AS/NZS 4853:2012

Australian/New Zealand Standard™

Electrical hazards on metallic pipelines

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-001, Wiring Rules. It was approved on behalf of the Council of Standards Australia on 23 February 2012 and on behalf of the Council of Standards New Zealand on 8 March 2012.
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The following are represented on Committee EL-001:

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Consumers' Federation of Australia
Electrical and Communications Association, Qld
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We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-001, Wiring Rules, to supersede AS/NZS 4853:2000.

This revision was prepared to address experience gained with the implementation of AS/NZS 4853:2000.

This revision is a general revision of the Standard and introduces a risk based design approach to address electric shock hazard situations and respective mitigation methods.

The significant changes in this revision include—

(a) the Standard has been restructured to improve its clarity;

(b) a structured process to assess the likelihood of an electrical hazard being present on a metallic pipeline, and the methodology by which the risk level associated with the hazard is calculated, and the effectiveness of methods to reduce the risk to an acceptable or in the ALARP region to a tolerable level is provided;

(c) a safety management methodology to document the assessment and control of electrical hazards is introduced, together with requirements for these to be reviewed at defined intervals to assure the ongoing effectiveness of the control; and

(d) the appendices are revised and expanded.

This Standard has adopted the risk based assessment criteria developed by Energy Networks Australia and Electrical Engineers Association (New Zealand) to align the safety requirements of this Standard with those of the electrical power industry.

Symbols used in equations in this Standard are defined in relation to the particular equations in which they occur.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables are deemed to be requirements of this Standard.

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FOREWORD

The close proximity of high voltage power networks and pipelines can result in hazardous voltages on the pipeline. Electrical traction systems and lightning activity can also cause hazardous voltages in pipelines.

This Standard provides guidelines to calculate the magnitude of the electrical hazards, and to assess the effectiveness of methods used to mitigate the hazard. Because experience has shown that it may not be practicable to achieve specific voltage limits, the Standard has adopted a risk management based methodology that requires the application of physical and procedural controls that will reduce the risk to an acceptable level.

This Standard considers a number of circumstances that give rise to electrical conditions on pipelines—

(a) low frequency induction (LFI) due to parallel or near parallel positioning of the pipelines and high voltage power lines or high voltage a.c. traction systems;

(b) earth potential rise (EPR) due to pipeline proximity with high voltage power line towers, underground cable joint bays, substation earth grids, and other earthing current discharge points;

(c) EPR due to lightning current following lightning strikes adjacent to pipelines;

(d) the effects of lightning current introduced to the pipeline, directly or indirectly, and the effects due to the electrical properties of the pipeline and its coating;

(e) capacitive coupling due to the placing, temporarily or permanently, of pipelines adjacent to high voltage power lines; and

(f) the accidental contact of pipelines with other electrical systems such as electricity distribution or traction systems.

The electrical characteristics of the pipeline are always influenced by the properties of the protective coating applied to the external surface of the pipe and the effect of this coating must be considered in any analysis.

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S E C T I O N 1 S C O P E A N D G E N E R A L

1.1 SCOPE

This Standard applies to metallic pipelines used for transmission and distribution of fluids, both buried and above ground. The responsibility for the application of this Standard rests with the owner, licensee or the operating authority of the pipeline.

This Standard sets down the minimum requirements for managing the safety of personnel working in the vicinity of pipelines and equipment installed on pipelines and specifically addresses the requirements for the control of electrical hazards on transmission and distribution pipelines.

The practical rules and guidelines also provide the basis for an engineering assessment by competent persons of situations that are not specifically addressed by the Standard.

This Standard describes the mechanisms that create hazardous electrical conditions on such pipelines and provides guidance on how to calculate and mitigate these hazards to minimize the risk of—

(a) harm to people making contact with the pipeline including employees and the public;

(b) damage to the pipeline coating and metal; and

(c) damage to equipment such as the pipeline cathodic protection (CP) system and telemetry systems.

The risk management based methodology developed by the power industry for a similar purpose in power system earthing design has been adopted to provide a consistent approach to risk treatment for similar electrical hazards in the power and pipeline industries.

Guidance on the treatment of lightning strikes is also provided.

The Standard also recognizes that alternating currents may cause corrosion of metallic pipelines.

1.2 EXCLUSIONS

This Standard does not apply to pipes installed within a plant or processing environment, although some of the principles in the Standard may have application in the analysis of electrical hazards in these areas.

This Standard does not apply to an electrically powered plant used in the construction of pipelines.

This Standard does not address issues associated with static electricity generated by fluid flow. Control of static electricity is addressed in AS/NZS 1020.

1.3 RETROSPECTIVE APPLICATION

Publication of a new Standard or a new edition of a Standard does not of itself require modification of existing physical assets constructed to a previous Standard or edition of a Standard.