# Annex D
(informative)

## Valve Material Combinations

Table D.1, Table D.2, and Table D.3 list valve body, bonnet, and cover materials (ASME B16.34, Material Groups 1, 2, and 3) along with associated valve trim materials (trim numbers, Table 8) and ASTM A193 and ASTM A194 specification bolting materials. For ASTM A193 and ASTM A194 listed bolting materials in Table D.1 and Table D.2, corresponding bolting materials listed in EN 10269 may be substituted in accordance with Table D.4.

**Table D.1—Material Combinations for Group 1 Body, Bonnet, and Cover Materials**

| Material Group ASME B16.34 | Body/Bonnet Material Abbreviation | Body, Bonnet, and Cover ASTM Specification | Trim Material CN Designation | Body-to-Bonnet and Body-to-Cover Bolting ASTM Specification |
|---|---|---|---|---|
| 1.1 | C-Si,<br>C-Mn-Si C-Mn-Si-V<br>3½ Ni | A105 or A216-WCB<br>A350-LF2-CL1<br>A350-LF6-CL1<br>A350-LF3 | 8, 8A<br>8, 8A<br>10<br>10 | B7/2H, B7M/2HM<br>B7/2H [a]<br>B8M-CL2/8M [b,c]<br>B8M-CL2/8M [b,c] |
| 1.2 | C-Mn-Si<br>C-Mn-Si-V<br>2½ Ni<br>3½ Ni | A216-WCC<br>A352-LCC<br>A350-LF6-CL2<br>A352-LC2<br>A352-LC3 | 8, 8A<br>8, 8A<br>10<br>10<br>10 | B7/2H, B7M/2HM<br>B7/2H, B7M/2HM<br>B8M-CL2/8M [b,c]<br>B8M-CL2/8M [b,c]<br>B8M-CL2/8M [b,c] |
| 1.3 | C-Si C-½ Mo | A352-LCB<br>A217-WC1<br>A352-LC1 | 8, 8A<br>8, 8A<br>10 | B7/2H, B7M/2HM<br>B7/2H, B7M/2HM<br>B8M-CL2/8M [b,c] |
| 1.4 | C-Mn-Si | A350-LF1 | 8 | B7/2H, B7M/2HM |
| 1.5 | C-½ Mo | A182-F1 | 8 | B7/2H, B7M/2HM |
| 1.7 | ½ Cr-½ Mo<br>Ni-½ Cr-½ Mo<br>¾ Ni-¾ Cr-1Mo | A182-F2<br>A217-WC4<br>A217-WC5 | 8 | B7/2H, B7M/2HM |
| 1.9 | 1¼ Cr-½ Mo<br>1¼ Cr-½ Mo-Si | A217-WC6<br>A182-F11-CL2 | 8 | B16/8M [a] |
| | | A182-F22-CL3 | | |

# Valve Material Selection Guide

**Valve Material Selection Guide:**

**A Practical Guide to Piping and Valves for the Oil and Gas Industry** Karan Sotoodeh,2021-01-12 A Practical Guide to Piping and Valves for the Oil and Gas Industry covers how to select test and maintain the right oil and gas valve Each chapter focuses on a specific type of valve with a built in structured table on valve selection Covering both onshore and offshore projects the book also gives an introduction to the most common types of corrosion in the oil and gas industry including CO2 H2S pitting crevice and more A model to evaluate CO2 corrosion rate on carbon steel piping is introduced along with discussions on bulk piping components including fittings gaskets piping and flanges Rounding out with chapters devoted to valve preservation to protect against harmful environments and factory acceptance testing this book gives engineers and managers a much needed tool to better understand today s valve technology Presents oil and gas examples and challenges relating to valves including many illustrations from valves in different stages of projects Helps readers understand valve materials testing actuation packing and preservation also including a new model to evaluate CO2 corrosion rates on carbon steel piping Presents structured valve selection tables in each chapter to help readers pick the right valve for the right project **The Concise Valve Handbook, Volume I** Michael A. Crabtree,2018-09-26 This two volume book comprises a comprehensive up to date body of knowledge that provides a total in depth insight into valve and actuator technology looking not just at control valves but a whole host of other types including check valves shut off valves solenoid valves and pressure relief valves Research studies within the process industry routinely indicate that the fluid control valve is responsible for 60 to 70% of poor functioning control systems Furthermore valves in general are consistently wrongly selected regularly misapplied and often incorrectly installed A methodology is presented to ensure the optimum selection of size choice of body and trim materials components and ancillaries Whilst studying the correct procedures for sizing readers will also learn the correct procedures for calculating the spring wind up or bench set Maintenance issues also include testing for deadband hysteresis stick slip and non linearity on line diagnostics and signature analysis Written in a detailed but understandable language the two volumes are presented in a form suitable for both the beginner with no prior knowledge of the subject and the more advanced specialist *Valve Selection and Specification Guide* Ronald C. Merrick,1991-01-10 Today people who specify or select valves spend over two thirds of their time researching literature for information on valve sizing availability materials and standards This is nonproductive time Unfortunately most companies do not have the luxury of a team of experts with the necessary experience and education in all of the different fields that apply to valves The next best alternative is to understand what valves are and all the things they can do By definition valves are devices that stop start mix or change the direction and or magnitude of the fluid flow pressure or its tempera ture As a specifier or selector you will have to determine whether the valve is going to be used for flow control throttling or for on off service Then you will have to determine the cycle life or frequency of their operation You will discover that valves are classified into three categories on off

