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METHOD OF RISK ANALYSIS AND RECOMMENDATIONS FOR THE USE OF ELECTRONICS IN SYSTEMS FOR THE CONTROL OF GAS BURNERS AND GAS BURNING APPLIANCES

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English version

Method of risk analysis and recommendations for the use of electronics in systems for the control of gas burners and gas burning appliances

Méthode d'analyse des risques et recommandations d'utilisation de l'électronique dans les systèmes de commande des brûleurs à gaz et appareils à gaz

Risikobewertung und Empfehlungen bei der Anwendung von Elektronik in Systemen für Schutz-, Regel- und Steuerungseinrichtungen fu*r Gasbrenner und Gasgeräte

This European Prestandard (ENV) was approved by CEN on 16 October 2002 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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Foreword

This document ENV 14459:2002 has been prepared by Technical Committee CEN /TC 58, "Safety and control devices for gas-burners and gas-burning appliances burning appliances", the secretariat of which is held by BSI.

This document supersedes ENV 1954:1996.

Annexes A and B are informative.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard : Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Control systems are designed to control and protect gas appliances and the combustion process. All functions are performed depending on their safety relevance within a specific tolerance of measures and time and with a specific certainty under external influences and internal failures.

Existing control standards are based on fault recognition up to 2 faults deep. It was concluded in controls committees that it is not always needed to protect against the consequences of any hazardous event with uniform measures as hazards differ in severity and also the probability of unwanted occurrence may differ. As there exists large interpretation differences on what level of protection is needed against certain hazards, there is a need for guidance to bring the safety philosophy for gas appliances and controls in line. The discussions of different committees regarding safety related control functions and the application of controls in the appliances show that it is worthwhile to refine the basic safety philosophy of gas appliances into different risk levels.

For the evaluation of preventative measures concerning fault tolerance and avoidance of hazards it is essential to classify control functions with regard to their fault behaviour. For the classification of control functions their integration into the complete safety concept of the appliance should be taken into account.

For electronic controls covered by CEN/TC 58 consensus was reached by assuming 2 faults, including hardware and software, that should result in a safe situation. Class C software is regarded equivalent to this 2 faults assessment.

In the appliance standards only specific fault conditions are considered when controls complying with CEN/TC 58 standards are used, e.g. flame simulation and air proving before each new start. In some cases (e.g. switch contacts) shorting is excluded when certain tests have proven that the probability of a fault occurrence is low. For gas valves it is considered that a single valve is not sufficient.

Regarding protection against overheat of gas appliances reference is made to EN 60730-2-9. In case of electronic temperature controls the safety philosophy is not on the same level as for controls covered by CEN/TC 58 (see e.g. EN 483:2000, 5.6.7.6 where only fault conditions of the sensor are considered, however other hardware or software faults are not considered). Actually the proper safety level for the control is not specified by the appliance committees.

This prestandard will give the manufacturer and the test house a method for a safety check for new products in the field of GAD for which no product standards are actually available.

The safety check is oriented on the controlled parameters (high/low temperature, pressure, flow) in the combustion process and in the functionality of the controls (open/closed; lock/un-lock; start/stop). Each control function needs to be classified concerning the safety aspect (Class A, B, C):

To analyse the effect of fault conditions it is essential to know the specific application and the related risk.

NOTE As a consequence of this, the appliance standard is supposed to describe the allowed behaviour of the appliance under fault conditions (e. g. specifying testing under abnormal operating conditions; for examples see EN 60335-series, clause 19 “Abnormal operation”). In order to evaluate the appliance on functional safety after inducing faults in safety relevant components and circuits such a description should also contain operating conditions in such cases when the appliance continues to operate to guide in judgements if remaining hazards or risks can be acceptable (examples are volatile lockout instead of non-volatile lockout, cycling operation, extended safety time etc.).

This European Prestandard covers type testing only.