

Carbon Steel, Alloy Steel, Stainless Steel, and Nickel Base Alloy Castings for Use in the Petroleum and Natural Gas Industry

API SPECIFICATION 20A
SECOND EDITION, AUGUST 2017

ADDENDUM 1, SEPTEMBER 2018
ADDENDUM 2, APRIL 2020

API MONOGRAM PROGRAM EFFECTIVE DATE: OCTOBER 1, 2020



AMERICAN PETROLEUM INSTITUTE

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

All rights reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, NW, Washington, DC 20005.

Copyright © 2017 American Petroleum Institute

Foreword

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

The verbal forms used to express the provisions in this document are as follows.

Shall: As used in a standard, “shall” denotes a minimum requirement in order to conform to the standard.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order to conform to the standard.

May: As used in a standard, “may” denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, “can” denotes a statement of possibility or capability.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

Page

1	Scope	1
2	Normative References	1
3	Terms, Definitions, and Abbreviations	3
3.1	Terms and Definitions	3
3.2	Abbreviations	6
4	Foundry Qualification	6
4.1	General	6
4.2	Quality Management System (QMS)	6
4.3	Qualification Casting	7
4.4	Qualification Test Coupon (QTC)	8
4.5	Casting Qualification Testing	10
4.6	Acceptance of the Qualification Casting	15
4.7	Records of Qualification	17
4.8	Limits of Casting Qualifications	17
5	Production Castings	18
5.1	General	18
5.2	Manufacturing Process Specification (MPS)	18
5.3	Process Control Variables	18
5.4	Sample Casting	19
5.5	Design and Maintenance of Pattern Equipment	20
5.6	Inspection, Quality Control, Marking	21
5.7	Limits on the Qualification of Production Castings by CSL	23
5.8	Traceability	24
5.9	Marking	24
5.10	Record Retention	25
5.11	Documentation Provided with the Castings	25
5.12	Handling, Storage, and Shipping	26
5.13	Minimum Facility Requirements for the Foundry	26
	Annex A (informative) API Monogram Program—Use of the API Monogram by Licensees	27
	Bibliography	30
Figures		
1	Equivalent Round Models—Solids of Length L	8
2	Equivalent Round Models—Tube (Any Section)	9
3	Equivalent Round Models—Complex Shapes	9
4	Equivalent Round Models—Keel Block Configuration	10
5	Example of Development of Keel Block Dimensions	11
Tables		
1	As-cast Weight Range	7
2	Material Groups	7
3	Casting Weld Repair Limitations	8
4	Guidance for Qualification Examination/Testing Requirements	10
5	Surface Examination Acceptance	15
6	Volumetric Examination Acceptance Criteria	16
7	Limits of CSL Qualification Summary	17
8	Production Casting Weld Repair Limitations	23

Contents

	Page
9 Limits of CSL Production Casting Summary	23
10 Example: Casting Marking	25
11 Minimum Facility Requirements	26

Carbon Steel, Alloy Steel, Stainless Steel, and Nickel Base Alloy Casting for Use in the Petroleum and Natural Gas Industry

1 Scope

This specification identifies requirements for the foundry qualification, production, design, marking and documentation of carbon steel, alloy steel, stainless steel, and nickel-base alloy castings used in the petroleum and natural gas industries when referenced by an applicable API product standard or otherwise specified as a requirement for compliance.

This specification applies to castings used in the manufacture of pressure containing, pressure-controlling, and primary load-bearing components. Castings manufactured in accordance with this API Standard may be produced using any industry standard casting method.

This specification provides manufacturers with a fixed methodology to examine a qualification casting and to compare the results of that examination to a defined set of acceptance criteria. The results of the qualification testing by material grouping are then used to establish a baseline Casting Specification Level (CSL) for subsequently produced castings.

This specification also provides manufacturers with a fixed production testing methodology to determine if subsequently produced castings conform to the minimum requirements for the intended CSL. The intent is that the production castings meet the minimum CSL requirements established during qualification testing by material grouping and/or the minimum CSL specified by the purchaser.

If product is supplied bearing the API Monogram and manufactured at a facility licensed by API, the requirements of Annex A apply.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies.

For undated references, the latest edition of the referenced document (including any amendments) applies, except that new editions may be used on issue and shall become mandatory upon the effective date specified by the publisher or six months from the date of the revision (where no effective date is specified).

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

API Specification 6A, *Specification for Wellhead and Christmas Tree Equipment*

API Standard 20H, *Heat Treatment Services – Batch Type for Equipment Used in the Petroleum and Natural Gas Industry*

ANSI/NACE MR0175¹/ISO 15156, *Materials for use in H₂S-containing environments in oil and gas production*

ASME Boiler and Pressure Vessel Code (BPVC)², Section VIII, Division 1, *Pressure Vessels ASME Boiler and Pressure Vessel Code (BPVC), Section IX, Welding and Brazing Qualifications*

ASME Boiler and Pressure Vessel Code (BPVC), Section V, *Nondestructive Examination*

¹ NACE International (formerly the National Association of Corrosion Engineers), 1440 South Creek Drive, Houston, Texas 77084-4906, www.nace.org.

² ASME International, 2 Park Avenue, New York, New York 10016-5990, www.asme.org.