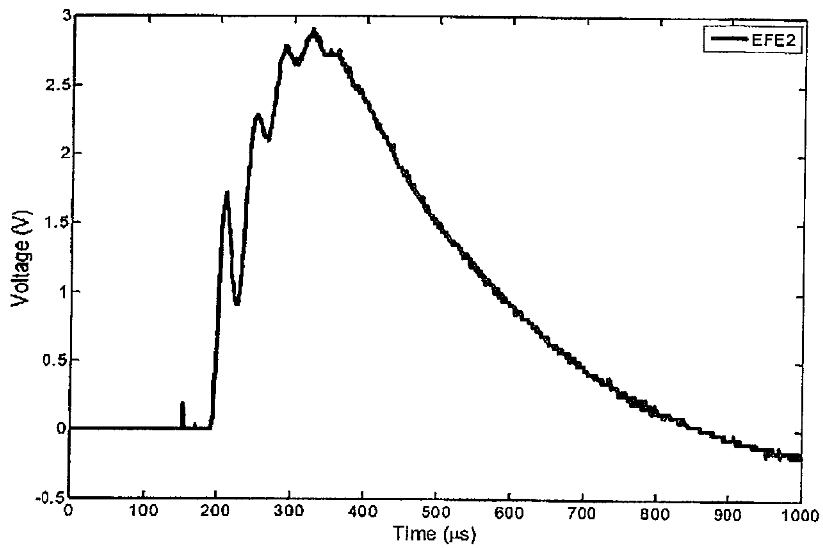


Figure 5. Output voltage waveform for the electric fence energizers EFE2. The maximal charge that flows through the cardiac cell model is given by $Q = CV = 200\ \mu F \times 2.91\ V = 582\ \mu C$, the current during which the capacitor charges to maximal value is given by $I = CV/T = (200\ \mu F \times 2.91\ V)/132\ \mu s = 4.41\ A$.

6. Discussion

Geddes and Baker (1989) have shown that for pulses shorter than the cardiac cell time constant of 2 ms, the electric charge is the quantity that excites cardiac cells. Because the first half wave is the largest, the charge integrated in the first half wave determines cardiac cell excitation. The next half wave discharges the cardiac cell capacitance and does not contribute to cardiac cell excitation. Thus we list integral $I(t)$ = charge Q in Table 1.

IEC (2006) integrates $I^2(t)$, which is roughly equal to $I(t)$. Their Figure 102 roughly follows charge.

We propose revising EFE standards for measuring current to determine a safety standard to prevent VF. The new standard would measure cardiac cell excitation. It would not require the complex calculations required to determine "The current which flows during the time period in which 95 percent of the output energy (is delivered)." It would use a simple circuit similar to that in Figure 2 composed of resistors and a capacitor. The investigator would discharge the device into the circuit and measure the maximum voltage. If the maximum voltage does not exceed 5 V (as a conservative estimate), the EFE passes the test. The 500 Ω resistor closely approximates the resistance of the body and determines the current that flows through the body.

Acknowledgements

We thank L Burke O'Neal and Silas Bernardoni for their help and suggestions.

References

Geddes L A, and Baker L E 1989 *Principles of applied biomedical instrumentation* (New York: John Wiley & Sons) pp 458–61

Geddes L A and Bourland J D 1985 The strength-duration curve. *IEEE. Trans. Biomed. Eng.* **32(6)** 458–9

IEC 1987 *International Electrotechnical Commission IEC Report: Effects of current passing through the human body* (IEC 60479-2) pp 47

IEC 2006 *Household and similar electrical appliances – Safety – Part 2-76: Particular requirements for electric fence energizers*, (IEC 60335-2-76, Edition 2.1)

Jones M and Geddes L A 1977 Strength duration curves for cardiac pacemaking and ventricular fibrillation *Cardiovasc. Res. Center Bull.* **15** 101–12

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI IEC 60335-2-76

Edition 2.1

2006-04

Edition 2:2002 consolidée par l'amendement 1:2006
Edition 2:2002 consolidated with amendment 1:2006

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-76: Règles particulières pour les électrificateurs de clôtures

Household and similar electrical appliances – Safety –

Part 2-76: Particular requirements for electric fence energizers

Numéro de référence
Reference number
CEI/IEC 60335-2-76:2002+A1:2006

28

22.108 Energizer output characteristics shall be such that
– the impulse repetition rate shall not exceed 1 Hz;
– the **impulse duration** of the impulse in the 500 ∧ component of the **standard load** shall not exceed 10 ms;
– for **energy limited energizers** the energy/impulse in the 500 ∧ component of the **standard load** shall not exceed 5 J;

