

**ASME B31T-2021**  
(Revision of ASME B31T-2018)

# **Standard Toughness Requirements for Piping**

---

**ASME Code for Pressure Piping, B31**

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

**ASME B31T-2021**  
(Revision of ASME B31T-2018)

# **Standard Toughness Requirements for Piping**

---

**ASME Code for Pressure Piping, B31**

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 30, 2021

The next edition of this Standard is scheduled for publication in 2024.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under <http://go.asme.org/Interpretations>. Periodically certain actions of the ASME B31 Committee may be published as Cases. Cases are published on the ASME website under the B31 Committee Page at <http://go.asme.org/B31committee> as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages of the associated codes and standards to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The B31 Committee Page can be found at <http://go.asme.org/B31committee>. The associated B31 Committee Pages for each code and standard can be accessed from this main page. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,  
in an electronic retrieval system or otherwise,  
without the prior written permission of the publisher.

The American Society of Mechanical Engineers  
Two Park Avenue, New York, NY 10016-5990

Copyright © 2021 by  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
All rights reserved  
Printed in U.S.A.

# CONTENTS

|   |   |          |
|---|---|----------|
| Foreword . . . . .                              |   | iv       |
| Committee Roster . . . . .                      |   | v        |
| Correspondence With the B31 Committee . . . . . |   | vi       |
| Introduction . . . . .                          |   | viii     |
| Summary of Changes . . . . .                    |   | x        |
| <b>1</b>  | <b>General . . . . .</b>  | <b>1</b> |
| <b>2</b>  | <b>Glossary . . . . .</b>   | <b>1</b> |
| <b>3</b>  | <b>Low-Temperature Ranges and Requirements . . . . .</b>  | <b>1</b> |
| <b>4</b>  | <b>Impact Testing Methods and Acceptance Criteria . . . . .</b>   | <b>6</b> |
| <b>5</b>  | <b>References . . . . .</b>   | <b>8</b> |
| <br><b>Mandatory Appendices</b>                 |   |          |
| I   | Impact Test Exemption Curves . . . . .  | 37       |
| II  | Stress Ratio Curves . . . . .   | 43       |
| III   | Material Groupings by T-Number . . . . .  | 45       |
| <br><b>Nonmandatory Appendices</b>              |   |          |
| A   | Flowchart of Requirements . . . . .   | 53       |
| B   | Guidelines for Establishing T-Number Group . . . . .  | 55       |
| <br><b>Figures</b>                              |   |          |
| I-1   | Impact Test Exemption Curves for T-Number Groups CS A, CS B, CS C, and CS D (U.S. Customary Units) . . . . .      | 38       |
| I-1M  | Impact Test Exemption Curves for T-Number Groups CS A, CS B, CS C, and CS D (SI Units) . . . . .                  | 39       |
| II-1  | Stress Ratio Curve (U.S. Customary Units) . . . . .   | 43       |
| II-1M   | Stress Ratio Curve (SI Units) . . . . .   | 44       |
| A-1   | Flowchart of Requirements . . . . .   | 54       |
| <br><b>Tables</b>                               |   |          |
| 3.1-1   | Low-Temperature Service Requirements by Material Group . . . . .  | 12       |
| 3.2-1   | Material Groupings by Material Specification . . . . .  | 28       |
| 4.4.2-1   | Charpy Impact Test (Absorbed Energy) Temperature Reduction for Material or Specimens <10 mm (0.394 in.) . . . . . | 35       |
| 4.5.1-1   | Minimum Required Charpy V-Notch Impact Values . . . . .   | 36       |
| I-1   | Tabular Values for Figures I-1 and I-1M . . . . .   | 40       |
| III-1   | Material Groupings by T-Number . . . . .  | 46       |