valves control or regulator valves and fixed valves such as orifice plate nozzle duckbill rupture disk blind valve etc These valves represent approximately thirty different design configurations It has been said that if cost and delivery were no problem anyone of the seven basic valve styles could do the job of any other one But cost and delivery are very important factors in the real world So you have to be able to distinguish among these seven styles ball butterfly gate globe pinch diaphragm plug and poppet valves HVAC and Chemical Resistance Handbook for the Engineer and Architect Tom Arimes,1994 The title is misleading until you check out the contents It is all about HVAC and more This compilation has organized data frequently used by Mechanical Engineers Mechanical Contractors and Plant Facility Engineers The book will end the frustration on a busy day searching for design criteria **Case Studies of Material Corrosion Prevention for Oil and Gas Valves** Karan Sotoodeh,2022-06-07 Case Studies of Material Corrosion Prevention for Oil and Gas Valves delivers a critical reference for engineers and corrosion researchers Packed with nearly 30 real world case studies this reference gives engineers standardized knowledge on how to maintain select and prevent typical corrosion problems in a variety of oil and gas settings Subsea offshore refineries and processing plants are all included covering a variety of challenges such as chloride stress cracking how to use Teflon powder to prevent cross contamination and carbon dioxide corrosion Organized for quick discovery this book gives engineers a much needed tool to safely protect their assets and the environment Engineers working in oil and gas operations understand that corrosion is a costly expense that increases emissions and damages the environment but many standards do not provide practical examples with solutions leaving engineers to learn through experience This resource provides comprehensive information on topics of interest Provides solutions to common oil and gas corrosion valve failures with standard case studies Helps readers improve safety and reliability with the addition of references for further training Presents tactics on how to reduce environmental impact and use methods to prevent corrosion across offshore subsea and refinery activities Catalog of Copyright Entries. Third Series Library of Congress. Copyright Office,1973 Pipeline Valve Technology Karan Sotoodeh,2022-12-21 The e book version of the book Pipeline Valve Technology complements the other versions of the book The e book version provides the user with additional questions and answers at the end of each chapter to gauge and enhance the user s understanding The book covers the life cycle of pipeline valves the largest and most essential valves in offshore pipeline engineering Discussing the design process testing production transportation installation and maintenance the book also covers the risk analysis required to assess the reliability of these valves Pipeline valves require particular attention to ensure they are safely designed installed and maintained due to the high stakes Failure would result in environmental pollution the destruction of expensive assets and potential loss of life Proper installation and upkeep require specialist processes throughout the life cycle of the valve This book is a key guide to these processes Beginning by looking at the design of pipeline valves this book details how conserving weight and space is prioritized how materials are chosen how thickness is calculated and how leakage is minimized It then discusses production