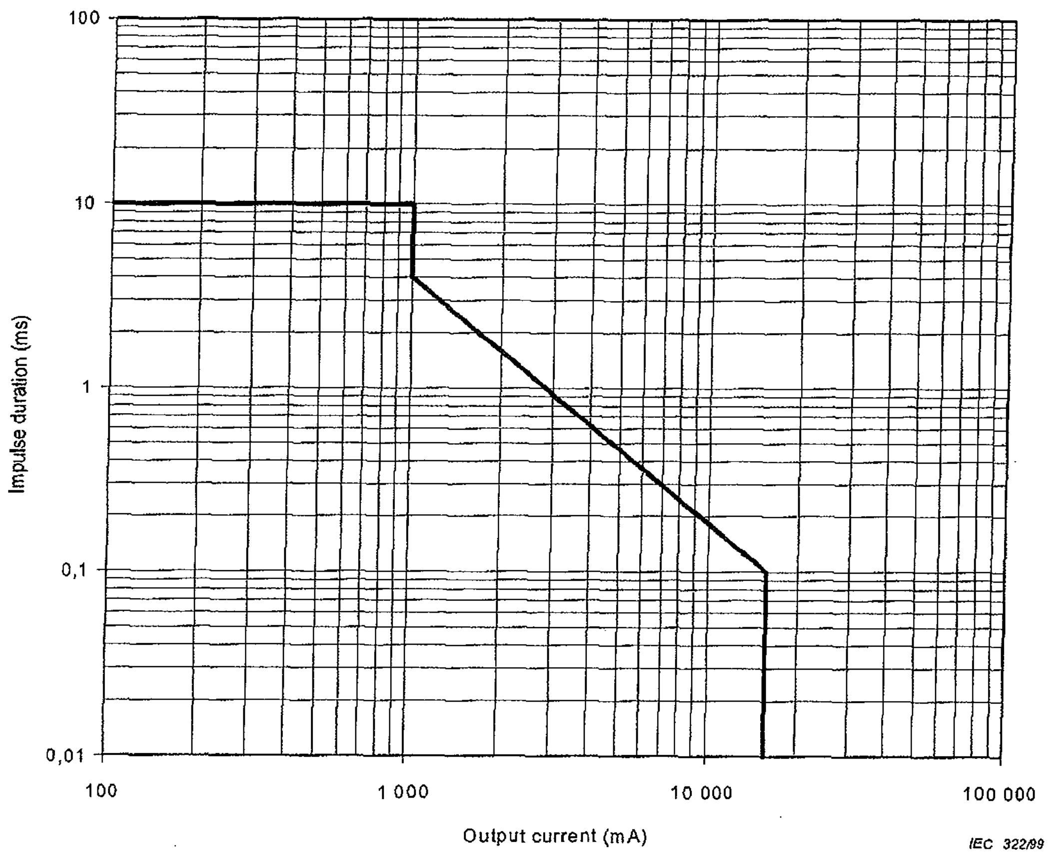
NOTE The energy/impulse is the energy measured in the impulse over the **impulse duration**.

– for **current limited energizers** the **output current** in the 500 ∧ component of the **standard load** shall not exceed for

□ an **impulse duration** of greater than 0,1 ms, the value specified by the characteristic limit line detailed in Figure 102;
□ an **impulse duration** of not greater than 0,1 ms, 15 700 mA.

Compliance is checked by measurement when the ***energizer*** *is supplied with the voltage in 11.5, the* ***energizer*** *being operated under conditions of* ***normal operation*** *but with the* ***standard load*** *connected to its output terminals. When measuring the impulse repetition rate the* ***standard load*** *is not connected.*

The measurements are made using a measuring arrangement with an input impedance consisting of a non-inductive resistance of not less than 1 M∧ in parallel with a capacitance of not more than 100 pF.



NOTE The equation of the line relating **impulse duration** (ms) to **output current** (mA) for 1 000 mA < **output current** < 15 700 mA, is given by **impulse duration** = 41,885 × 10^3 × (**output current**)$^{-1,34}$

Figure 102 – Current limited energizer characteristic limit line

30

Annex CC
(informative)

Installation of electric security fences

CC.1 General

An **electric security fence** should be installed so that, under normal conditions of operation, persons are protected against inadvertent contact with **pulsed conductors**.

NOTE 1 This requirement is primarily intended to establish that a desirable level of safety is present or is being maintained in the **physical barrier**.

NOTE 2 When selecting the type of **physical barrier**, the likely presence of young children should be a factor in considering the size of openings.

CC.2 Location of electric security fence

The **electric fence** should be separated from the **public access area** by means of a **physical barrier**.

