ASME Code for Pressure Piping, B31
An American National Standard

ASME B31G-1991

(REVISION OF ANSI/ASME B31G-1984)

Manual for Determining the Remaining Strength of Corroded Pipelines

A Supplement to ASME B31 Code for Pressure Piping

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers

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The 1991 edition of this Manual will be revised when public comment or Committee actions necessitate the issuance of a new edition, or it will be reviewed and reaffirmed 5 years from the date of approval of this edition. No addenda service is provided with this publication. Written interpretations of the requirements of this Manual will not be issued to the current edition.

FOREWORD

(This Foreword is not a part of ASME B31G-1991.)

It is recognized by pipeline companies that some sections of high pressure pipelines, particularly those installed a number of years ago, have experienced some corrosion. Where corrosion is found, pipeline operators have been deeply concerned about the need for a method of determining the remaining strength of these corroded areas. If the corrosion does not penetrate the pipe wall, what is the pressure containing capability of the remaining pipe metal in terms of its ability to continue to operate safely at the maximum allowable operating pressure (MAOP) of the pipeline system? Thus, one of the needs of the pipeline industry has been a procedure that will help operators, particularly field personnel, make decisions on existing pipelines, when exposed for any purpose, as to whether any corroded region may be left in service or whether it needs to be repaired or replaced. Such determinations must be based upon sound research and extensive testing in order to provide safe and conservative guidelines on which to base field decisions. The Manual provides procedures to assist in this determination.

Parts 2, 3, and 4 are based on Appendices G-6, G-7, and G-8 of the ASME Guide for Gas Transmission and Distribution Piping Systems, 1983 Edition. They are included in this Manual for use by field operators to determine the remaining strength of corroded pipe. The technology is based on research done in the Columbus laboratories of the Battelle Memorial Institute; specifically, their report *Summary of Research to Determine the Strength of Corroded Areas in Line Pipe,* July 10, 1971.

A revision to the 1984 edition of the Manual was undertaken in 1989. The revision includes a number of clarifications and corrections. The computer program presented in Appendix B and used to produce a printed table of maximum acceptable corrosion lengths for a given pipe diameter, and up to ten wall thicknesses of that diameter, was upgraded.

This Manual was approved by ASME and subsequently by the American National Standards Institute on May 20, 1991.

ASME CODE FOR PRESSURE PIPING, B31

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PART 1
INTRODUCTION

1.1 SCOPE

The scope of this Manual includes all pipelines within the scope of the pipeline codes that are part of ASME B31 Code for Pressure Piping, i.e., ASME B31.4, Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols; ASME B31.8, Gas Transmission and Distribution Piping Systems; and ASME B31.11, Slurry Transportation Piping Systems. Parts 2, 3, and 4 are based on material included in ASME Guide for Gas Transmission and Distribution Piping Systems, 1983 Edition.

This Manual is not applicable to new construction covered under the B31 Code Sections. That is, it is not intended that this Manual be used to establish acceptance standards for pipe that may have become corroded prior to or during fabrication and/or installation.

This Manual is intended solely for the purpose of providing guideline information for the designer/owner/operator. Thus, the specific use of this Manual is the responsibility of the designer/owner/operator.

1.2 LIMITATIONS

(a) This Manual is limited to corrosion on weldable pipeline steels categorized as carbon steels or high strength low alloy steels. Typical of these materials are those described in ASTM A 53, A 106, and A 381, and API 5L. (The current API 5L includes all Grades formerly in API 5LX and 5LS.)

(b) This Manual applies only to defects in the body of line pipe which have relatively smooth contours and cause low stress concentration (e.g., electrolytic or galvanic corrosion, loss of wall thickness due to erosion).

(c) This procedure should not be used to evaluate the remaining strength of corroded girth or longitudinal welds or related heat affected zones, defects caused by mechanical damage, such as gouges and grooves, and defects introduced during pipe or plate manufacture, such as seams, laps, rolled ends, scabs, or slivers.

(d) The criteria for corroded pipe to remain in service presented in this Manual are based only upon the ability of the pipe to maintain structural integrity under internal pressure. It should not be the sole criterion when the pipe is subject to significant secondary stresses (e.g., bending), particularly if the corrosion has a significant transverse component.

(e) This procedure does not predict leaks or rupture failures.