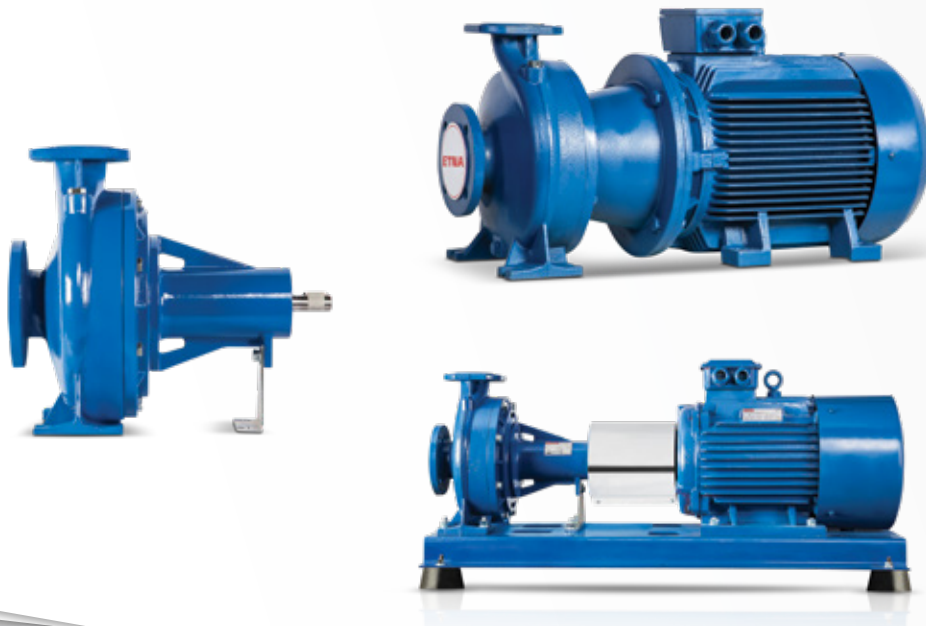




Horizontal Single-Stage Centrifugal Pumps EA Series



High-efficiency, end-suction, horizontal-shaft, centrifugal pumps compliant with DIN EN 733

Centrifugal pumps with long service life and ease of maintenance are used in

- HVAC systems
- Fire pump systems
- Irrigation
- Water supply
- Water treatment
- Power plants

FLUIDPROPERTY

- Clean, non-hard, non-viscose, chemically neutral water that is free of solid abrasive particles
- The maximum glycol ratio that can be added to the circulation water is 30%.

TECHNICAL SPECIFICATIONS

Max. Flow Rate	: 480 m ³ /h
Max. Head	: 155 mwc
Motor Speed	: 2950 rpm (50 Hz), 1450 rpm (50 Hz) :
Connection	DN 32 - DN 100
Power	: 0.25 kW - 160 kW
Maximum Operating Pressure	: 16 bar
Maximum Ambient Temperature	: 40°C
Temperature of Pumped Liquid	: -10°C ÷ +120°C
Protection Class	: IP44
Insulation Class	: Class F

Design Properties

Pump Body	: GG25 - Cast Iron
Shaft	: AISI 420 - Stainless Steel
Impeller	: GG25- Cast Iron (ops. CuSn7 Bronze)
Adapter	: GG25 - Cast Iron
Mechanical Seal	: Carbon / Silicone / Carbide

CONSTRUCTION SPECIFICATIONS

EA

- End-suction, cast iron pump with radial outlet.
- Hydraulic sizes and nominal diameters of inlet and outlet ports conform with (DN) EN 733 DIN 24255.
- Flanges conform with EN 1092-2 DIN 2532.

MOTOR - PUMP COUPLING

- Two different types of motor/pump couplings are available:

EAR- RIGID COUPLING

- Shaft extension (rigid coupling) attached to the standard motor shaft with a wedge, bracket, adapter and pump.

EAS-FLEXABLE COUPLING

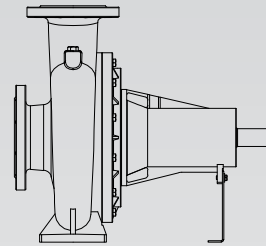
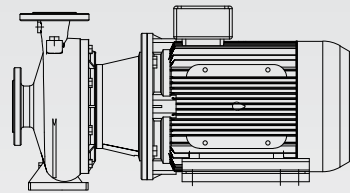
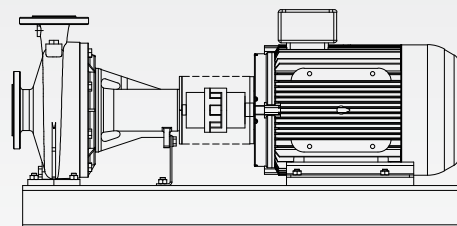
- Pump and electric motor supported with a bracket leg and a connection set on a chassis with a flexible coupling