and specific welding techniques to bond dissimilar materials alongside casting and machining Building on other discussions in the text with case studies and questions and answers for self study this book is the ideal guide to pipeline valves This book will be of interest to professionals in the industries of offshore oil and gas material engineering coatings mechanical engineering and piping It will also be relevant to students studying coating and welding or mechanical piping or petroleum engineering **Metering Pump Handbook** Robert E. McCabe,Philip G. Lanckton,William V. Dwyer,1984 An outstanding reference the Handbook is designed for metering pump designers and engineers working in all industries Easily accessible information includes fundamentals of metering pump operation principles of pump and piping system design guidelines for selection pump construction materials procedures for installation operation and maintenance of metering pumps and general formulas tables charts and pumping system layouts Presents the basic principles of the positive displacement pump Develops in depth analysis of the design of reciprocating metering pumps and their piping systems Demonstrates the practical implementation of these concepts through examples of actual pump applications **The Wiley Engineer's Desk Reference** Sanford I. Heisler,1998-04-24 The Reference of Choice for Today s Engineer Revised expanded updated and ready to use Every engineer should have a copy of the bestselling Wiley Engineer s Desk Reference the ideal all in one resource for practical engineering applications and daily problem solving Now fully updated to address the latest developments in theory and practice this brand new Second Edition balances authoritative coverage of classical engineering topics with new material on state of the art subjects such as composites lasers automatic data collection and more No other book on the market covers the broad spectrum of engineering in as concise a fashion So whether you re looking for a specific piece of data or general background knowledge this conveniently sized ready reference puts the information you need right at your fingertips Contents include Mathematics Mechanics and materials Hydraulics Structures Thermodynamics Electricity and electronics Process control Statistics and economics Energy sources Engineering practice The design process Tables and reference data *Introduction to Engine Valvetrains* Yushu Wang,2006-10-27 Many books have been written about the design construction and maintenance of valvetrains but until now information has been scattered and difficult to find This comprehensive book will serve as your single resource providing a systematic introduction to valvetrain systems and components Focusing on the fundamental concepts this book enables you to appreciate design and material considerations while at the same time understanding the difficulties in designing valvetrains to satisfy functional requirements and manufacturing challenges **The Comprehensive Valve Dictionary** Karan Sotoodeh,2025-09-10 This book is a pioneering reference work designed to address the complex terminology technical specifications and diverse applications of valves in industrial systems The Comprehensive Valve Dictionary is an authoritative and practical reference that demystifies the technical language surrounding industrial valves The dictionary provides detailed definitions of over a thousand valve related terms including valve types components materials standards testing methods and failure mechanisms In addition to

traditional applications this dictionary places significant emphasis on valves used in renewable energy systems including those for hydrogen production hydropower carbon capture and storage CCS geothermal energy and wind power Moreover it explores the definitions and real world applications of cutting edge technologies such as smart valves condition monitoring digital twin technology and additive manufacturing It also includes cross references to relevant international standards e g API ASME ISO troubleshooting guides and operational insights By bridging gaps in understanding this resource will support professionals in making informed decisions improving system reliability and ensuring compliance with industry best practices This work is specifically tailored for engineers designers manufacturers and researchers working in oil and gas petrochemicals power generation and renewable energy industries Industrial Valves Karan Sotoodeh,2023-06-27 INDUSTRIAL VALVES Improve the design and safety of your industrial valves with this comprehensive guide Industrial valves are used to regulate the flow of liquids gases or slurries They are fundamental to multiple industries including marine shipping in which valves regulate power supply wastewater water for fire fighting and other shipboard essentials They are also critical to the oil and gas industry where valves are used to control the flow of oil or gas out of deposits direct the crude oil refining process protect key areas and equipment from spillage and overflow and more Without the safety and regulating power provided by industrial valves these industries could not proceed This book provides a thorough introduction to the modeling and calculation of key challenges related to valve design manufacturing and operation It focuses particularly on solving problems of material failure due to corrosion and cavitation allowing readers to construct valve designs that will maximize safety and reliability It is a critical resource in helping protect workplaces industrial sites and valuable equipment from the externalities of these fundamental industrial resources Readers will also find Applied calculations based on real life cases from industry Information based on international standards including NORSOK Norwegian standard and IECs European standards Based on decades of experience in the relevant industries Industrial Valves is a useful reference for engineers and practitioners in the oil and gas and marine industries piping engineers valve manufacturers and more

**Power Plant Instrumentation and Control Handbook** Swapan Basu,Ajay Kumar Debnath,2014-11-04 The book discusses instrumentation and control in modern fossil fuel power plants with an emphasis on selecting the most appropriate systems subject to constraints engineers have for their projects It provides all the plant process and design details including specification sheets and standards currently followed in the plant Among the unique features of the book are the inclusion of control loop strategies and BMS FSSS step by step logic coverage of analytical instruments and technologies for pollution and energy savings and coverage of the trends toward filed bus systems and integration of subsystems into one network with the help of embedded controllers and OPC interfaces The book includes comprehensive listings of operating values and ranges of parameters for temperature pressure flow level etc of a typical 250 500 MW thermal power plant Appropriate for project engineers as well as instrumentation control engineers the book also includes tables charts and figures from real life

