

Table 5 Pump Material Classification Code

Base Code — Pressure Casing and Impeller							
Part Name	73DI-	73DI/SS-	73SS-	73A20-	73CD4-	73HC276-	73X-
Casing	Ductile iron	Ductile iron	316 SS	Alloy 20	Duplex SS	Alloy C276	As specified
Impeller	Ductile iron	316 SS	316 SS	Alloy 20	Duplex SS	Alloy C276	As specified
Cover	Ductile iron	Ductile iron	316 SS	Alloy 20	Duplex SS	Alloy C276	As specified
Seal gland	316 SS	316 SS	316 SS	Alloy 20	Alloy 20	Alloy C276	As specified
First Suffix — Shaft							
Part Name	A			B		X	
Shaft	Solid shaft			Sleeved shaft		As specified	
Wetted area of shaft with no sleeve	316 SS minimum, same as casing for higher alloy			NA		As specified	
Shaft sleeve	NA			316 SS minimum, same as casing for higher alloy		As specified	
Shaft with sleeve	NA			Carbon steel with 316 SS sleeve or 316 SS with higher alloy sleeve		As specified	
Second Suffix — Fasteners							
Part Name	CS	SS		TCS		X	
Casing fasteners	Carbon steel	304 SS or 316 SS		Carbon steel with PTFE fluoropolymer		As specified	
Gland fasteners	304 SS or 316 SS	304 SS or 316 SS		304 SS or 316 SS		As specified	
Third Suffix — Casing Gasket							
Part Name	AF		T		G		X
Casing gasket	Arimid fiber		Modified PTFE		Flexible graphite		As specified

GENERAL NOTES:

(a) As an example, the pump material classification code 73DI-A-TCS-T indicates the following:

- (1) casing = ductile iron
- (2) impeller = ductile iron
- (3) cover = ductile iron
- (4) seal gland = 316 SS
- (5) shaft = 316 SS solid shaft
- (6) casing fasteners = carbon steel with PTFE coating
- (7) gland fasteners = 304 SS or 316 SS
- (8) casing gasket = modified PTFE

(b) NA = not applicable.

(c) PTFE = polytetrafluoroethylene.

(d) Carbon steel may be offered as an alternative casing material for ductile iron.

Table 6 Material of Construction

Material Designation	ASTM Material Code by Application				
	Casting Wetted by Pumped Fluid	Casting Not Wetted by Pumped Fluid	Bar Stock	Pressure-Retaining Bolts and Studs	Nuts
Standard Available Pump Materials					
Cast iron	...	A48	...	...	...
Ductile iron	A395 Gr 60-40-18	A395 Gr 60-40-18 or A536	...	...	...
Carbon steel	A216 Gr WCB	...	A108 Gr 1144 or A434 Gr 4140	A193 Gr B7	A194 Gr 2H
Carbon steel with PTFE coating	...	...	...	A193 Gr B7 with PTFE coating	A194 Gr 2H with PTFE coating
304 SS	...	...	...	A193 Gr B8	A194 Gr 8
316 SS	A744 Gr CF-8M	A744 Gr CF-8M or A743 Gr CF8M	A276 Type 316 SS	A193 Gr B8M	A194 Gr 8M
Alloy 20 stainless steel	A744 Gr CN-7M	A744 Gr CN-7M	B473 N08020	B473 N08020	B473 N08020
316L SS	A744 Gr CF-3M	A744 Gr CF-3M	...	...	...
Duplex stainless steel	A995 Gr 1B	A743 Gr CF3M	A276 Gr S32205	A276 Gr S32205	A276 Gr S32205
Monel	A494 Gr M-35-1	A890 Gr 1B	B164 N04400	...	...
Nickel	A494 Gr CZ-100	A494 Gr CZ-100	B160 N02200	...	...
Alloy B2	A494 Gr N-7M	A494 Gr N-7M	B335 N10665	...	...
Alloy C4	A494 Gr CW-2M	A494 Gr CW-2M	B575 N06455	...	...
Alloy C276	A494 Gr CW-6M A494 Gr CW-2M	A494 Gr CW-6M A494 Gr CW-2M	B574 N10276	...	...
Titanium	B367 Gr C-3	B367 Gr C-3	B348 Gr 2	...	...

GENERAL NOTES:

- (a) For glands and gland fastening, see para. 5.6.6.
 (b) PTFE = polytetrafluoroethylene.

Table 7 Minimum Requirement for Auxiliary Piping Materials

ASTM Material Requirements by Type				
Material Designation	Tubing Size range: $\frac{3}{8}$ -in. O.D. to $\frac{3}{4}$ -in. O.D. Minimum wall thickness: 0.035 in.	Tube Fittings		Pipe Fittings
		Compression Type		ASME B16.11 Class 2000 Minimum
Carbon steel	Seamless A519	A108		A105
316 SS	Seamless A269 Gr TP316	Bar Stock	Forgings	A182 Gr F316
		A479 Type 316	A182 Gr F316	
		Schedule 40 Minimum		
		Seamless A106 Gr B		
		Seamless A312 Gr TP316		

least as high as the ultimate torque strength of the pump shaft at the coupling end. When the driver pedestal or adapter is used to clamp the rear cover to the casing, the material properties of the driver pedestal and adapter shall meet the requirement of para. 5.12.7.

5.12.7 Pressure-Retaining Nonwetted Components.

Pressure-retaining nonwetted components shall be made of a material that is classified as ductile throughout the full range of operating temperatures, such as cast ductile iron or cast carbon steel.

5.12.8 Drainage. A threaded drain connection(s) ($\frac{1}{2}$ in. NPT preferred) shall be provided so that liquid will drain from the driver pedestal or adapter, and cover.

6 GENERAL INFORMATION

6.1 Application

6.1.1 Terminology. Terminology shall be in accordance with ANSI/HI 1.1-1.2 and ANSI/HI 14.6, except as net positive suction head required (NPSHR) is clarified in para. 6.1.7.

6.1.2 Nozzle Loading. Allowable nozzle loading imposed by the piping shall be in accordance with ANSI/HI-9.6.2.

6.1.3 Sound. The maximum sound pressure level produced by the pump and driver shall comply with the limit specified by the purchaser. A test, if specified, shall be conducted in accordance with ANSI/HI 9.1-9.5. Driver noise data must be determined separately.

6.1.4 Vibration. The vibration level measured on the pump bearing frame, when specified, at the supplier's test facility at rated condition point (speed $\pm 5\%$, flow $\pm 5\%$) shall not exceed the allowable "factory" pump bearing housing vibration limits shown in ANSI/HI 9.6.4 for types OH3, OH4, and OH5 pumps (B73.2 pumps).

6.1.5 Hydraulic Coverage. Tables 8 and 9 show the approximate hydraulic coverage for 50 Hz and 60 Hz.

6.1.6 Allowable Operating Region. Pumps shall be designed to operate continuously between 120% of the flow at the best efficiency point (BEP) and the minimum flows shown in Table 10, unless specifically noted otherwise by the manufacturer, and meet the requirements of paras. 5.5.4 (shaft deflection), 5.7.5.2 and 5.7.6.2 (bearing life), and 6.1.4 (vibration) when pumping water at ambient conditions.

CAUTION: The values in Table 10 do not consider minimum thermal flow for a specific installation; therefore, the practical minimum operating flow may be higher than shown. Pumped fluid is heated as it goes through a pump, and the minimum thermal flow is where the temperature rises enough through the pump that recirculation of some of the flow reduces the available net positive suction head below that required by the pump, resulting in cavitation or vaporization of the pumped fluid. Refer to ANSI/HI 1.3 for detailed application information.

6.1.7 NPSHR. NPSHR is defined as per ANSI/HI 14.6 except this value is equal to or greater than NPSH3. Under special circumstances, NPSHR may be less than NPSH3, if agreed upon between the supplier and the purchaser.

6.1.8 NPSH Margin. An operating NPSH margin is necessary to ensure satisfactory operation. A minimum margin of 3 ft (0.9 m) or a margin ratio of 1.2 (whichever yields a higher NPSH requirement) should be made available. This margin should be increased if variables exist that will increase the NPSHR of the pump. Refer to ANSI/HI 9.6.1 for additional application information.

6.1.9 Performance Curves. Published performance curves in printed or electronic format shall be based on tests conducted in accordance with ANSI/HI 14.6. Accuracy of the curves shall be that 90% of pumps purchased "untested," when operated between minimum allowable flow and BEP, will perform to the published curve within the following tolerances:

- (a) head +5%, -5%
- (b) efficiency -5%

NOTE: The published performance curves shall be used for preliminary sizing only and are based on water performance with a simple sealing device such as packing or a single mechanical seal.