OPTIONAL ACCESSORIES

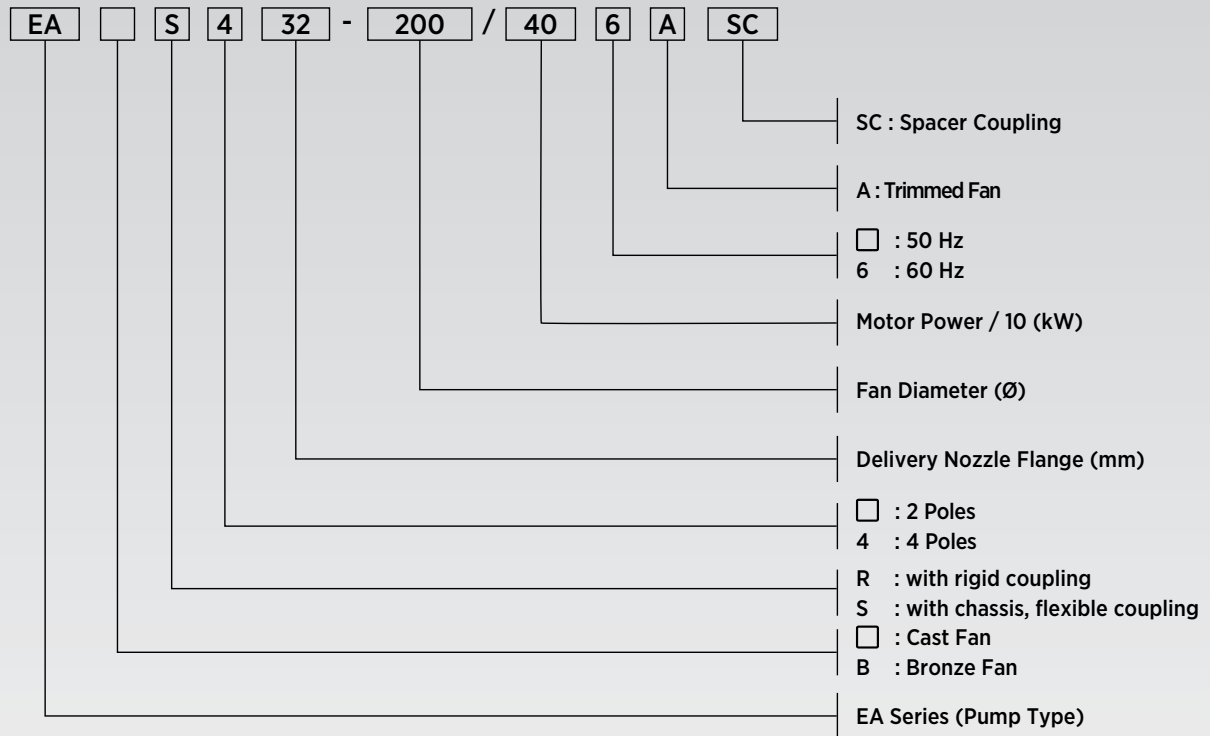
- Stainless steel 316 or galvanized steel counter-flanges.
- Pressure gauge attachable intermediate flange.

OPTIONAL FEATURES

- Different voltages and frequencies
- Special materials for the mechanical seal and gasket
- Models with air relief valves
- Frequency converter system
- Flexible coupling for EAS series - Spacer coupling connection system (Enables easy maintenance of mechanical seal, impeller and other parts without dismantling the suction and discharge pipes of the pump body)
- Bronze impeller

EA**EAR****EAS**

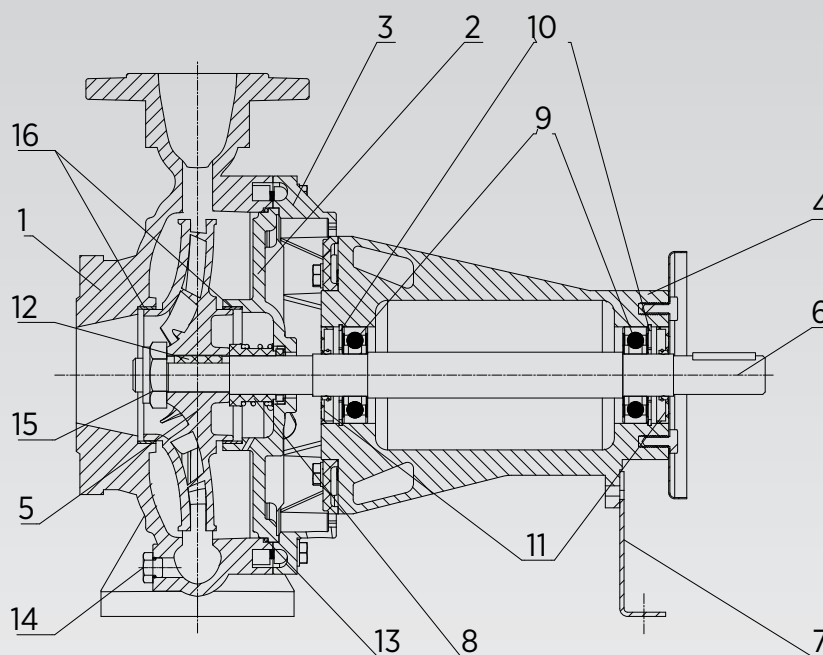
EA SERIES PUMP IDENTIFICATION CODE



PUMP LABEL

ETNA®		CE	ALP Pompa Teknolojileri A.Ş. Dudullu OSB 2. Cad. No: 14 34775 Ümraniye - İSTANBUL 0216 561 47 74	
TYPE:				
CAPACITY (Q): m ³ /h		H: mSS		
SPEED: rpm		POWER: kW		
SERIAL NO:		YEAR of MANUFACTURE:		

