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Control of Electrochemical Corrosion of Underground Metallic Structures



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PREFACE

This is the third edition of C22.3 No. 4, it supersedes previous editions published in 1936 and 1958.

In the first edition, major emphasis was placed upon the corrosive effects of stray currents originating in direct-current electric railway systems. In fact, the title of the first edition was "Principles and Practices for Protecting Underground Structures from the Effects of Stray Currents Originating in Direct-Current Electric Railway Systems".

In preparing the second edition of C22.3 No. 4, the Committee recognized certain major changes that were occurring throughout the country. Many transportation systems had discontinued operation of electrically operated railways employing grounded rails, or were in the process of eliminating this type of system. For this reason, the stray current situation was undergoing a radical change, and often this change resulted in more severe corrosion problems than existed during the operation of the electric railway. For example, many street railways have in the past cooperated extensively with the owners of other subsurface structures by, designing their systems to limit stray currents and by permitting the installation of drainage bonds between the two systems at strategic locations. The net result of this cooperation has been a large measure of cathodic protection to the other system. With the elimination of the street railway, however, this protection has been withdrawn, and corrosion due to other causes has been permitted to take place.

It should be recognized that electrically operated railways employing grounded rail returns are not the only source of stray currents. Other types of systems utilizing grounded direct-current circuits often act as sources of stray currents in the earth. One such source that is becoming of major importance is the pipeline equipped with cathodic protection.

While the electric railway is becoming of decreasing importance as a source of stray currents, considerable experience in the mitigation of corrosion due to stray currents originating in such railways has accumulated over the years. For this reason some of the Rules contained in this Code apply specifically to railways. It should be realized, however, that these Rules apply in general to all systems which originate stray earth currents, and that railways are mentioned specifically merely for convenience.

The Committee charged with the preparation of the second edition foresaw the gradual abolition of electric railways and attempted to emphasize cathodic protection systems as a new and important source of stray dc current. In the interim between the publication of the second edition and the preparation of the third edition it is now apparent that electric traction systems may see increasing use in urban and inter-urban service. With the advent of high voltage direct current transmission for the long distance transportation of power and the almost universal use of cathodic protection on oil and gas piping systems the up-dating of this Standard is most timely.

This Standard was prepared by the Task Group on Electrochemical Corrosion of Underground Metallic Structures under the jurisdiction of the Subcommittee on Ground Current Coordination and the Committee on Canadian Electrical Code, Part III and was formally approved by these Committees.

REXDALE, APRIL, 1974

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