Where an **electric fence** is installed in an elevated position, such as on the inner side of a window or skylight, the **physical barrier** may be less than 1,5 m high where it covers the whole of the **electric fence**. If the bottom of the window or skylight is within a distance of 1,5 m from the floor or access level then the **physical barrier** need only extend up to a height of 1,5 m above the floor or access level.

CC.3 Prohibited zone for pulsed conductors

Pulsed conductors shall not be installed within the shaded zone shown in Figure CC1.

NOTE 1 Where an **electric security fence** is planned to run close to a site boundary, the relevant government authority should be consulted before installation begins.

NOTE 2 Typical **electric security fence** installations are shown in Figure CC2 and Figure CC3.

CC.4 Separation between electric fence and physical barrier

Where a **physical barrier** is installed in compliance with CC.3 at least one dimension in any opening should be not greater than 130 mm and the separation between the **electric fence** and the **physical barrier** should be

- within the range of 100 mm to 200 mm or greater than 1 000 mm where at least one dimension in each opening in the **physical barrier** is not greater than 130 mm;
- greater than 1 000 mm where any opening in the **physical barrier** has all dimensions greater than 50 mm;
- less than 200 mm or greater than 1 000 mm where the **physical barrier** does not have any openings.

NOTE 1 These restrictions are intended to reduce the possibility of persons making inadvertent contact with the **pulsed conductors** and to prevent them from becoming wedged between the **electric fence** and the **physical barrier**, thereby being exposed to multiple shocks from the **energizer**.

NOTE 2 The separation is the perpendicular distance between the **electric fence** and the **physical barrier**.

31

CC.5 Prohibited mounting

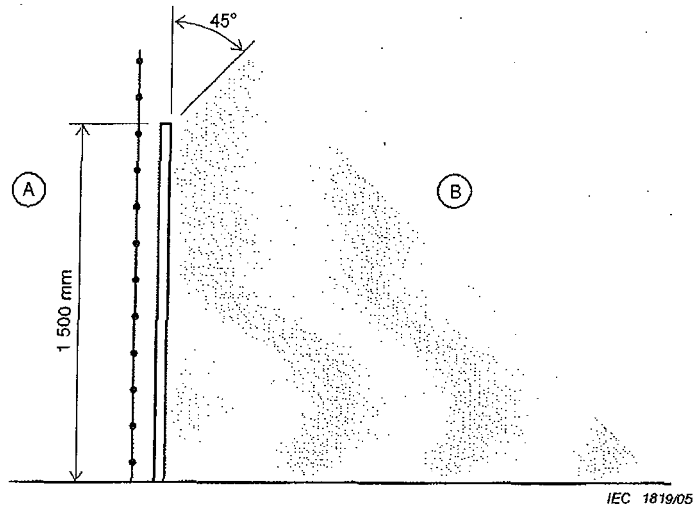
Electric fence conductors should not be mounted on a support used for any overhead power line.

CC.6 Operation of electric security fence

The conductors of an **electric fence** should not be energized unless all authorized persons, within or entering the **secure area**, have been informed of its location.

Where there is a risk of persons being injured by a secondary cause, appropriate additional safety precautions should be taken.

NOTE An example of a secondary cause is where a person may be expected to fall from a surface if contact is made with **pulsed conductors**.