EA SERIES PUMPS



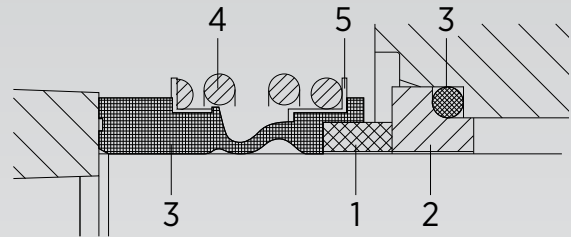
REF. N.	PART NAME	MATERIAL	STANDARDS	
			EUROPE	USA
1	Pump Body	Cast Iron	EN 1561 - GJL 250 (JL1040)	ASTM Class 35
2	Seal Body	Cast Iron	EN 1561 - GJL 250 (JL1040)	ASTM Class 35
3	Pump Flange	Cast Iron	EN 1561 - GJL 200 (JL1030)	ASTM Class 25
4	Bearing Body	Cast Iron	EN 1561 - GJL 200 (JL1030)	ASTM Class 25
5	Impeller (Cast Iron)	Cast Iron	EN 1561 - GJL 200 (JL1030)	ASTM Class 25
	Impeller (Bronze)	Bronze	CuSn7ZnPb - Rg-7 (DIN 1705)	UNS C90700
6	Shaft	Steel	EN 10088-X17CrNi16-2 (1.4057)	AISI 431
7	Pump Foot	Steel	EN 10025:2:2006-S235JR	A283C
8	Mechanical Seal	Ceramic / Carbon / NBR (Standard)		
9	Bearing	Steel	DIN 625 , 6300 Series	
10	Snap Ring	Spring Steel C60-C65	DIN 472	
11	Oil Seal	NBR (Standard)		
12	Wedge	Stainless Steel	EN 10088-1 X2CrNiMo17-12-2 (1.44044)	
13	O-ring	EPDM (Standard)		
14	Fill and Drain	Nickel Coated Brass (Standard)		
15	Shaft End	Stainless Steel	EN 10088-1 X2CrNiMo17-12-2 (1.44044)	
16	Wear Ring	Bronze	CuSn7ZnPb - Rg-7 (DIN 1705)	AISI 316L

MECHANICAL SEAL

Mechanical seal connection dimensions in accordance with EN 12756 and ISO 3069

List of Materials

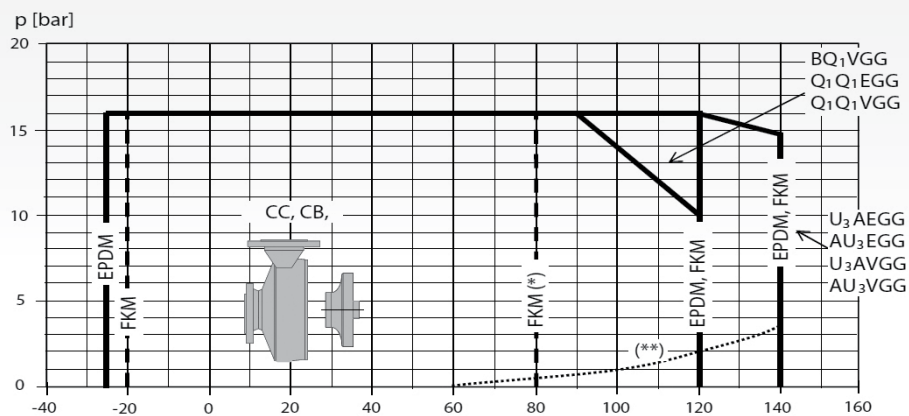
Positions 1-2	Position 3	Positions 4-5
B: Resin-Impregnated Carbon	E : EPDM	G : AISI 304
V: Ceramic	V : FKM (FPM)	
Q1: Silicon Carbide	P : NBR	
U3 : Tungsten Carbide		
A: Antimony-Impregnated Carbon		



Seal Type

Type	Position					Temperature (°C)
	1	2	3	4	5	
	Rotating Part	Stationary Part	Elastics	Springs	Other Parts	
Standard Mechanical Seal						
B V E G G	B	V	E	G	G	-30/+120
Other Mechanical Seal Types						
V B V G G	V	B	V	G	G	-10/+120
Q ₁ B V G G	Q ₁	B	V	G	G	-10/+120
Q ₁ Q ₁ V G G	Q ₁	Q ₁	V	G	G	-10/+120
V B E G G	V	B	E	G	G	-30/+120
Q ₁ B E G G	Q ₁	B	E	G	G	-30/+120
Q ₁ Q ₁ E G G	Q ₁	Q ₁	E	G	G	-30/+120
A U ₃ E G G	A	U ₃	E	G	G	-25/+140

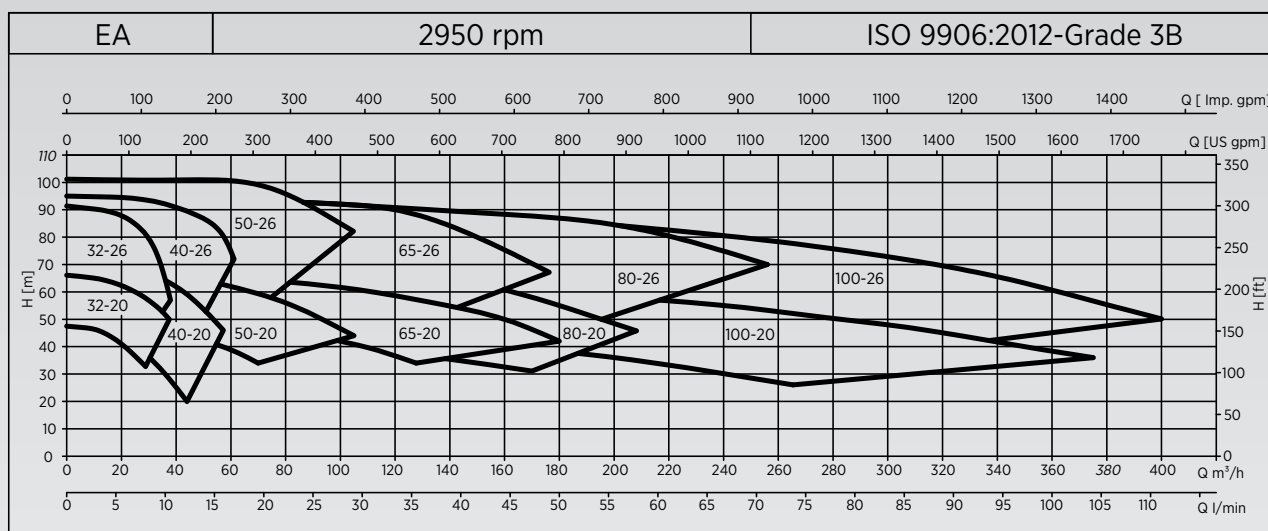
Pressure / Temperature Limits (for any type of seal)