Table 8 Approximate Performance of Standard Pumps (60 Hz)

Dimension Designation		Size		1,750 rpm				3,500 rpm			
				Capacity		Total Head		Capacity		Total Head	
				gpm	m ³ /h	ft	m	gpm	m ³ /h	ft	m
in.	(mm)	in.	(mm)								
2015/15	(50-40-380)	2 × 1.5 × 6	(50 × 40 × 150)	54	12	30	9	104	24	121	37
3015/15	(80-40-380)	3 × 1.5 × 6	(80 × 40 × 150)	90	20	31	9	176	40	125	38
3020/17	(80-50-430)	3 × 2 × 6	(80 × 50 × 150)	156	35	32	10	295	67	134	41
2015/17	(50-40-430)	2 × 1.5 × 8	(50 × 40 × 200)	79	18	57	17	151	34	233	71
3020/17	(80-50-430)	3 × 2 × 7	(80 × 50 × 180)	150	34	40	12	294	67	158	48
3015/19	(80-40-480)	3 × 1.5 × 8	(80 × 40 × 200)	115	26	60	18	234	53	242	74
4030/22	(100-80-560)	4 × 3 × 8	(100 × 80 × 200)	270	61	62	19	545	124	252	77
6040/24	(150-100-610)	6 × 4 × 9	(150 × 100 × 200)	515	117	62	19	1,030	234	255	78
2015/19	(50-40-480)	2 × 1.5 × 10	(50 × 40 × 250)	78	18	95	29	147	33	398	121
3015/19	(80-40-480)	3 × 1.5 × 10	(80 × 40 × 200)	144	33	90	27	275	62	380	116
3020/20	(80-50-510)	3 × 2 × 10	(80 × 50 × 250)	206	47	89	27	406	92	364	111
4030/25	(100-80-635)	4 × 3 × 10	(100 × 80 × 250)	345	78	85	26	678	154	344	105
6040/28	(150-100-710)	6 × 4 × 10	(150 × 100 × 250)	1,100	250	92	28	1,820	413	230	70
[Note (1)]											
3015/24	(80-40-610)	3 × 1.5 × 13	(80 × 40 × 330)	225	51	144	44	...	...	...	...
3020/24	(80-50-610)	3 × 2 × 13	(80 × 50 × 330)	324	73	148	45	...	...	...	...
4030/28	(100-80-710)	4 × 3 × 13	(100 × 80 × 330)	648	147	163	50	875	202	425	129
[Note (1)]											
6040/30	(150-100-760)	6 × 4 × 13	(150 × 100 × 330)	1,172	266	155	47	...	...	...	...
[Note (1)]											

GENERAL NOTE: This Standard does not cover exact hydraulic performance of pumps. Information on approximate head and capacity at the best efficiency point for standard pumps is for general information only. Consult manufacturers regarding hydraulic performance data for specific applications.

NOTE:

- (1) Liquid end may be modified for condition, or maximum impeller diameter may be limited due to limitation of the pump's rotor assembly.

Table 9 Approximate Performance of Standard Pumps (50 Hz)

Dimension Designation		Size		1,450 rpm				2,900 rpm			
				Capacity		Total Head		Capacity		Total Head	
				gpm	m ³ /h	ft	m	gpm	m ³ /h	ft	m
in.	(mm)	in.	(mm)								
2015/15	(50-40-380)	2 × 1.5 × 6	(50 × 40 × 150)	46	11	21	6	88	20	80	25
3015/15	(80-40-380)	3 × 1.5 × 6	(80 × 40 × 150)	77	18	21	6	145	33	82	25
3020/17	(80-50-430)	3 × 2 × 6	(80 × 50 × 150)	130	30	22	7	242	55	89	27
2015/17	(50-40-430)	2 × 1.5 × 8	(50 × 40 × 200)	65	15	39	12	126	29	156	48
3020/17	(80-50-430)	3 × 2 × 7	(80 × 50 × 180)	124	28	27	8	243	55	109	33
3015/19	(80-40-480)	3 × 1.5 × 8	(80 × 40 × 200)	99	23	40	12	187	43	164	50
4030/22	(100-80-560)	4 × 3 × 8	(100 × 80 × 200)	224	51	41	12	448	102	167	51
6040/24	(150-100-610)	6 × 4 × 8	(150 × 100 × 200)	420	95	43	13	855	194	180	55
2015/19	(50-40-480)	2 × 1.5 × 10	(50 × 40 × 250)	66	15	64	20	125	29	261	80
3015/19	(80-40-480)	3 × 1.5 × 10	(80 × 40 × 200)	110	25	62	19	242	55	246	75
3020/20	(80-50-510)	3 × 2 × 10	(80 × 50 × 250)	169	38	61	19	334	76	244	74
4030/25	(100-80-635)	4 × 3 × 10	(100 × 80 × 250)	295	67	59	18	555	126	236	72
6040/28	(150-100-710)	6 × 4 × 10	(150 × 100 × 250)	880	200	62	19	1,540	350	157	36
[Note (1)]											
3015/24	(80-40-610)	3 × 1.5 × 13	(80 × 40 × 330)	191	43	97	30	...	...	...	...
3020/24	(80-50-610)	3 × 2 × 13	(80 × 50 × 330)	268	61	101	31	...	...	...	...
4030/28	(100-80-710)	4 × 3 × 13	(100 × 80 × 330)	530	120	111	34	858	195	364	111
[Note (1)]											
6040/30	(150-100-760)	6 × 4 × 13	(150 × 100 × 330)	989	225	103	31	...	...	...	...
[Note (1)]											

GENERAL NOTE: This Standard does not cover exact hydraulic performance of pumps. Information on approximate head and capacity at the best efficiency point for standard pumps is for general information only. Consult manufacturers regarding hydraulic performance data for specific applications.

NOTE:

- (1) Liquid end may be modified for condition, or maximum impeller diameter may be limited due to limitation of the pump's rotor assembly.

Table 10 Minimum Continuous Flow

Dimension Designation		Size		Minimum Continuous Flow, % BEP [Note (1)]	
				3,500 rpm/ 2,900 rpm 60 Hz/50 Hz	1,750 rpm/ 1,450 rpm 60 Hz/50 Hz
in.	(mm)	in.	(mm)		
2015/15	(50-40-380)	2 × 1.5 × 6	(50 × 40 × 150)	15	10
3015/15	(80-40-380)	3 × 1.5 × 6	(80 × 40 × 150)	15	10
3020/17	(80-50-430)	3 × 2 × 6	(80 × 50 × 150)	20	10
3020/17	(80-50-430)	3 × 2 × 7	(80 × 50 × 180)	20	10
2015/17	(50-40-430)	2 × 1.5 × 8	(50 × 40 × 200)	20	10
3015/19	(80-40-480)	3 × 1.5 × 8	(80 × 40 × 200)	20	10
4030/22	(100-80-560)	4 × 3 × 8	(100 × 80 × 200)	20	10
2015/19	(50-40-480)	2 × 1.5 × 10	(50 × 40 × 250)	25	10
3015/19	(80-40-480)	3 × 1.5 × 10	(80 × 40 × 200)	30	15
3020/20	(80-40-510)	3 × 2 × 10	(80 × 50 × 250)	30	15
4030/25	(100-80-635)	4 × 3 × 10	(100 × 80 × 250)	30	15
4030/28	(100-80-710)	4 × 3 × 13	(100 × 80 × 330)	40	40
6040/24	(150-100-610)	6 × 4 × 9	(150 × 100 × 200)	25	25
3015/24	(80-40-610)	3 × 1.5 × 13	(80 × 40 × 200)	30	15
3020/24	(80-50-610)	3 × 2 × 13	(80 × 50 × 330)	40	15
6040/28	(150-100-710)	6 × 4 × 10	(150 × 100 × 250)	40	20
6040/30	(150-100-760)	6 × 4 × 13	(150 × 100 × 330)	...	40

GENERAL NOTE: See para. 6.1.6 for caution using values in this Table.

NOTE:

- (1) Limits refer to actual hydraulic performance, not the approximate values in Tables 8 and 9. Consult manufacturers regarding hydraulic performance data for specific applications.

Other sealing configurations may add to the power requirement. Head and efficiency at flows greater than BEP may have greater variation than the tolerances stated above.

6.2 Tests and Inspections

Unless otherwise agreed upon, the supplier shall give at least five working days of advanced notification of an observed or witnessed test or inspection.

6.2.1 Tests

6.2.1.1 Hydrostatic. After machining, casings, covers, and jackets shall be hydrostatically tested for 10 min minimum with water at 1.5 times the maximum design pressure corresponding to 100°F (38°C) for the material of construction used. No visible leakage through the part shall be permitted. Drilled and tapped connections added post-hydro require a visual inspection only to ensure no voids exist and threads are well formed.

