

# Brazed Aluminum Plate-fin Heat Exchangers

API STANDARD 668  
FIRST EDITION, NOVEMBER 2018



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.

Classified areas may vary depending on the location, conditions, equipment, and substances involved in any given situation. Users of this standard should consult with the appropriate authorities having jurisdiction.

Users of this standard should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

Where applicable, authorities having jurisdiction should be consulted.

Work sites and equipment operations may differ. Users are solely responsible for assessing their specific equipment and premises in determining the appropriateness of applying the standard.

At all times, users should employ sound business, scientific, engineering, and judgment safety when using this standard.

API is not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations to comply with authorities having jurisdiction.

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.

## 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 this publication be construed as insuring anyone against liability for infringement of letters patents.

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 and updated quarterly by API, 1220 L Street, NW, Washington, D.C. 20005.

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

Currently in preview, click buy full version

## Contents

	Page
1 Scope .....	1
2 Normative References .....	1
3 Terms and Definitions .....	1
4 General Requirements .....	4
5 Proposal Information Required .....	4
6 Drawings and Other Required Data .....	5
6.1 Outline Drawings and Other Supporting Data .....	5
6.2 Information Required After Outline Drawings Are Reviewed .....	6
6.3 Reports and Records .....	7
7 Design .....	8
7.1 General .....	8
7.2 Design Temperature .....	8
7.3 Design Pressure .....	8
7.4 Thermal Stress .....	8
7.5 Fouling Resistance .....	9
7.6 Corrosion Allowance .....	9
7.7 Supports .....	9
7.8 Connections .....	10
7.9 Bimetallic Transition Joints .....	10
7.10 Temperature Monitoring .....	13
7.11 Handling Devices .....	13
8 Materials .....	14
9 Fabrication .....	14
9.1 Welding and Brazing .....	14
9.2 Reinforcing Pads and Wear Plates .....	15
9.3 Dimensional Tolerances .....	15
10 Inspection and Testing .....	15
10.1 Quality Control .....	15
10.2 Pressure and Leak Testing .....	16
10.3 Rectification .....	17
10.4 Nameplate .....	18
11 Preparation for Shipment .....	18
Annex A (informative) Recommended Practice .....	19
Annex B (informative) Plate-fin Heat Exchanger Checklist .....	26
Annex C (informative) Plate-fin Heat Exchanger Datasheets .....	27
Annex D (informative) Block-in-Shell Heat Exchangers .....	34
Bibliography .....	40
<b>Figures</b>	
1 Cross-sectional View of Fin and Parting Sheet .....	2
2 Typical Components of a Brazed Aluminum Plate-Fin Heat Exchanger .....	3
3 Bimetallic Transition Joints .....	12
D.1 Block-in-Shell Heat Exchanger .....	35

currently in preview, click buy full version

## Introduction

It is necessary that users of this standard should be aware that further or differing requirements may be necessary for individual applications. This standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is an innovative or developing technology. Where an alternative is offered, it is the responsibility of the vendor to identify any variations from this standard and provide details.

This standard has been re-numbered; it was previously published as API Standard 662, Part 2.

A recommended practice is included within this standard (see Annex A).

This standard requires the purchaser to specify certain details and features.

A bullet (●) at the beginning of a paragraph or subsection indicates a requirement for the purchaser to make a decision or provide information (for information, a checklist is provided in Annex B).

In this standard, where practical, US Customary units are included in parentheses for information.

# Brazed Aluminum Plate-fin Heat Exchangers

## 1 Scope

This standard gives requirements and recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of brazed aluminum plate-fin heat exchangers for use in the petroleum, petrochemical, and natural gas industries.

## 2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

ALPEMA<sup>1</sup>, *The Standards of the Brazed Aluminum Plate-Fin Heat Exchanger*, Manufacturers' Association, 3rd Edition

NOTE In this standard, this normative reference will be referred to in the text as the "ALPEMA Standards" due to its lengthy title and multiple citations.

ASME *Boiler and Pressure Vessel Code (BPVC)*<sup>2</sup>, Section VIII: Rules for construction of pressure vessels; Division 1 or Division 2

ASME B16.25, *Buttwelding Ends*

ASME B16.5, *Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard*

ASME B16.9, *Factory-Made Wrought Buttwelding Fittings*

ASME B31.3, *Process Piping*

## 3 Terms and Definitions

For the purposes of this document, the following definitions apply.

### 3.1 block core

An assembly consisting of alternating layers (passages) of corrugated fins, separated by parting sheets and sealed along their edges by means of side bars and bounded by cap sheets, which are brazed to become a rigid structure.

### 3.2 block-in-shell heat exchanger

A heat exchanger system consisting of one or more plate-fin heat exchangers installed within a pressure vessel shell.

### 3.3 cold box

An enclosure consisting of a carbon steel casing, usually rectangular in shape, that supports and houses plate-fin heat exchangers, pressure vessels, piping, and other cryogenic equipment, filled with insulation and operated under an inert atmosphere.

---

<sup>1</sup> Brazed Aluminum Plate-Fin Heat Exchanger Manufacturers' Association, [www.alpema.org](http://www.alpema.org).

<sup>2</sup> American Society of Mechanical Engineers, Two Park Avenue, New York City, NY 10016-5990, [www.asme.org](http://www.asme.org).