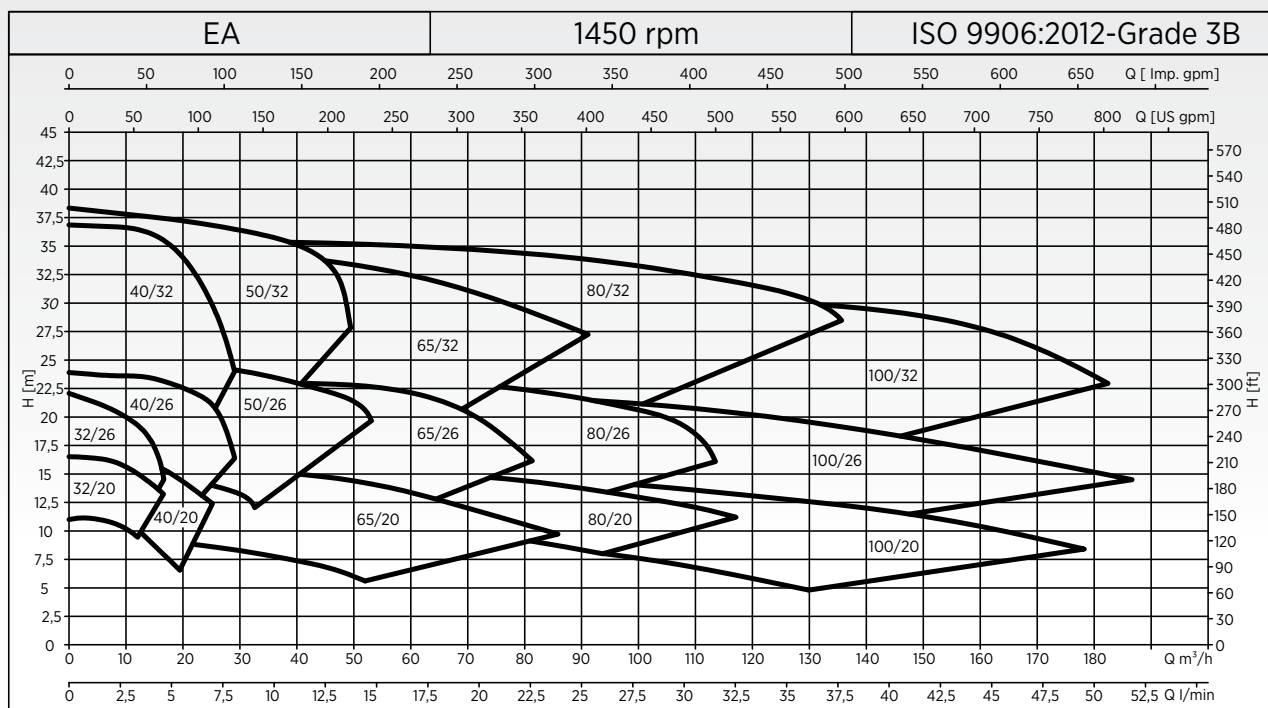
CC: Cast Iron Body, Cast Iron Fan

CB: Cast Iron Body, Bronze Fan