6.2.1.2 Performance

(a) *Procedure.* When performance tests are required, they shall be conducted in accordance with ANSI/HI 14.6.

(b) *Acceptance Criteria.* Performance Acceptance Grade 1B shall be used for all pump input powers. ANSI/HI 14.6 performance acceptance Grade 1B includes power or efficiency as an optional guarantee

requirement. When specified, the acceptance criteria shall include either power or efficiency at the rated condition point.

(c) When specified, the performance test shall include vibration measurements in accordance with para. 6.1.4.

(d) If the tested impeller is required to be trimmed less than 5% of trimmed diameter due to failure to meet acceptance criteria, a retest after trimming is not necessary. Trims of greater than 5% require a retest. If a new impeller is required, a retest is required.

(e) A complete written record of the relevant test information including performance curves, the date of the tests, and the signature of the person(s) responsible for conducting the tests shall be delivered as part of the pump documentation.

6.2.1.3 Additional Data. Additional data, when specified, may be taken during the performance test. These data may include such things as vibration and bearing housing temperature. Unless otherwise specified, the additional data will be taken at the rated duty point. When these data are specified, they shall be conducted in accordance with ANSI/HI 14.6.

6.2.1.4 Leak. When specified by the purchaser, the assembled pump shall be leak tested using a procedure and acceptance criteria as agreed upon. If the assembly is to contain a mechanical seal, consult with

the seal manufacturer for the seal static pressure limits before exposing it to the test pressure.

6.2.1.5 NPSHR. When NPSHR tests are required, they shall be conducted in accordance with ANSI/HI 14.6. Unless otherwise agreed to by the purchaser and supplier, the NPSH test will be a Type II test, which is for determination of NPSH3 at the rated flow only.

6.2.2 Inspections

6.2.2.1 Final Inspections. A final inspection may be specified by the purchaser. If specified, the purchaser or purchaser's representative will be given access to the completed pump assembly for visual inspection of the assembly prior to shipment.

6.2.2.2 Dismantle and Inspect After Test. If specified, the pump shall be dismantled and inspected after test. Inspection procedure and criteria must be agreed upon by the purchaser and supplier.

6.2.2.3 Inspection of Connection Welds. When a visual inspection of weld connection is specified, it shall be conducted in accordance with AWS B1.11 for evaluation of size of weld, undercut, and splatter. A complete written record of welder, date of welding, method, and filler material must be retained.

6.2.2.4 Inspection of Castings. When inspection of cast parts wetted by the process fluid is specified, a visual inspection shall be conducted in accordance with Manufacturers Standardization Society (MSS) Standard SP-55 for evaluation of cast surfaces. Inspection of the castings by other nondestructive methods such as dye penetrant or x-ray may be agreed upon between manufacturer and purchaser.

6.3 Nameplates

The nameplate(s) is to be of 24 U.S. Standard Gage (minimum) AISI 300 series stainless steel and shall be securely attached to the pump. It shall include pump model, standard dimension designation, serial number, size, impeller diameter (maximum and installed), material of construction, and maximum design pressure for 100°F (38°C).

7 DOCUMENTATION

7.1 General

The documentation specified covers the minimum required to provide clear communication between the pump user and pump manufacturer and to facilitate the safe design, installation, and operation of the pump.

Additional data, as required for specific purposes, shall be available, if requested. It is the intent that information be furnished in a similar form from all sources to improve clarity and foster efficient utilization of the documentation.

7.2 Requirements

The following documents shall be supplied for each pump item furnished. There can be a difference between proposal and purchase documents:

- (a) pump and driver outline drawing
- (b) centrifugal pump data sheet
- (c) mechanical seal drawing (if applicable)
- (d) mechanical seal piping drawing (if applicable)
- (e) cooling/heating piping drawing (if applicable)
- (f) performance curve with rated point
- (g) cross-section drawing with parts list
- (h) manual describing installation, operation, and maintenance
- (i) coupling data (if applicable)
- (j) driver data (if applicable)

7.3 Document Description

7.3.1 Pump and Driver Outline Drawing

(a) The pump and driver outline drawing may contain all information shown on, and may be arranged as, the sample outline drawing included herein and identified as Fig. 7.

(b) Tapped openings, when supplied, shall be identified with the following markings:

Marking	Purpose
I	Casing drain
II	Discharge gage or flush connection
III	Suction gage or flush connection
X	Oil drain
XI	Bearing frame cooling
F	Mechanical seal flush or lantern ring
FI	Flush inlet
FO	Flush outlet
LBI	Liquid barrier/buffer inlet
LBO	Liquid barrier/buffer outlet
V	Vent
D	Drain
Q	Quench
C/HI	Cooling/heating inlet
C/HO	Cooling/heating outlet
CSD	Containment seal drain
CSV	Containment seal vent
GBI	Gas barrier/buffer inlet
GBO	Gas barrier/buffer outlet

7.3.2 Centrifugal Pump Data Sheet

(a) *Data Sheet.* The ASME Centrifugal Pump Data Sheet in Mandatory Appendix I shall be used as the data sheet for all pumps covered by this Standard when the data sheet is initiated by the purchaser. The data sheet, electronic or printed copy, shall be used for inquiry, proposal, and as-built.

(b) *Electronic Data.* See Nonmandatory Appendix A.

7.3.3 Mechanical Seal Drawing

(a) A mechanical seal drawing shall be included if the pump is fitted with a mechanical shaft seal.

(b) The drawing shall show the general arrangement of the mechanical seal, identifying all parts with name, part number, and material of construction.

(c) If a throat bushing is to be installed in the seal cavity, it is to be clearly indicated and identified on the seal drawing.

(d) Drawings for noncartridge seals shall include dimensions complete with the seal setting dimension referred to on the seal chamber face.

(e) The drawings shall have a title block including the information on the title block of the pump data sheet, Form I-1 or Form I-1M, and have a blank space for the user's identification stamp 1½ in. × 3 in. (40 mm × 80 mm) minimum.

7.3.4 Mechanical Seal Piping Drawing

(a) A mechanical seal piping drawing or schematic shall be provided if the pump includes a mechanical seal piping system.

(b) The mechanical seal piping drawing or schematic shall contain information and uniform nomenclature consistent with the references given in para. 5.6.1.

7.3.5 Cooling/Heating Piping Drawing

(a) A cooling/heating piping drawing or schematic shall be provided if the pump includes a heating/cooling piping system.

(b) The cooling/heating piping drawing or schematic shall contain all information and uniform nomenclature consistent with the references given in para. 5.6.1.

7.3.6 Performance Curve

7.3.6.1 Single-Speed Performance. The single-speed performance curve shall be the composite (family) type curve for full impeller diameter range, plotting head against flow and including efficiency, minimum flow, NPSHR, power consumption, and speed. Power consumption shall be provided at all flows including shutoff. Performance curves may be categorized as published, proposal, as-built, and test.

(a) The published, or catalog, performance curve shall be as stated above and is based on water. These performance curves are normally found in the manufacturer's catalogs or electronic media, and do not reflect a pump configured for a specific pumping application.

(b) The proposal performance curve shall be as stated above. The design impeller diameter shall be indicated with the rated duty point identified on the curve. It is not necessary to include the complete composite (family) curves; however, the maximum and minimum impeller diameter head-flow curves must be included. When the pumped fluid viscosity or specific gravity affects the pump performance, the proposal performance curve shall be corrected for these effects. Mechanical seal losses shall be reflected in the proposal performance curve. The proposal performance curves are normally supplied as part of a pump proposal and reflect a pump that has been configured for the specific pumping application.

(c) As-built, or as-configured, performance curves shall be as stated for the proposal performance curves and they must be for the pump configuration actually supplied to the purchaser. As-built, or as-configured, performance curves are provided as part of the pump final documentation package.

7.3.6.2 Variable-Speed Performance. When variable-speed operation is specified, variable-speed performance curves shall be provided. The requirements and categories of variable-speed curves are the same as for single-speed curves (see para. 7.3.6.1), except that the curve will show a composite of curves with a single impeller trim when operated over a range of speeds. The speed for each curve will be clearly indicated.

7.3.6.3 Performance Test Curve. The performance test curve, if specified, shall be at rated speed and as described in para. 6.2.1.2(e) and provided as part of the pump final documentation package.

7.3.7 Cross-Section Drawing. The cross-section drawing shall show all components of the pump. It shall be complete with a parts list referenced to the drawing. Nomenclature and definitions should be in accordance with ANSI/HI 1.1-1.2.

7.3.8 Instruction Manual

(a) The instruction manual should include information on the correct installation, preparation for start-up, starting up, operation, trouble checklist, and maintenance information for the pump model furnished.

(b) Any limitation or warning on the installation, operation, etc., of the unit shall be clearly defined.

