API Standard 610
Third Edition
January 1960

CENTRIFUGAL PUMPS FOR GENERAL REFINERY SERVICES

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AMERICAN PETROLEUM INSTITUTE
Division of Refining
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FOREWORD

This standard is based on the accumulated knowledge and experience of buyers and manufacturers of centrifugal pumps. The object of this publication is to provide a purchase specification to facilitate the manufacture and procurement of centrifugal pumps for oil refinery service.

This standard requires the purchaser to specify certain details and features. Also, it is recognized that the purchaser may desire to modify, delete, or amplify sections of the standard. It is strongly recommended that such modifications, deletions, and amplifications be made by supplementing this standard, rather than by rewriting or by incorporating sections thereof into another complete standard.

Suggested revisions are invited and should be submitted to the director of the Division of Refining, American Petroleum Institute, 1271 Avenue of the Americas, New York 20, N. Y.

Note: An asterisk (*) at the beginning of a paragraph indicates where a decision may be required which may not be obvious from the data sheet in Appendix A; see Check List, p. 20.

CONTENTS

ABBREVIATIONS USED IN THIS PUBLICATION

allow.	allowable
amps	amperes
ASA	American Standards Association
aux	auxiliary
avail.	available
bhp	brake horsepower
C	degrees centigrade
class.	classification
conns	connections
corr	corrosion
des	design
diam	diameter
diff	differential
disch	discharge
dwg	drawing
eff	efficiency
enc	enclosed
eros	erosion
F	degrees fahrenheit
FL	full load
ft	feet
gpm	gallons per minute
hp	horsepower
hr	hour
imp	impeller
in.	inch
insul	insulated
lb	pound
mat'l	material
max	maximum
mech	mechanical
mfr	manufacturer
min	minimum
mtd	mounted
nor.	normal
No.	number
NPSH	net positive suction head above vapor pressure referred to the pump centerline in the case of horizontal pumps and to the eye of the first-stage impeller in the case of vertical pumps
perf	performance
press.	pressure
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gage
PT	pumping temperature

req'd ..... required
rpm ..... revolutions per minute
sect. ..... section
sp gr ..... specific gravity
Ssu ..... Saybolt seconds universal
stuff. ..... stuffing
suct ..... suction
temp ..... temperature
U.S. ..... United States
vap ..... vapor
vis ..... viscosity
WP ..... working pressure

Note: The nomenclature and part definitions used in this standard are taken from the *Centrifugal Pump Section* of the *Standards of the Hydraulic Institute,* 10th edn.

CENTRIFUGAL PUMPS FOR GENERAL REFINERY SERVICES

SECTION I—GENERAL

1. Scope

This standard is intended to cover the minimum requirements for centrifugal-type pumps for petroleum products, including single-case horizontal and single- and double-case vertical pumps. It is not intended that this standard be used for heavy-duty, double-case horizontal pumps or for pumps of a highly specialized nature, such as those used for pumping chemicals, and the like.

2. Alternate Design

A vendor may offer an alternate pumping unit of a manufacturer's standard design, provided the alternate design covers a construction which is equivalent to, guaranteed, and otherwise submitted in accordance with the requirements herein specified. All deviations in the manufacturer's standard design from the requirements specified herein shall be described fully in the proposal. The alternate design will receive full consideration.

3. Conflicting Requirements

Whenever the information included on the purchaser's data sheets, order sheets, or purchase orders conflicts with the provisions of this standard, the purchaser's data sheets, order sheets, and purchase orders shall govern.

4. Definitions

Design pressure, as used in this standard, is defined as at least the maximum possible suction pressure to be encountered, plus the maximum differential pressure the pump is able to develop when operating at specified speed and using the specific gravity of the specified liquid at pumping temperature.

The design pressure (as defined herein) should not be confused with the maximum allowable working pressure actually used by the vendor in the design of the pumps. The value of the maximum allowable working pressure and temperature, if quoted, shall conform to the rules for pump design laid down in this standard. It should be noted that the allowable working temperature for the pump casing may be considerably higher than the allowable temperature of the mechanical seal attached to it.

5. Reference Specifications

See Appendix B, p. 23.

SECTION II—DESIGN

6. General

a. Pumps shall not be furnished with maximum- or minimum-diameter impellers unless so stated in the proposal.

b. Pumps shall operate at standard electric-motor speeds unless otherwise stated in the proposal.

c. Pumping units may be of single- or multi-stage design. When the suction pressure is more than zero psig or the differential pressure exceeds 50 psi, the pump should be designed so as to minimize the pressure on the stuffing boxes. This can be accomplished by one of three methods: i.e., rings on the back of impellers, close-fitting throat bushing with bleed back to suction, or vanes on the back of the impeller.

***d.** Vendor shall, in all cases, list on the data sheet the net positive suction head (NPSH) which would be required if the pump were operated on water at the specified capacity and quoted speed. For pumps operated on hydrocarbons, vendor may, if appropriate and unless otherwise specified, apply NPSH factor which, if used, shall be reported separately and shall result in a change no greater than that obtained from the *Centrifugal Pump Section* of the *Standards of the Hydraulic Institute.*

7. Motors

a. Motors required as drivers for any pumps covered by this standard shall have horsepower ratings at least equal to the following percentage of pump design point brake horsepower:

Motor Ratings	Per Cent of Pump Brake Horsepower
25 hp and less	125
30 hp to 75 hp	115
100 hp and over	110

Where it appears that this will lead to unnecessary oversizing of the driver, an alternate quotation shall be submitted for the purchaser's approval.

b. Motors of a particular horsepower rating shall, insofar as possible, be built in frame sizes which comply with the standards of the National Electrical Manufacturers Association. S-frame or short-shaft motors are preferred. On motor-turbine dual drives, the horsepower rating of the motor shall be sufficient to drive the