Signal Processing, Transmission, and Installation

API RECOMMENDED PRACTICE 552
SECOND EDITION, JANUARY 2025

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. The use of API publications is voluntary. In some cases, third parties or authorities having jurisdiction may choose to incorporate API standards by reference and may mandate compliance.

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.

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, 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001. 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, 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001.

Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001, standards@api.org.

Contents

Figures

Tables

Notice Regarding Communications Protocols

The following protocols are used as examples only, and their inclusion in this document is not intended to endorse them specifically or limit users from considering other applications:

— Common Industrial Protocol (CIP™)

— EtherNet/IP™

— FOUNDATION™ Fieldbus

Signal Processing, Transmission, and Installation

1 Scope

This document describes methods used to transmit process measurement and control commands as well as diagnostic information between field devices and control systems.

This document is limited to the transmission of measurements, diagnostic statuses, and control data between field devices and control systems or data acquisition systems. It does not cover communications within a control system. See API 554 for discussions of these systems.

The communication technologies included in this document are as follows.

a) Electronic signals that communicate values on an analog or discrete circuit.

b) Transmission of values using pneumatic signals.

c) Serial data transmission over wire, fiber optic cable, or wireless media.

d) Industry fieldbus systems that supply communications among devices using digital communications.

e) Measurements using wireless communication to control systems or data acquisition systems.

2 Normative References

No document is identified as indispensable or required for the application of this standard. A list of documents associated with API 552 are included in the Bibliography.

3 Terms, Definitions, and Acronyms

3.1 Terms and Definitions

3.1.1
8P8C modular connector
Used to install Ethernet four-pair cables according to ANSI/TIA-568. It is similar in appearance to an RJ-45 phone connector.

3.1.2
advance physical layer
An Ethernet-based loop power two-wire physical layer intended for data transmission up to 1000 m.

3.1.3
approved
Acceptable to the authority having jurisdiction (AHJ).

3.1.4
arcing device
A device during normal operation that produces an arc with enough energy to cause ignition.

3.1.5
associated apparatus
A device where the circuits are not necessarily intrinsically safe but affects the energy in the intrinsically safe circuits and is relied on to maintain intrinsic safety.