(c) The instruction manual shall be in electronic or printed format.

(d) The use of a single manual to describe many similar models of pumps should be minimized to reduce purchaser confusion on the exact model furnished.

(e) If an adjustable alignment feature is provided, the recommended tolerance for coupling alignment shall be supplied to the purchaser.

(f) The instruction manual for the pump driver, mechanical seal, coupling, etc., shall be furnished if included in the scope of supply.

(g) A guideline for developing instruction manuals may be found in ANSI/HI 1.4.

7.3.9 Coupling Data. When flexible couplings are supplied, the coupling data shall include manufacturer, type, model, size, spacer length, materials of construction, and hub-to-shaft attachment method.

7.3.10 Driver. The driver data shall include manufacturer, nameplate, and dimensional data.

7.4 Specially Requested Documentation

Documentation in addition to that listed in para. 7.3 shall be made available when specified.

7.4.1 Master Document List

(a) This is a composite list of all documents submitted by the manufacturer, including title of document and drawing or other identification numbers, including revision dates.

(b) This list shall be submitted along with the first document in order to apprise the purchaser of the documents that will follow.

(c) Revisions to this document list shall be made as required.

7.4.2 External Forces or Moments on Nozzles List.

This list summarizes the allowable external forces and moments on pump suction and discharge nozzles (see para. 6.1.2).

7.4.3 Parts List

(a) A list of all pump parts with pump identification numbers, part numbers, and material descriptions shall be supplied. This list shall be as-built.

(b) A list of recommended spare parts shall be supplied and shall be subdivided into the following two categories:

- (1) for start-up
- (2) for 3-yr operation

(c) The spare parts list for auxiliary equipment shall be supplied with the pump. This would include, as

applicable, mechanical seal, coupling, driver, gear-boxes, etc.

(d) These lists shall be presented to the purchaser before the equipment is shipped, and reflect the as-built equipment.

7.4.4 Special Operating or Design Data. Special operating and design data required by the purchaser shall be supplied. For example, these may include the following:

- (a) minimum mechanical seal flush flow
- (b) seal chamber/packing box pressure
- (c) maximum allowable casing pressure and temperature
- (d) maximum allowable jacket pressure and temperature

7.4.5 Special Testing, Painting, and Preparation.

Any required special testing, painting, or preparation shall be specified on the centrifugal pump data sheet or purchase order.

7.4.6 Statement of Compliance. A statement of compliance shall be included, if specified. This statement shall include assurance that the pump is being supplied according to the requirements of this Standard.

MANDATORY APPENDIX I

ASME CENTRIFUGAL PUMP DATA SHEET

See Forms I-1 and I-1M on the following pages.

ASME B73**Form I-1 Centrifugal Pump Data Sheet**

Rev. No.: _____ Rev. Date: _____

Issue Date
APRIL 2012ASME Centrifugal Pumps (U.S. Customary Units)
ASME B73.1, ASME B73.2

Page 1 of 4

Usage key—data provided by:

☒ Purchaser☐ Supplier☐ Supplier if not by purchaser1 Issued for: ☐ Proposal ☐ Purchase ☐ As built

2 Facility name / location: _____

3 Item name: _____ Purchaser / location: _____

4 Item tag number: _____ Job number: _____

5 Service: _____ Purchaser order number: _____

6 Unit: _____ Supplier / location: _____

7 P&ID number: _____ Supplier order / serial numbers: _____ / _____

● GENERAL

9 No. of pumps req.: _____ Motor item number: _____

10 ▲ Pump size: _____ Motor provided by: _____

11 ▲ Pump model: _____ Motor mounted by: _____

12 ▲ Pump type: _____ Variable-speed operation: ☐ YES ☐ NO**● Operating Conditions**

	Rated	Additional duty points (max., min., or VS)				
Point #:	1	2	3	4	5	
Flow:						(gpm)
Head:						(ft)
NPSHA:						(ft)
Suct. pres.:						(psig)
▲ Speed:						(rpm)

22 System design:

23 Suction pressure: min. / max.: _____ / _____ (psig)

24 Suction temperature: min. / max.: _____ / _____ (°F)

25 ☐ Stand-alone operation26 ☐ Parallel operation with item no.: _____27 ☐ Series operation with item no.: _____

28 Service:

29 ☐ Continuous ☐ Intermittent: _____ starts/day

30 System control method:

31 ☐ Speed ☐ Throttle ☐ System Resistance Only**● Pumped Fluid**

35 Pumped fluid: _____

	RATED	MAX.	NORMAL	MIN.
36 Pumping temperature:				
*At pumping temperatures designated above				
37 Specific gravity*:				
38 Vapor pressure*:				
39 Viscosity*:				
40 Specific heat*:				

41 Atm pressure boiling point: _____ (°F) @ _____ (psia)

42 Liquid: ☐ Hazardous ☐ Flammable pH: _____43 ☐ Other: _____

44 Corrosion / erosion caused by: _____

45 % solids: _____ Max. particle size: _____ (in.)

46 Other: _____

■ Performance

Performance curve number: _____ ▲ Speed: _____ (rpm)

Total differential head @ rated impeller: _____ (ft)

Maximum differential head @ rated impeller: _____ (ft)

Point #:	1	2	3	4	5
NPSHR:					

Minimum continuous stable flow: _____ (gpm)

Allowable operating region: _____ to: _____ (gpm)

Best efficiency point for rated impeller: _____ (gpm)

Suction specific speed: _____

Impeller diameter: Rated: _____ Max.: _____ Min.: _____ (in.)

Pump rated power: _____ (bhp) Efficiency: _____ (%)

Maximum power with rated impeller: _____ (bhp)

Case pressure rating:

Maximum allowable working pressure: _____ (psig) @ _____ (°F)

Hydrostatic test pressure: _____ (psig)

● Site Conditions and Utilities

Location:

☐ Indoor ☐ Outdoor Altitude: _____ (ft)

Range of ambient temperatures: min. / max.: _____ / _____ (°F)

Electrical area classification: ☐ Nonhazardous

Cl.: _____ Div. or Zone: _____ Gr.: _____ T Code: _____

Electricity

	Voltage	Phase	Hertz
Drivers			
Heating			

Cooling water:

Source: _____

Supply temp.: _____ (°F) Max. return temp.: _____ (°F)

Supply pressure: _____ (psig) Design press.: _____ (psig)

Min. return press. _____ (psig) Max. allow. D.P. _____ (psig)

Chloride concentration: _____ (ppm)

● General Remarks

Number	Date	Data Revision Description	By	Approved
50				
51				
52				
53				

ASME B73

Form I-1 Centrifugal Pump Data Sheet

Rev. No.: _____ Rev. Date: _____

Issue Date
APRIL 2012ASME Centrifugal Pumps (U.S. Customary Units)
ASME B73.1, ASME B73.2

Page 2 of 4

Usage key—data provided by:

☒ Purchaser☐ Supplier☐ Supplier if not by purchaser1 **Mechanical Data**2 **▲ Impeller Type:**3 ☐ Closed ☐ Open ☐ Semi-open4 **▲ Casing Mounting:**5 ☐ Foot ☐ Centerline6 ☐ Vertical in-line7 **■ Bearings:**8 **▲ Bearing manufacturer:** _____

9 Radial bearing type: _____ No.: _____

10 Thrust bearing type: _____ No.: _____

11 **▲ Bearing isolators:** ☐ Labyrinth (standard)12 ☐ Magnetic seal

13 Manufacturer: _____

14 **▲ Lubrication:**15 ☐ Flood ☐ Pure mist ☐ Shielded (grease)16 ☐ Grease ☐ Purge mist ☐ Sealed (grease)17 ☐ Magnetic drain plug in housing required18 **▲** ☐ Oil cooler required19 **■** ☐ Oil viscosity: ISO grade: _____ Other: _____20 **Nozzle Connections:** **▲** Size **▲** Rating **▲** Facing

21 Suction: _____

22 Discharge: _____

23 **● Aux. case connection:** ☐ Drain required24 **▲** Size: _____ (in.)25 ☐ Threaded ☐ Welded and flanged26 **▲ Materials**

27 Material class code: _____

28 Casing: _____

29 Impeller: _____

30 Cover: _____

31 Shaft: _____

32 Shaft sleeve: _____

33 Baseplate: _____

34 Casing gasket: _____

35 Impeller gasket: _____

36 Casing fasteners: _____

37 Gland fasteners: _____

38 Bearing housing: _____

39 Bearing housing adapter: _____

40 Bearing isolators: _____

41 Coupling guard: _____

42 Mechanical seal materials — see page 3

43 **▲ Coupling Between Pump and Driver**

44 Specification: _____

45 Manufacturer: _____

46 Type: _____

47 Size: _____

48 Model: _____

49 Spacer length: _____ (in.)

50 Coupling guard type:

51 ☐ Pump supplier's standard52 ☐ Baseplate mounted53 ☐ Non-spark coupling guard required