Key

A = **Secure area**

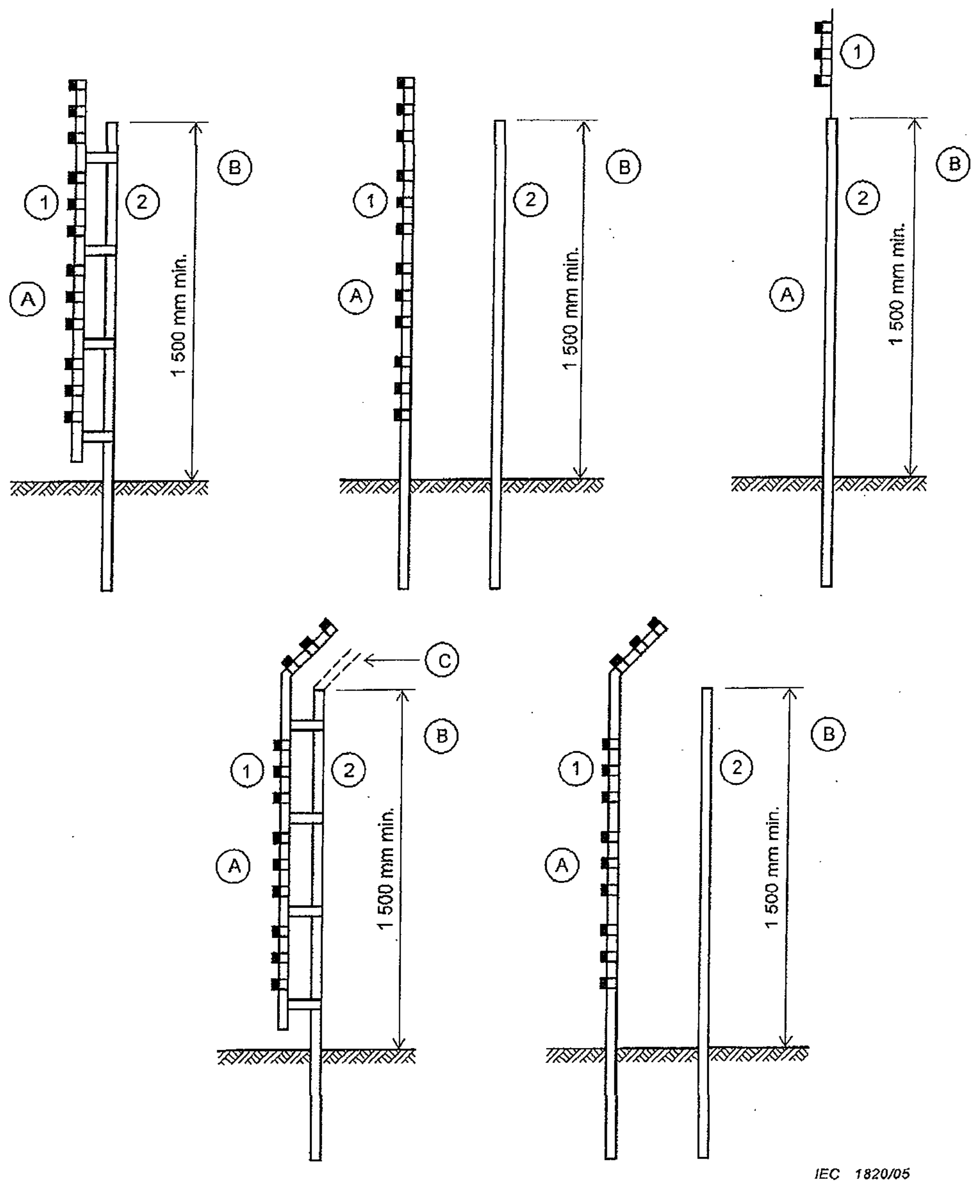
B = **Public access area**

Physical barrier

Prohibited area

Electric security fence

Figure CC.1 – Prohibited area for pulse conductors



Key

A = **Secure area**

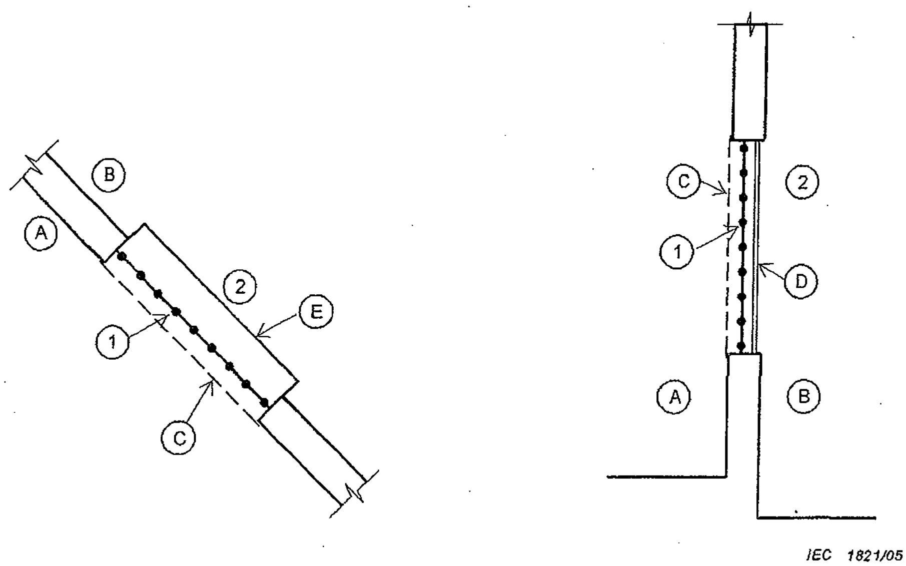
B = **Public access area**

C = Barrier where required

1 = **Electric security fence**

2 = **Physical barrier**

Figure CC.2 – Typical constructions where an electric security fence is exposed to the public



Key

A = **Secure area**

B = **Public access area**

C = Barrier where required

D = Glass window pane

E = Skylight in roof

1 = **Electric security fence**

2 = **Physical barrier**

Figure CC.3 – Typical fence constructions where the electric security fence is installed in windows and skylights

35