projects around the world Covers systems in use in a wide range of power plants conventional thermal power plants combined cogen plants supercritical plants and once through boilers Presents practical design aspects and current trends in instrumentation Discusses why and how to change control strategies when systems are updated changed Provides instrumentation selection techniques based on operating parameters Spec sheets are included for each type of instrument Consistent with current professional practice in North America Europe and India **High-Performance Chevy Small-Block Cylinder Heads** Graham Hansen,2007 This book shows you how to choose the best cylinder head for your application It covers both Gen I and Gen II small block Chevy versions occasionally touching on the Gen III and Gen IV production versions This book taps into some of the best small block Chevy cylinder head resources this country has to offer with a combination of insight and best guesstimates because much of what we know about port design and airflow management falls under the category of art rather than science **Valves, Piping, and Pipelines Handbook** T. Christopher Dickenson,1999 Hardbound Over recent years a number of significant developments in the application of valves have taken place the increasing use of actuator devices the introduction of more valve designs capable of reliable operation in difficult fluid handling situations low noise technology and most importantly the increasing attention being paid to product safety and reliability Digital technology is making an impact on this market with manufacturers developing intelligent smart control valves incorporating control functions and interfaces New metallic materials and coatings available make it possible to improve application ranges and reliability New and improved polymers plastic composite materials and ceramics are all playing their part Fibre reinforced plastic pipe systems glass reinforced epoxy pipe systems and the traditional low cost polyester pipe systems have all undergone sophisticated design and manufacturing technology changes The pote

**Process Design for Cryogenics** Alexander Alekseev,2024-10-14 Up to date overview of the method for producing the main industrial gases This book covers process design for cryogenic processes like air separation natural gas liquefaction and hydrogen and helium liquefaction It offers an overview of the basics of cryogenics and information on process design for modern industrial plants Throughout the book helps readers visualize the theories of thermodynamics related to cryogenics in practice A central concept in the book is the connection between the theoretical world of process design and the real limitations given by available hardware components and systems Sample topics covered in Process Design for Cryogenics include Cryogenic gases like nitrogen oxygen argon neon hydrogen helium and methane Thermodynamics Typical cryogenic refrigeration processes including the classic Joule Thomson process the contemporary mixed gas Joule Thomson process and expander based processes like Brayton and Claude cycles Helium and hydrogen liquefaction and air separation Process Design for Cryogenics is a comprehensive must have resource for engineers and scientists working in academia and industry on cryogenic processes **Springer Handbook of Mechanical Engineering** Karl-Heinrich Grote,Hamid Hefazi,2021-04-10 This resource covers all areas of interest for the practicing engineer as well as for the student at various

levels and educational institutions It features the work of authors from all over the world who have contributed their expertise and support the globally working engineer in finding a solution for today s mechanical engineering problems Each subject is discussed in detail and supported by numerous figures and tables **Handbook of Valves and Actuators** Brian Nesbitt,2011-04-19 Industries that use pumps seals and pipes will also use valves and actuators in their systems This key reference provides anyone who designs uses specifies or maintains valves and valve systems with all of the critical design specification performance and operational information they need for the job in hand Brian Nesbitt is a well known consultant with a considerable publishing record A lifetime of experience backs up the huge amount of practical detail in this volume Valves and actuators are widely used across industry and this dedicated reference provides all the information plant designers specifiers or those involved with maintenance require Practical approach backed up with technical detail and engineering know how makes this the ideal single volume reference Compares and contracts valve and actuator types to ensure the right equipment is chosen for the right application and properly maintained **Consulting Engineer** ,1971

Coating Application for Piping, Valves and Actuators in Offshore Oil and Gas Industry Karan Sotoodeh,2022-09-14 This book looks at the applications of coating in piping valves and actuators in the offshore oil and gas industry Providing a key guide for professionals and students alike it highlights specific coating standards within the industry including ISO NORSOK SSPC and NACE In the corrosive environment of a seawater setting coatings to protect pipes valves and actuators are essential This book provides both the theory behind these coatings and practical applications including case studies from multinational companies It covers different offshore zones and their corrosivity level alongside the different types of external corrosion such as stress cracking and hydrogen induced stress cracking The key coatings discussed are zinc rich coatings thermal spray zinc or aluminum phenolic epoxy and passive fire protection with a review of their defects and potential failures The book also details the role of coating inspectors and explains how to diagnose faults Case studies from companies such as Aker Solutions Baker Hughes Equinor and British Petroleum illustrate the wide range of industrial applications of coating technologies This book is of interest to engineers and students in materials coating mechanical piping or petroleum engineering

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