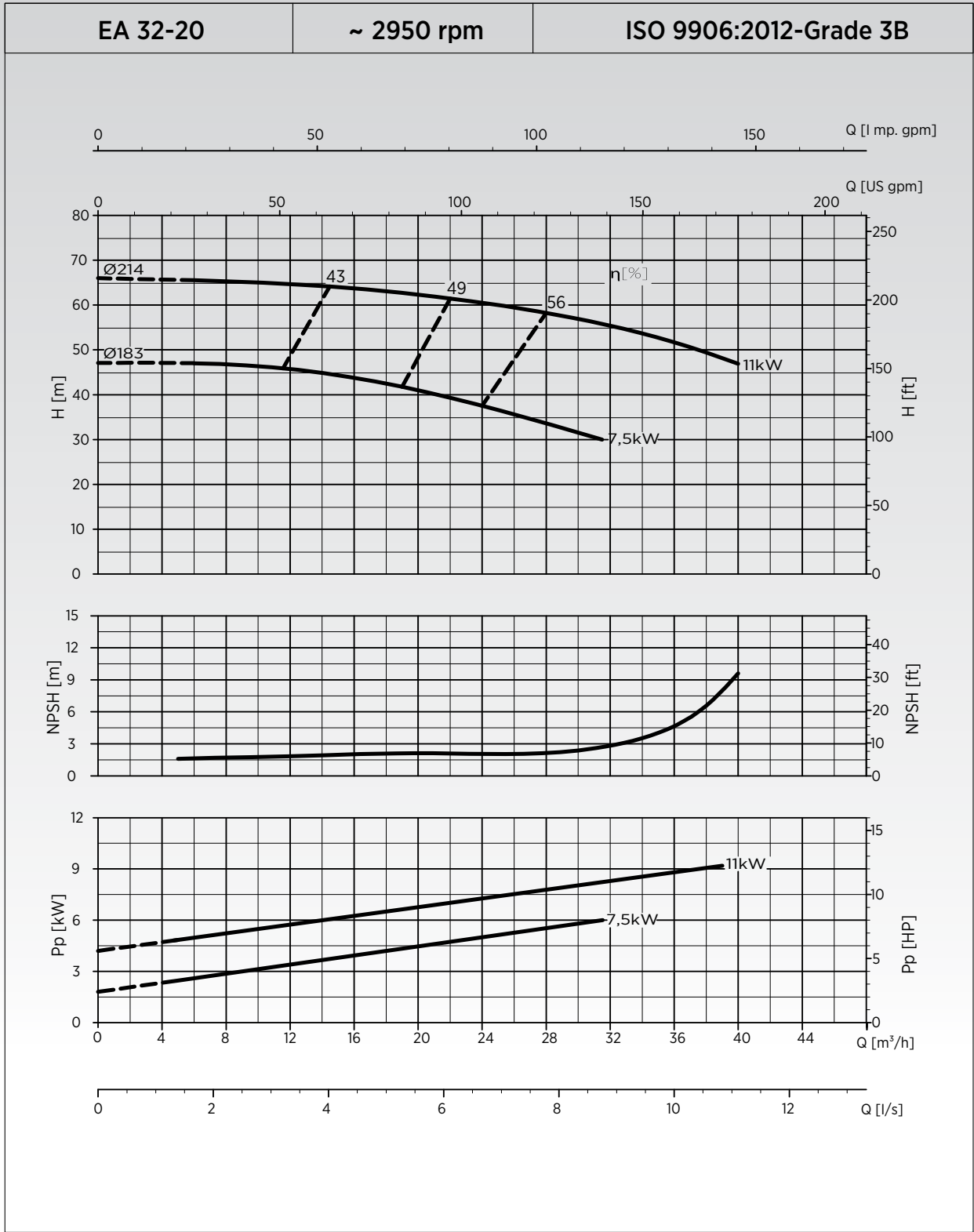
PERFORMANCE CURVES 50Hz, 2 POLES



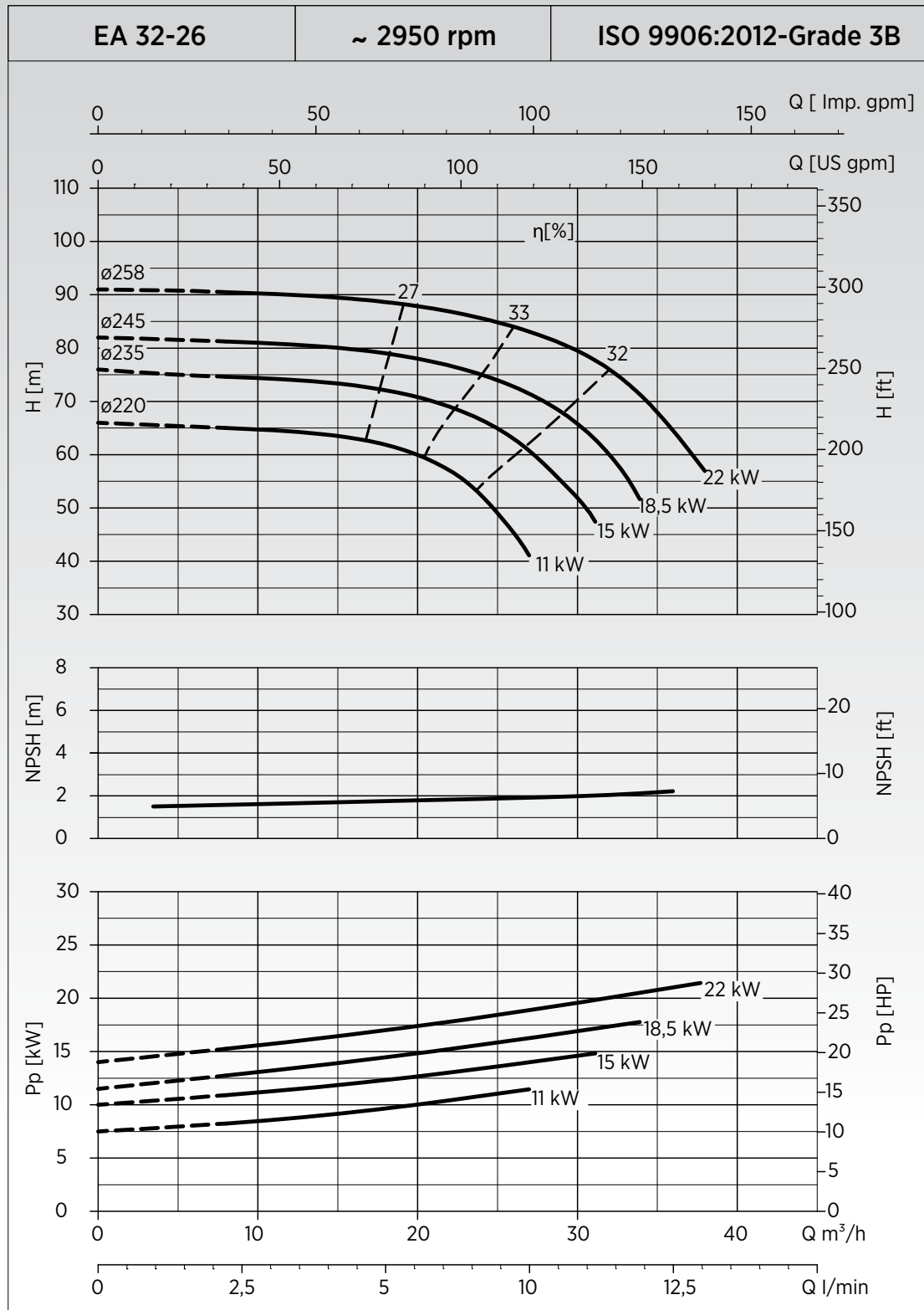
