



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 3830:2022

**Aerospace series - Electrical system -
Load analysis**

Luft- und Raumfahrt - Elektrisches
Bordnetz - Energiebilanz

Série aérospatiale - Réseau électrique -
Bilan électrique

02/2022



National Foreword

This European Standard EN 3830:2022 was adopted as Luxembourgish Standard ILNAS-EN 3830:2022.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

EUROPEAN STANDARD ILNAS-EN 3830:2022 **EN 3830**
NORME EUROPÉENNE
EUROPÄISCHE NORM February 2022

ICS 49.060

English Version

Aerospace series - Electrical system - Load analysis

Série aérospatiale - Réseau électrique - Bilan électrique

Luft- und Raumfahrt - Elektrisches Bordnetz -
Energiebilanz

This European Standard was approved by CEN on 7 February 2020.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword	3
Introduction	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions	5
3.1 Electrical load and power analysis	5
3.2 Electrical system	6
3.3 Power ratings	8
3.4 Available power.....	8
3.5 Operating time	10
3.6 Operating conditions	10
4 Analysis report	12
4.1 General.....	12
4.2 Introduction.....	12
4.3 Electrical system functional description	12
4.4 Power sources data	12
4.5 Time intervals	13
5 d.c. load analysis.....	13
5.1 General.....	13
5.2 Minimum parameters required for the d.c. load analysis.....	13
5.3 Calculation of average power consumption.....	14
5.4 d.c. load summary	14
6 a.c. load analysis.....	15
6.1 General.....	15
6.2 Minimum parameters required for the a.c. load analysis.....	15
6.3 Calculation of average power consumption.....	16
6.4 a.c. load summary	16
7 Power source analysis.....	17
7.1 General.....	17
7.2 Derating.....	17
7.3 Growth capacity verification	17
7.4 Power source utilisation	17
8 Battery analysis	17
8.1 General.....	17
8.2 Initial charge state.....	18
8.3 Determination of charge rate	18
8.4 Remaining flight time.....	18
Annex A (informative) Example of power source utilisation.....	19
Bibliography	22

European foreword

This document (EN 3830:2022) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2022, and conflicting national standards shall be withdrawn at the latest by August 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this document: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is applicable to a.c. and d.c. aircraft electrical power systems in accordance with EN 2282 and has been prepared under consideration of MIL-E-7016F. It describes the methods and procedures necessary for the preparation of an electrical load analysis.

1 Scope

This document defines the method to establish an electrical load analysis which is used to compare the supply capacity of an electrical power generation system with the power demand of the connected electrical utilisation equipment.

It shall prove that the power sources are capable of supplying these loads under all electrical power system states and aircraft operating conditions and that specified growth capacity for future requirements is ensured.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2282, *Aerospace series — Characteristics of aircraft electrical supplies*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Electrical load and power analysis

3.1.1

electrical load and power analysis

an electrical load and power source analysis comprises two parts:

- an analysis of the capacity of an electrical power supply system (power source analysis) ;
- an analysis of the power requirements of the utilisation equipment connected to it (load analysis)

3.1.2

power source analysis

a power source analysis determines the capacity of a power supply system to satisfy the connected utilisation equipment under all specified aircraft conditions and provides a calculation of the percentage load growth capacity

3.1.3

load analysis

a load analysis is essentially a compilation of the electrical loads, grouped in accordance with the busbar arrangement of the supplying power sources, and a summation of the equipment load values required from these during the same aircraft operating conditions as specified for the power source analysis

3.2 Electrical system

3.2.1

electrical system

the electrical system is an assembly constituted by the electrical power sources, utilisation equipment, control and protection devices and all common connections of the installation

3.2.2

power supply system

a power supply system consists of one or more sources of the same nominal voltage and/or frequency, and the corresponding power distribution system

3.2.2.1

power sources

power sources supply the power from the aircraft engines, a power conversion device, a ground power unit or batteries

Examples of electrical power sources are:

- d.c. power sources:
 - generators,
 - transformer-rectifier units,
 - batteries ;
- a.c. power sources:
 - generators,
 - transformers,
 - inverters,
 - frequency converters.

3.2.2.2

normal power sources

normal power sources supply electrical power to the utilisation equipment during normal system operating conditions as defined in EN 2282

3.2.2.3

emergency power sources

emergency power sources supply electrical power to the utilisation equipment (or a specified part thereof) in case of a failure of the normal power sources, as defined in EN 2282.

Emergency power sources may have limited (e.g. batteries) or unlimited (e.g. ram air generators) supply duration, in general, they are limited in capacity, requiring a certain amount of load to be shed during their operation