54 Remarks: _____

55 _____

56 _____

▲ Driver

Power rating: _____ (hp) Speed: _____ (rpm)

Drive HP selected for max. S.G.: _____ & max. visc.: _____ (cP)

Driver specification: _____

Driver manufacturer: _____

Driver enclosure: _____ Driver frame: _____

Remarks: _____

● BaseplateType: ☐ Grouted☐ Pregouted☐ Ungouted (anchored)☐ Free standing **▲** Pump CL to foundation _____ (in.)☐ Vertical in-line pump case support bracketDesign: ☐ Purchaser specification _____☐ Pump supplier's standard

Remarks: _____

● Paint, Shipment, and Storage Preparation

Paint:

☐ Pump supplier's standard☐ Other: _____

Shipment:

☐ Domestic☐ Export☐ Export boxing required

Storage:

☐ Outside☐ Under roof☐ Environmentally controlled☐ Short term☐ Long term (>6 months)

Environment: _____

☐ Supplier's standard preservation specification

Purchaser storage specification: _____

■ Unit shipping weight: _____ (lb)**● Tests and Inspections**Test: Unwitnessed Witnessed CertificateHydrostatic: ☐ ☐ ☐Leak: ☐ ☐ ☐NPSHR: ☐ ☐ ☐Performance: ☐ ☐ ☐Opt. perf. acceptance criteria: ☐ Power ☐ Efficiency ☐ NeitherAdditional data: ☐ Vibration ☐ Bearing temp.☐ Other perf. data: _____☐ Final inspection required Days notification required: _____☐ Dismantle and inspect after test☐ Casting repair procedure approval required

Material certification required:

☐ Casing ☐ Cover ☐ Impeller ☐ Shaft☐ Other: _____

Inspection required for connection welds:

☐ Manufacturer's standard ☐ Visual inspection

Inspection required for castings:

☐ Manufacturer's standard ☐ Visual inspection☐ Other: _____**● Manufacturer Documentation Required**

For supplier data requirements, refer to: _____

Remarks: _____

<div style="font-size: 24pt; font-weight: bold; margin: 0;">ASME B73</div>		<div style="font-weight: bold; margin: 0;">Form I-1 Centrifugal Pump Data Sheet</div> <div style="font-size: 10pt; margin: 0;">Rev. No.: _____ Rev. Date: _____</div>		<div style="font-size: 10pt; margin: 0;">Issue Date APRIL 2012</div>	
		<div style="font-weight: bold; margin: 0;">ASME Centrifugal Pumps (U.S. Customary Units)</div> <div style="font-size: 10pt; margin: 0;">ASME B73.1, ASME B73.2</div>		<div style="font-weight: bold; margin: 0;">Page 3 of 4</div>	
Usage key — data provided by: <input checked="" type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Supplier if not purchaser					
1	▲ Shaft Sealing Furnished by: _____ Installed by: _____	<input type="checkbox"/> Mechanical seal <input type="checkbox"/> Packing <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser	▲ Flush Plan — Single or Inner Seal Piping plan number(s): _____ External flush fluid: _____ Supply temperature: Min. _____ Max. _____ (°F) Specific gravity: _____ Specific heat: _____ (Btu/lb °F) Vapor pressure: _____ psia @ _____ (°F) Flow rate required: Min. _____ Max. _____ (gpm) Maximum flow rate allowed by process: _____ (gpm) Pressure required: Min. _____ Max. _____ (psig) Maximum pressure allowed by process: _____ (psig) Temperature required: Min. _____ Max. _____ (°F) Inner seal flush plan piping: <input type="checkbox"/> Tube <input type="checkbox"/> Pipe <input type="checkbox"/> Other: _____ Tube/pipe size: _____ Tube/pipe material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Other _____ Tube/pipe specification: _____ Tube/pipe connections: <input type="checkbox"/> Threaded <input type="checkbox"/> Socket weld <input type="checkbox"/> Unions <input type="checkbox"/> Butt weld <input type="checkbox"/> Tube fitting <input type="checkbox"/> Other: _____ Furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Remarks: _____		
2	▲ Seal Chamber Throat bushing: _____ Throat bushing material: _____ Jacketed seal chamber/packing box: <input type="checkbox"/> Yes <input type="checkbox"/> No For: <input type="checkbox"/> Heating <input type="checkbox"/> Cooling Remarks: _____	<input type="checkbox"/> Taper bore <input type="checkbox"/> Large cylindrical bore <input type="checkbox"/> Universal cover <input type="checkbox"/> Packing box <input type="checkbox"/> None <input type="checkbox"/> Fixed bushing <input type="checkbox"/> Floating bushing	▲ Flush Plan — Outer Seal Piping plan number(s): _____ External flush fluid: _____ Supply temperature: Min. _____ Max. _____ (°F) Specific gravity: _____ Specific heat: _____ (Btu/lb °F) Vapor pressure: _____ psia @ _____ (°F) Flow rate required: Min. _____ Max. _____ (gpm) Maximum flow rate allowed by process: _____ (gpm) Pressure required: Min. _____ Max. _____ (psig) Maximum pressure allowed by process: _____ (psig) Temperature required: Min. _____ Max. _____ (°F) MAWP flush plan: _____ psig @ min. temp. _____ (°F) _____ psig @ max. temp. _____ (°F) Outer seal flush plan piping: <input type="checkbox"/> Tube <input type="checkbox"/> Pipe <input type="checkbox"/> Other: _____ Tube/pipe size: _____ Tube/pipe material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Other _____ Tube/pipe specification: _____ Tube/pipe connections: <input type="checkbox"/> Threaded <input type="checkbox"/> Socket weld <input type="checkbox"/> Unions <input type="checkbox"/> Butt weld <input type="checkbox"/> Tube fitting <input type="checkbox"/> Other: _____ Furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Remarks: _____		
3	▲ Mechanical Seal (ref. Mand. App. II) Flexible element: <input type="checkbox"/> Rotating <input type="checkbox"/> Stationary B73.1 or B73.2 Mand. App. II configuration code: _____ API 682 Category 1: <input type="checkbox"/> Yes <input type="checkbox"/> No Manufacturer: _____ Model: _____ Manufacturer code: _____ Drawing number: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
4	▲ Seal Materials — Single or Inner Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Mechanical seal <input type="checkbox"/> Packing <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser	▲ Quench <input type="checkbox"/> Yes <input type="checkbox"/> No Quench fluid: _____ Flow rate: _____ Remarks: _____		
5	▲ Seal Materials — Outer Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Taper bore <input type="checkbox"/> Large cylindrical bore <input type="checkbox"/> Universal cover <input type="checkbox"/> Packing box <input type="checkbox"/> None <input type="checkbox"/> Fixed bushing <input type="checkbox"/> Floating bushing			
6	▲ Seal Gland Ports: <input type="checkbox"/> Flush <input type="checkbox"/> Drain <input type="checkbox"/> Vent <input type="checkbox"/> Quench <input type="checkbox"/> Buffer/barrier fluid inlet <input type="checkbox"/> Buffer/barrier fluid outlet Throttle bushing: <input type="checkbox"/> Yes <input type="checkbox"/> No Throttle bushing material: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)	▲ Quench <input type="checkbox"/> Yes <input type="checkbox"/> No Quench fluid: _____ Flow rate: _____ Remarks: _____		
7	▲ Seal Gland Ports: <input type="checkbox"/> Flush <input type="checkbox"/> Drain <input type="checkbox"/> Vent <input type="checkbox"/> Quench <input type="checkbox"/> Buffer/barrier fluid inlet <input type="checkbox"/> Buffer/barrier fluid outlet Throttle bushing: <input type="checkbox"/> Yes <input type="checkbox"/> No Throttle bushing material: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			