PERFORMANCE CURVES 50Hz, 4 POLES



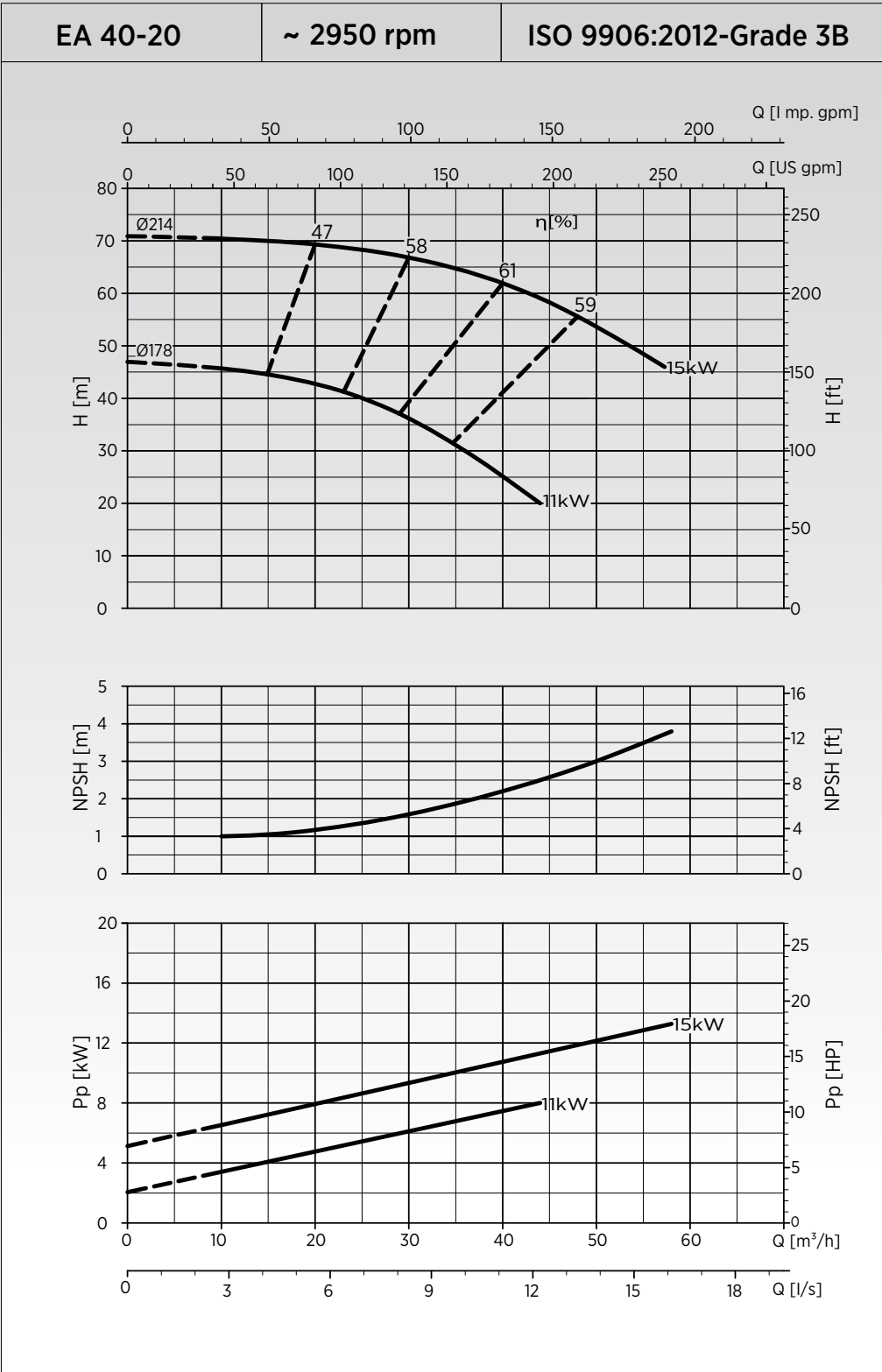
HYDRAULIC PERFORMANCE CURVES



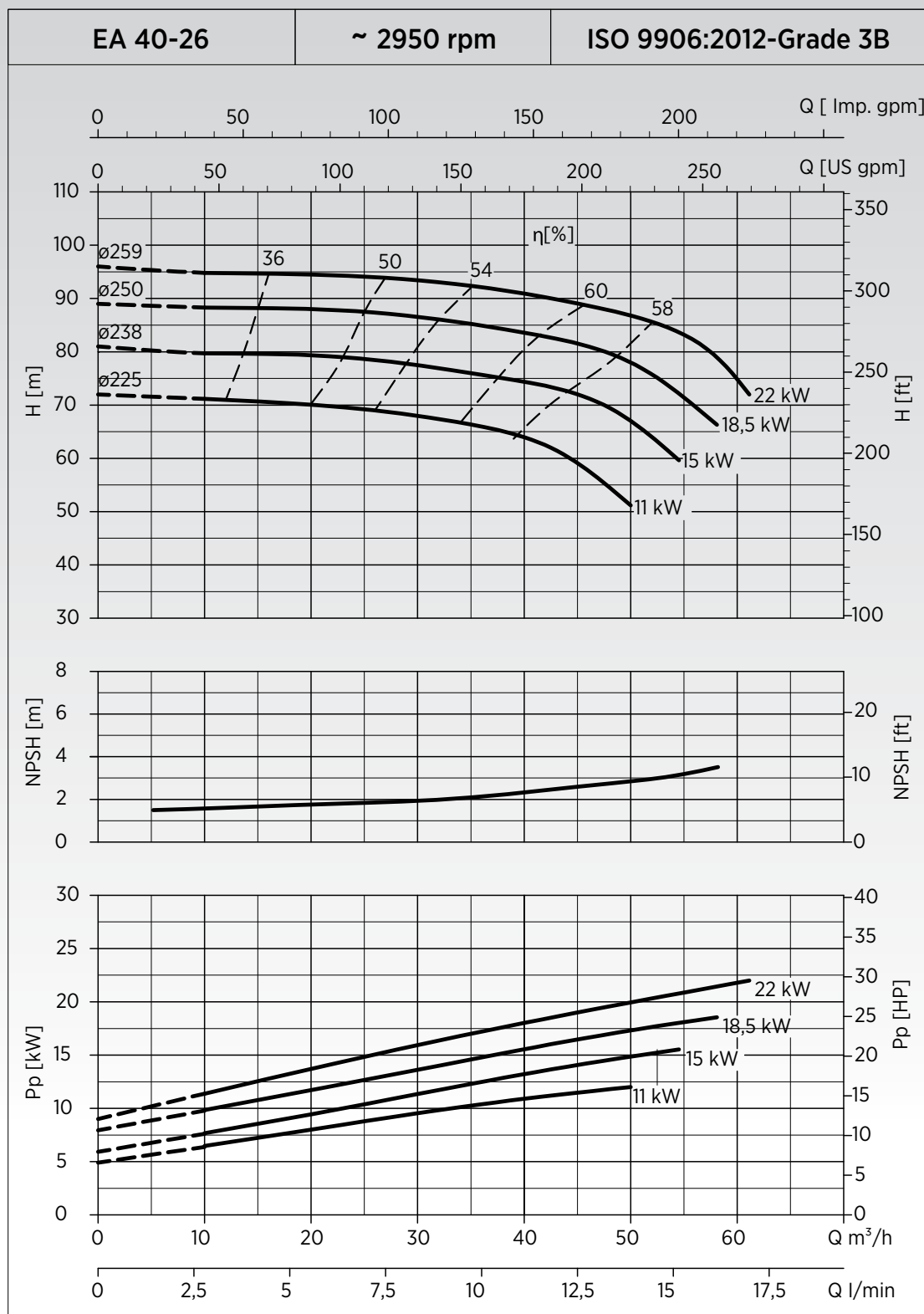
HYDRAULIC PERFORMANCE CURVES



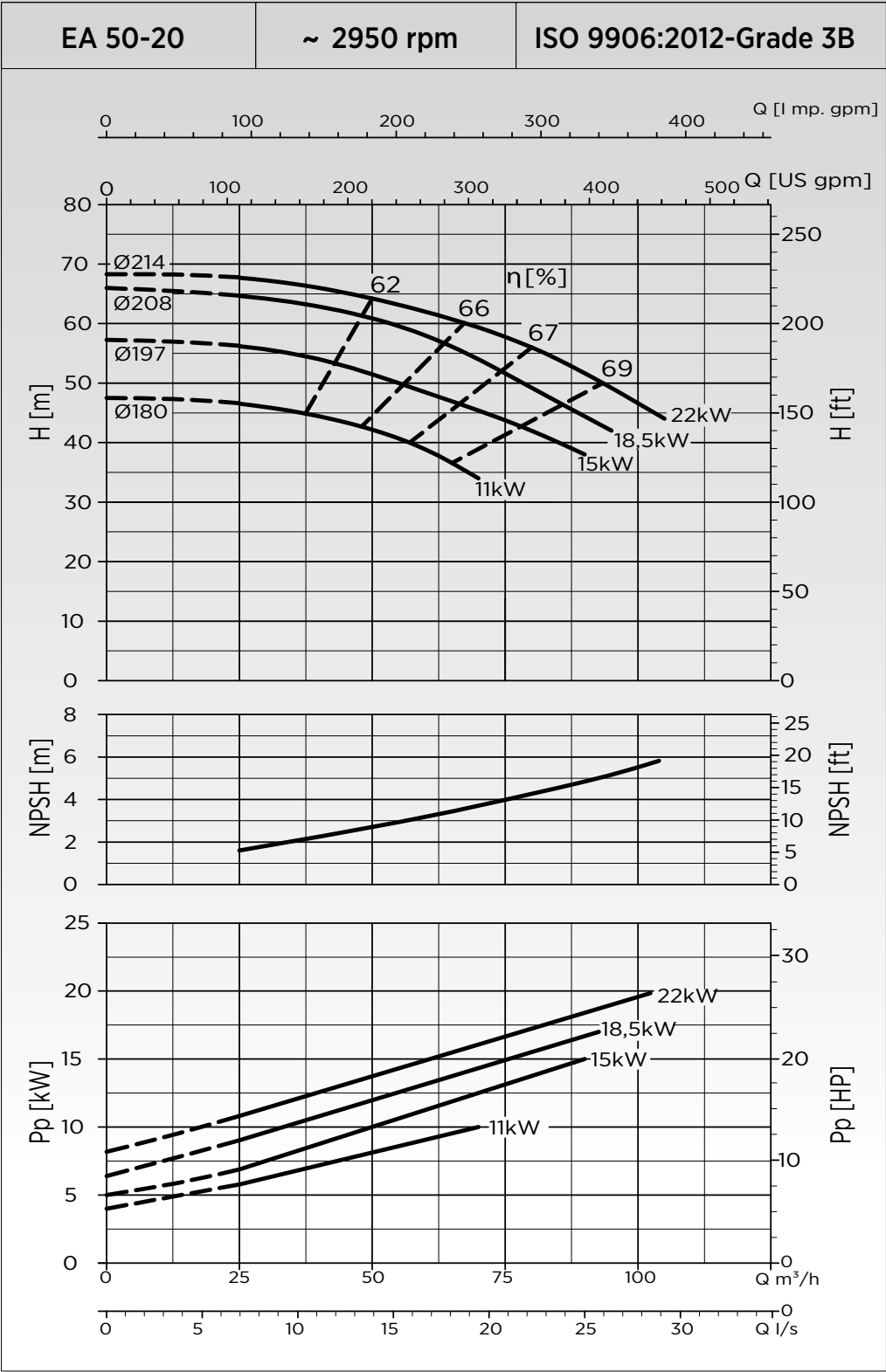