<h1 style="margin:0;">ASME B73</h1>	Form I-1 Centrifugal Pump Data Sheet		Issue Date APRIL 2012																																																
	Rev. No.: _____ Rev. Date: _____																																																		
	ASME Centrifugal Pumps (U.S. Customary Units) ASME B73.1, ASME B73.2		Page 4 of 4																																																
Usage key — data provided by <input checked="" type="radio"/> Purchaser <input type="radio"/> Supplier <input type="radio"/> Supplier if not purchaser																																																			
<div><div><div>▲ Auxiliary Equipment</div><div>Reservoir: <input type="checkbox"/> Yes <input type="checkbox"/> No Furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Drawing number: _____ Material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Other _____ Operating pressure: _____ (psig) Operating temperature: _____ (°F) MAWP of reservoir: _____ psig @ min. temp. _____ (°F) _____ psig @ max. temp. _____ (°F) Code specification: _____ Code stamped: <input type="checkbox"/> Yes <input type="checkbox"/> No Size: <input type="checkbox"/> 3 gallon <input type="checkbox"/> 5 gallon <input type="checkbox"/> Other _____ Internal cooling coils: <input type="checkbox"/> Yes <input type="checkbox"/> No Stand required: <input type="checkbox"/> Yes <input type="checkbox"/> No Baseplate mounted: <input type="checkbox"/> Yes <input type="checkbox"/> No Seal cooler: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Water cooled <input type="checkbox"/> Air cooled Manufacturer: _____ Model: _____ API 682 design: <input type="checkbox"/> Yes <input type="checkbox"/> No Splash shield: <input type="checkbox"/> Yes <input type="checkbox"/> No Remarks: _____ _____</div></div><div><div>▲ Heating and Cooling</div><div><input type="checkbox"/> Heating required <input type="checkbox"/> Cooling required Piping plan designation: _____ Piping plan furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Fluid: _____ Temperature: Inlet: _____ Outlet: _____ (°F) Maximum allowable differential temperature: _____ (°F) Rated flow rate: _____ (gpm) Supply pressure: _____ (psig) Type: <input type="checkbox"/> Tube <input type="checkbox"/> Pipe <input type="checkbox"/> Other _____ Tube/pipe size: _____ Tube/pipe material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Galvanized carbon steel <input type="checkbox"/> Other _____ Tube/pipe specification: _____ Tube/pipe connections: <input type="checkbox"/> Threaded <input type="checkbox"/> Socket weld <input type="checkbox"/> Unions <input type="checkbox"/> Butt weld <input type="checkbox"/> Tube fittings <input type="checkbox"/> Other _____ Remarks: _____ _____</div></div></div> <div><div><div>▲ Instrumentation</div><div><div>Inner seal:</div><table><tr><td></td><td>Indicator</td><td>Switch</td><td>Transmitter</td></tr><tr><td>Flow rate:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Temperature:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Pressure:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr></table>Remarks: _____</div><div><div>Outer seal:</div><table><tr><td></td><td>Indicator</td><td>Switch</td><td>Transmitter</td></tr><tr><td>Flow rate:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Temperature:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Pressure:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Level:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr></table>Remarks: _____</div><div><div>Heating or cooling:</div><table><tr><td></td><td>Indicator</td><td>Switch</td><td>Transmitter</td></tr><tr><td>Flow rate:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Temperature:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr></table>Remarks: _____</div></div></div> <div><div><div>▲ Packing</div><div>Packing code (P1-P4): _____ Number of rings: _____ Material: _____ Manufacturer: _____ Manufacturer style number: _____ Packing construction: _____ Sleeve hard surfacing: <input type="checkbox"/> Yes <input type="checkbox"/> No Lantern ring: <input type="checkbox"/> Yes <input type="checkbox"/> No Lantern ring port: <input type="checkbox"/> Yes <input type="checkbox"/> No Remarks: _____</div></div></div>					Indicator	Switch	Transmitter	Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Indicator	Switch	Transmitter	Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Level:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Indicator	Switch	Transmitter	Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Indicator	Switch	Transmitter																																																
Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
	Indicator	Switch	Transmitter																																																
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Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
Level:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
	Indicator	Switch	Transmitter																																																
Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																
Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																

ASME B73**Form I-1M Centrifugal Pump Data Sheet**

Rev. No.: _____ Rev. Date: _____

Issue Date
MARCH 2015ASME Centrifugal Pumps (SI Units)
ASME B73.1, ASME B73.2

Page 1 of 4

Usage key—data provided by:

☒ Purchaser☐ Supplier☐ Supplier if not by purchaser1 Issued for: ☐ Proposal ☐ Purchase ☐ As built

2 Facility name / location: _____

3 Item name: _____ Purchaser / location: _____

4 Item tag number: _____ Job number: _____

5 Service: _____ Purchaser order number: _____

6 Unit: _____ Supplier / location: _____

7 P&ID number: _____ Supplier order / serial numbers: _____ / _____

● GENERAL

9 No. of pumps req.: _____ Motor item number: _____

10 ▲ Pump size: _____ Motor provided by: _____

11 ▲ Pump model: _____ Motor mounted by: _____

12 ▲ Pump type: _____ Variable-speed operation: ☐ YES ☐ NO**● Operating Conditions**

	Rated	Additional duty points (max., min., or VS)				
Point #:	1	2	3	4	5	
Flow:						(m ³ /h)
Head:						(m)
NPSHA:						(m)
Suct. pres.:						(kPaG)
▲ Speed:						(rpm)

22 System design:

23 Suction pressure: min. / max.: _____ / _____ (kPaG)

24 Suction temperature: min. / max.: _____ / _____ (°C)

25 ☐ Stand-alone operation26 ☐ Parallel operation with item no.: _____27 ☐ Series operation with item no.: _____

28 Service:

29 ☐ Continuous ☐ Intermittent: _____ starts/day

30 System control method:

31 ☐ Speed ☐ Throttle ☐ System Resistance Only**● Pumped Fluid**

35 Pumped fluid: _____

	RATED	MAX.	NORMAL	MIN.	
36 Pumping temperature:					(°C)
*At pumping temperatures designated above					
37 Specific gravity*:					
38 Vapor pressure*:					(kPaA)
39 Viscosity*:					(mPa·s)
40 Specific heat*:					(kJ/kg °C)

41 Atm pressure boiling point: _____ (°C) @ _____ (kPaA)

42 Liquid: ☐ Hazardous ☐ Flammable pH: _____43 ☐ Other: _____

44 Corrosion / erosion caused by: _____

45 % solids: _____ ☐ %CV ☐ %CW Max. particle size: _____ (mm)

46 Other: _____

■ Performance

Performance curve number: _____ ▲ Speed: _____ (rpm)

Total differential head @ rated impeller: _____ (m)

Maximum differential head @ rated impeller: _____ (m)

Point #:	1	2	3	4	5	
NPSHR:						(m)

Minimum continuous stable flow: _____ (m³/h)Allowable operating region: _____ to: _____ (m³/h)Best efficiency point for rated impeller: _____ (m³/h)

Suction specific speed: _____

Impeller diameter: Rated: _____ Max.: _____ Min.: _____ (mm)

Pump rated power: _____ (kW) Efficiency: _____ (%)

Maximum power with rated impeller: _____ (kW)

Case pressure rating:

Maximum allowable working pressure: _____ (kPaG) @ _____ (°C)

Hydrostatic test pressure: _____ (kPaG)

● Site Conditions and Utilities

Location:

☐ Indoor ☐ Outdoor Altitude: _____ (m)

Range of ambient temperatures: min. / max.: _____ / _____ (°C)

Electrical area classification: ☐ Nonhazardous

Cl.: _____ Div. or Zone: _____ Gr.: _____ T Code: _____

Electricity

	Voltage	Phase	Hertz
Drivers			
Heating			

Cooling water:

Source: _____

Supply temp.: _____ (°C) Max. return temp.: _____ (°C)

Supply pressure: _____ (kPaG) Design press.: _____ (kPaG)

Min. return press. _____ (kPaG) Max. allow. D.P. _____ (kPaG)

Chloride concentration: _____ (ppm)

● General Remarks

Number	Date	Data Revision Description	By	Approved
50				
51				
52				
53				

ASME B73

Form I-1M Centrifugal Pump Data Sheet

Rev. No.: _____ Rev. Date: _____

Issue Date
MARCH 2015ASME Centrifugal Pumps (SI Units)
ASME B73.1, ASME B73.2

Page 2 of 4

Usage key—data provided by:

☒ Purchaser☐ Supplier☐ Supplier if not by purchaser

1 Mechanical Data

2 ▲ Impeller Type:

3 ☐ Closed ☐ Open ☐ Semi-open

4 ▲ Casing Mounting:

5 ☐ Foot ☐ Centerline
6 ☐ Vertical in-line

7 ■ Bearings:

8 ▲ Bearing manufacturer: _____

9 Radial bearing type: _____ No.: _____

10 Thrust bearing type: _____ No.: _____

11 ▲ Bearing isolators: ☐ Labyrinth (standard)12 ☐ Magnetic seal

13 Manufacturer: _____

14 ▲ Lubrication:

15 ☐ Flood ☐ Pure mist ☐ Shielded (grease)16 ☐ Grease ☐ Purge mist ☐ Sealed (grease)17 ☐ Magnetic drain plug in housing required18 ▲ ☐ Oil cooler required19 ■ ☐ Oil viscosity: ISO grade: _____ Other: _____

20 Nozzle Connections:

21 ▲ Size ▲ Rating ▲ Facing

22 Suction: _____

23 Discharge: _____

24 ● Aux. case connection:

☐ Drain required

25 ▲ Size: _____ (mm)

☐ Threaded ☐ Welded and flanged

26 ▲ Materials

27 Material class code: _____

28 Casing: _____

29 Impeller: _____

30 Cover: _____

31 Shaft: _____

32 Shaft sleeve: _____

33 Baseplate: _____

34 Casing gasket: _____

35 Impeller gasket: _____

36 Casing fasteners: _____

37 Gland fasteners: _____

38 Bearing housing: _____

39 Bearing housing adapter: _____

40 Bearing isolators: _____

41 Coupling guard: _____

42 Mechanical seal materials — see page 3

43 ▲ Coupling Between Pump and Driver

44 Specification: _____

45 Manufacturer: _____

46 Type: _____

47 Size: _____

48 Model: _____

49 Spacer length: _____ (mm)

50 Coupling guard type:

51 ☐ Pump supplier's standard52 ☐ Baseplate mounted53 ☐ Non-spark coupling guard required

54 Remarks: _____

55

56

▲ Driver

Power rating: _____ (kW) Speed: _____ (rpm)

Drive kW selected for max. S.G.: _____ & max. visc.: _____ (mPa·s)

Driver specification: _____

Driver manufacturer: _____

Driver enclosure: _____ Driver frame: _____

Remarks: _____

● Baseplate

Type: ☐ Grouted☐ Pregouted☐ Ungouted (anchored)☐ Free standing ▲ Pump CL to foundation _____ (mm)☐ Vertical in-line pump case support bracketDesign: ☐ Purchaser specification _____☐ Pump supplier's standard

Remarks: _____

● Paint, Shipment, and Storage Preparation

Paint:

☐ Pump supplier's standard☐ Other: _____

Shipment:

☐ Domestic☐ Export☐ Export boxing required

Storage:

☐ Outside☐ Under roof☐ Environmentally controlled☐ Short term☐ Long term (>6 months)

Environment: _____

☐ Supplier's standard preservation specification

Purchaser storage specification: _____

■ Unit shipping weight: _____ (kg)

● Tests and Inspections

Test: Unwitnessed Witnessed Certificate

Hydrostatic: ☐ ☐ ☐Leak: ☐ ☐ ☐NPSHR: ☐ ☐ ☐Performance: ☐ ☐ ☐Opt. perf. acceptance criteria: ☐ Power ☐ Efficiency ☐ NeitherAdditional data: ☐ Vibration ☐ Bearing temp.☐ Other perf. data: _____☐ Final inspection required Days notification required: _____☐ Dismantle and inspect after test☐ Casting repair procedure approval required

Material certification required:

☐ Casing ☐ Cover ☐ Impeller ☐ Shaft☐ Other: _____

Inspection required for connection welds:

☐ Manufacturer's standard ☐ Visual inspection

Inspection required for castings:

☐ Manufacturer's standard ☐ Visual inspection☐ Other: _____

● Manufacturer Documentation Required

For supplier data requirements, refer to: _____

Remarks: _____

<div style="font-size: 24pt; font-weight: bold; margin: 0;">ASME B73</div>		<div style="font-weight: bold; margin: 0;">Form I-1M Centrifugal Pump Data Sheet</div> <div style="font-size: 10pt; margin: 0;">Rev. No.: _____ Rev. Date: _____</div>		<div style="font-size: 10pt; margin: 0;">Issue Date MARCH 2015</div>	
		<div style="font-weight: bold; margin: 0;">ASME Centrifugal Pumps (SI Units)</div> <div style="font-size: 10pt; margin: 0;">ASME B73.1, ASME B73.2</div>		<div style="font-weight: bold; margin: 0;">Page 3 of 4</div>	
Usage key — data provided by: <input checked="" type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Supplier if not purchaser					
1	▲ Shaft Sealing Furnished by: _____ Installed by: _____	<input type="checkbox"/> Mechanical seal <input type="checkbox"/> Packing <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser	▲ Flush Plan — Single or Inner Seal Piping plan number(s): _____ External flush fluid: _____ Supply temperature: Min. _____ Max. _____ (°C) Specific gravity: _____ Specific heat: _____ (kJ/kg °C) Vapor pressure: _____ kPaA @ _____ (°C) Flow rate required: Min. _____ Max. _____ (m³/h) Maximum flow rate allowed by process: _____ (m³/h) Pressure required: Min. _____ Max. _____ (kPaG) Maximum pressure allowed by process: _____ (kPaG) Temperature required: Min. _____ Max. _____ (°C) Inner seal flush plan piping: <input type="checkbox"/> Tube <input type="checkbox"/> Pipe <input type="checkbox"/> Other: _____ Tube/pipe size: _____ Tube/pipe material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Other _____ Tube/pipe specification: _____ Tube/pipe connections: <input type="checkbox"/> Threaded <input type="checkbox"/> Socket weld <input type="checkbox"/> Unions <input type="checkbox"/> Butt weld <input type="checkbox"/> Tube fitting <input type="checkbox"/> Other: _____ Furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Remarks: _____		
2	▲ Seal Chamber Throat bushing: _____ Throat bushing material: _____ Jacketed seal chamber/packing box: <input type="checkbox"/> Yes <input type="checkbox"/> No For: <input type="checkbox"/> Heating <input type="checkbox"/> Cooling Remarks: _____	<input type="checkbox"/> Taper bore <input type="checkbox"/> Large cylindrical bore <input type="checkbox"/> Universal cover <input type="checkbox"/> Packing box <input type="checkbox"/> None <input type="checkbox"/> Fixed bushing <input type="checkbox"/> Floating bushing	▲ Flush Plan — Outer Seal Piping plan number(s): _____ External flush fluid: _____ Supply temperature: Min. _____ Max. _____ (°C) Specific gravity: _____ Specific heat: _____ (kJ/kg °C) Vapor pressure: _____ kPaA @ _____ (°C) Flow rate required: Min. _____ Max. _____ (m³/h) Maximum flow rate allowed by process: _____ (m³/h) Pressure required: Min. _____ Max. _____ (kPaG) Maximum pressure allowed by process: _____ (kPaG) Temperature required: Min. _____ Max. _____ (°C) MAWP flush plan: _____ kPaG @ min. temp. _____ (°C) _____ kPaG @ max. temp. _____ (°C) Outer seal flush plan piping: <input type="checkbox"/> Tube <input type="checkbox"/> Pipe <input type="checkbox"/> Other: _____ Tube/pipe size: _____ Tube/pipe material: <input type="checkbox"/> 316 SS <input type="checkbox"/> Other _____ Tube/pipe specification: _____ Tube/pipe connections: <input type="checkbox"/> Threaded <input type="checkbox"/> Socket weld <input type="checkbox"/> Unions <input type="checkbox"/> Butt weld <input type="checkbox"/> Tube fitting <input type="checkbox"/> Other: _____ Furnished by: <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser Remarks: _____		
3	▲ Mechanical Seal (ref. Mand. App. II) Flexible element: <input type="checkbox"/> Rotating <input type="checkbox"/> Stationary B73.1 or B73.2 Mand. App. II configuration code: _____ API 682 Category 1: <input type="checkbox"/> Yes <input type="checkbox"/> No Manufacturer: _____ Model: _____ Manufacturer code: _____ Drawing number: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
4	▲ Seal Materials — Single or Inner Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Mechanical seal <input type="checkbox"/> Packing <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser <input type="checkbox"/> Supplier <input type="checkbox"/> Purchaser			
5	▲ Seal Materials — Outer Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Taper bore <input type="checkbox"/> Large cylindrical bore <input type="checkbox"/> Universal cover <input type="checkbox"/> Packing box <input type="checkbox"/> None <input type="checkbox"/> Fixed bushing <input type="checkbox"/> Floating bushing			
6	▲ Seal Gland Ports: <input type="checkbox"/> Flush <input type="checkbox"/> Drain <input type="checkbox"/> Vent <input type="checkbox"/> Quench <input type="checkbox"/> Buffer/barrier fluid inlet <input type="checkbox"/> Buffer/barrier fluid outlet Throttle bushing: <input type="checkbox"/> Yes <input type="checkbox"/> No Throttle bushing material: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
7	▲ Quench Quench fluid: _____ Flow rate: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)	▲ Quench Quench fluid: _____ Flow rate: _____ Remarks: _____		
8	▲ Seal Materials — Single or Inner Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
9	▲ Seal Materials — Outer Seal Seal faces: Rotating face: _____ Stationary face: _____ Secondary seals: Rotating face: _____ Stationary face: _____ Sleeve: _____ Springs: _____ Bellows: _____ Metal parts: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
10	▲ Seal Gland Ports: <input type="checkbox"/> Flush <input type="checkbox"/> Drain <input type="checkbox"/> Vent <input type="checkbox"/> Quench <input type="checkbox"/> Buffer/barrier fluid inlet <input type="checkbox"/> Buffer/barrier fluid outlet Throttle bushing: <input type="checkbox"/> Yes <input type="checkbox"/> No Throttle bushing material: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			
11	▲ Quench Quench fluid: _____ Flow rate: _____ Remarks: _____	<input type="checkbox"/> Cartridge <input type="checkbox"/> Component <input type="checkbox"/> Arrangement 1 (single seal) <input type="checkbox"/> Arrangement 2 (dual unpressurized seal) <input type="checkbox"/> Arrangement 3 (dual pressurized seal)			

ASME B73	Form I-1M Centrifugal Pump Data Sheet	Issue Date MARCH 2015
	Rev. No.: _____ Rev. Date: _____	
	ASME Centrifugal Pumps (SI Units) ASME B73.1, ASME B73.2	Page 4 of 4
Usage key — data provided by ● Purchaser ■ Supplier ▲ Supplier if not purchaser		

▲ Auxiliary Equipment

Reservoir: ☐ Yes ☐ No

Furnished by: ☐ Supplier ☐ Purchaser

Drawing number: _____

Material: ☐ 316 SS ☐ Other _____

Operating pressure: _____ (kPaG)

Operating temperature: _____ (°C)

MAWP of reservoir: _____ kPaG @ min. temp. _____ (°C)

_____ kPaG @ max. temp. _____ (°C)

Code specification: _____

Code stamped: ☐ Yes ☐ No

Size: ☐ 12 L ☐ 20 L ☐ Other _____

Internal cooling coils: ☐ Yes ☐ No

Stand required: ☐ Yes ☐ No

Baseplate mounted: ☐ Yes ☐ No

Seal cooler: ☐ Yes ☐ No

_____ Water cooled ☐ Air cooled

Manufacturer: _____

Model: _____

API 682 design: ☐ Yes ☐ No

Splash shield: ☐ Yes ☐ No

Remarks: _____

▲ Heating and Cooling

☐ Heating required ☐ Cooling required

Piping plan designation: _____

Piping plan furnished by: ☐ Supplier ☐ Purchaser

Fluid: _____

Temperature: Inlet: _____ Outlet: _____ (°C)

Maximum allowable differential temperature: _____ (°C)

Rated flow rate: _____ (m³/h)

Supply pressure: _____ (kPaG)

Type: ☐ Tube ☐ Pipe ☐ Other _____

Tube/pipe size: _____

Tube/pipe material: ☐ 316 SS ☐ Galvanized carbon steel

_____ Other _____

Tube/pipe specification: _____

Tube/pipe connections: ☐ Threaded ☐ Socket weld

☐ Unions ☐ Butt weld ☐ Tube fittings

☐ Other _____

Remarks: _____

▲ Instrumentation

Inner seal:	Indicator	Switch	Transmitter
Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks: _____			

Outer seal:	Indicator	Switch	Transmitter
Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks: _____			

Heating or cooling:	Indicator	Switch	Transmitter
Flow rate:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks: _____			

▲ Remarks

▲ Packing

Packing code (P1-P4): _____ Number of rings: _____

Material: _____

Manufacturer: _____

Manufacturer style number: _____

Packing construction: _____

Sleeve hard surfacing: ☐ Yes ☐ No

Lantern ring: ☐ Yes ☐ No

Lantern ring port: ☐ Yes ☐ No

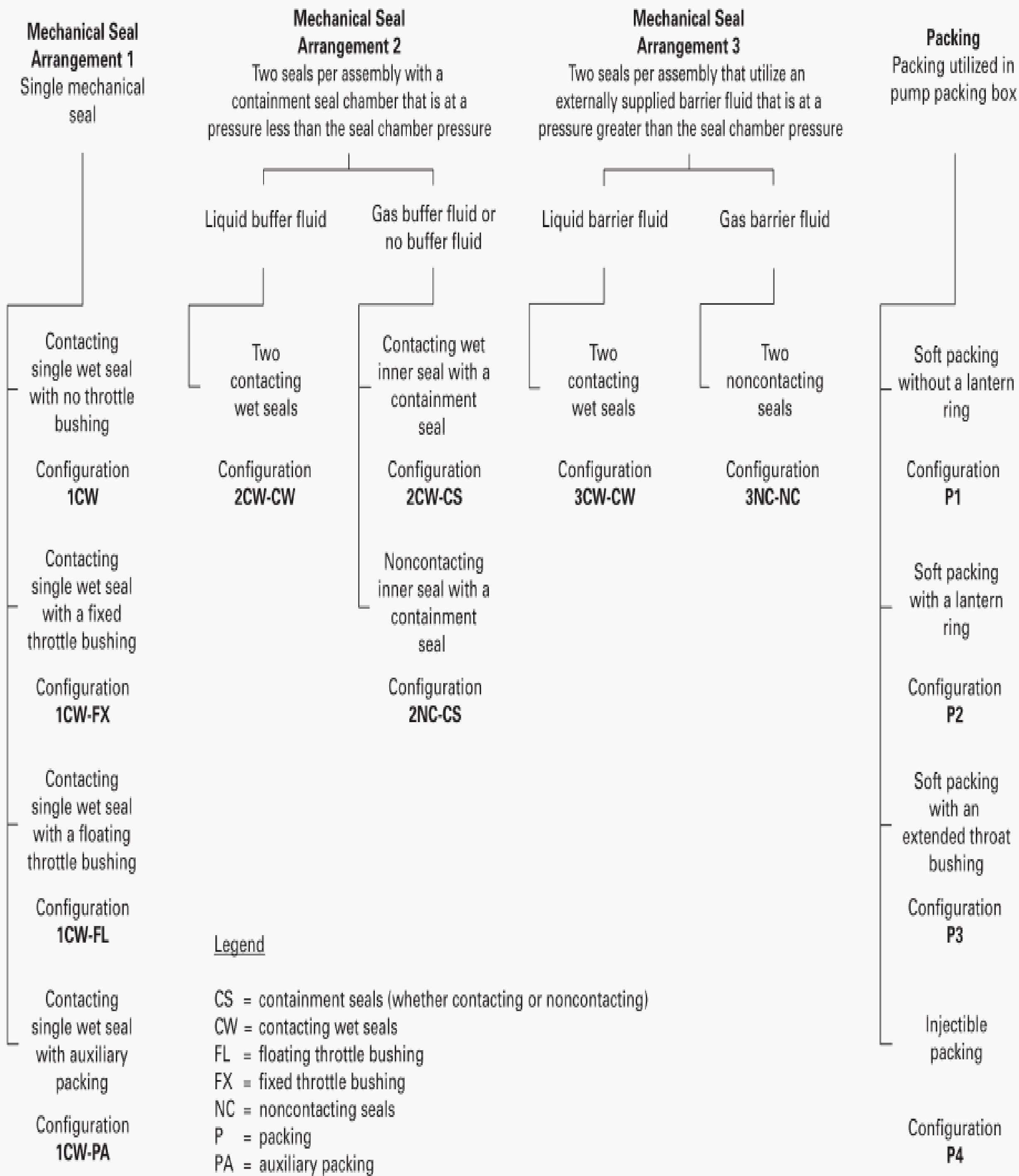
Remarks: _____

MANDATORY APPENDIX II

MECHANICAL SEAL AND PACKING CONFIGURATION CODES

See Fig. II-1 on the following page.

Fig. II-1 Mechanical Seal and Packing Configuration Codes



NONMANDATORY APPENDIX A ELECTRONIC DATA EXCHANGE

The information contained in pump data sheets may be transmitted digitally rather than via a conventional data sheet format. This is suitable when the pump purchaser and supplier have systems that can process digital information rather than paper-based data sheets. Direct electronic transfer can be achieved with a transfer protocol that is adopted by both purchaser and supplier. This transfer protocol must also be commercially neutral if it is to be accepted by all parties. Such a method improves the operating efficiencies of both parties if their internal data systems can import and export via this neutral protocol.

Those interested in adopting electronic data exchange (EDE) are encouraged to reference the EDE technology and implementation standard, HI 50.7, for the digital

transfer of centrifugal pump data. HI 50.7 provides implementation details and examples toward adopting EDE that are suitable for ASME B73 centrifugal pump data. Additional interpretive information is also available at www.pumps.org/ede.

This EDE Standard was developed and supported by the Hydraulic Institute and the Fiatech Automating Equipment Information Exchange (AEX) project. Information on the EDE technology and the AEX XML schemas is available online at www.fiatech.org/projects/idim/aex.htm.

A complete listing of data fields in the ASME B73 data sheet and their corresponding XML structures are found in HI 50.7 or via Fiatech at www.fiatech.org.

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