HYDRAULIC PERFORMANCE CURVES



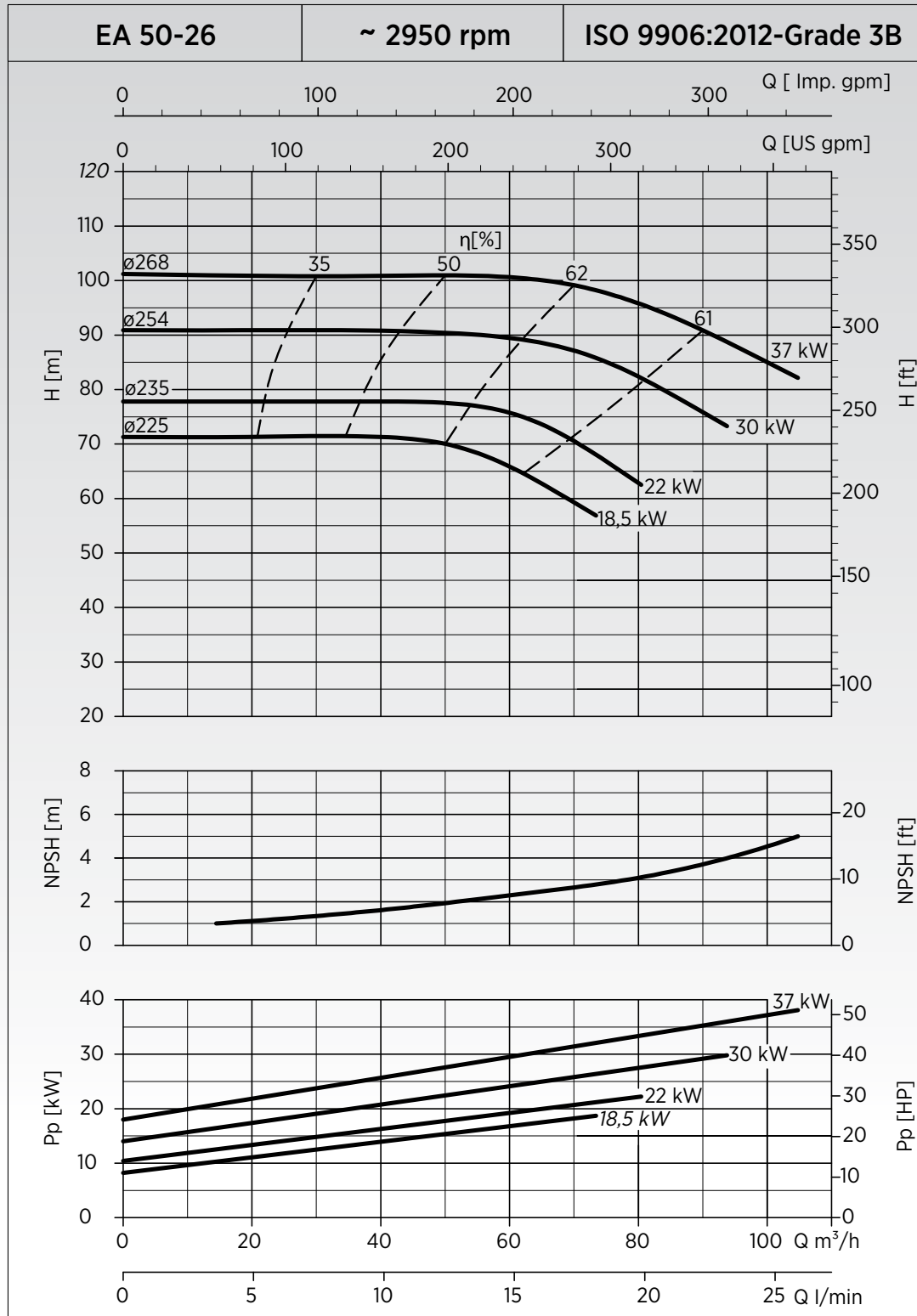
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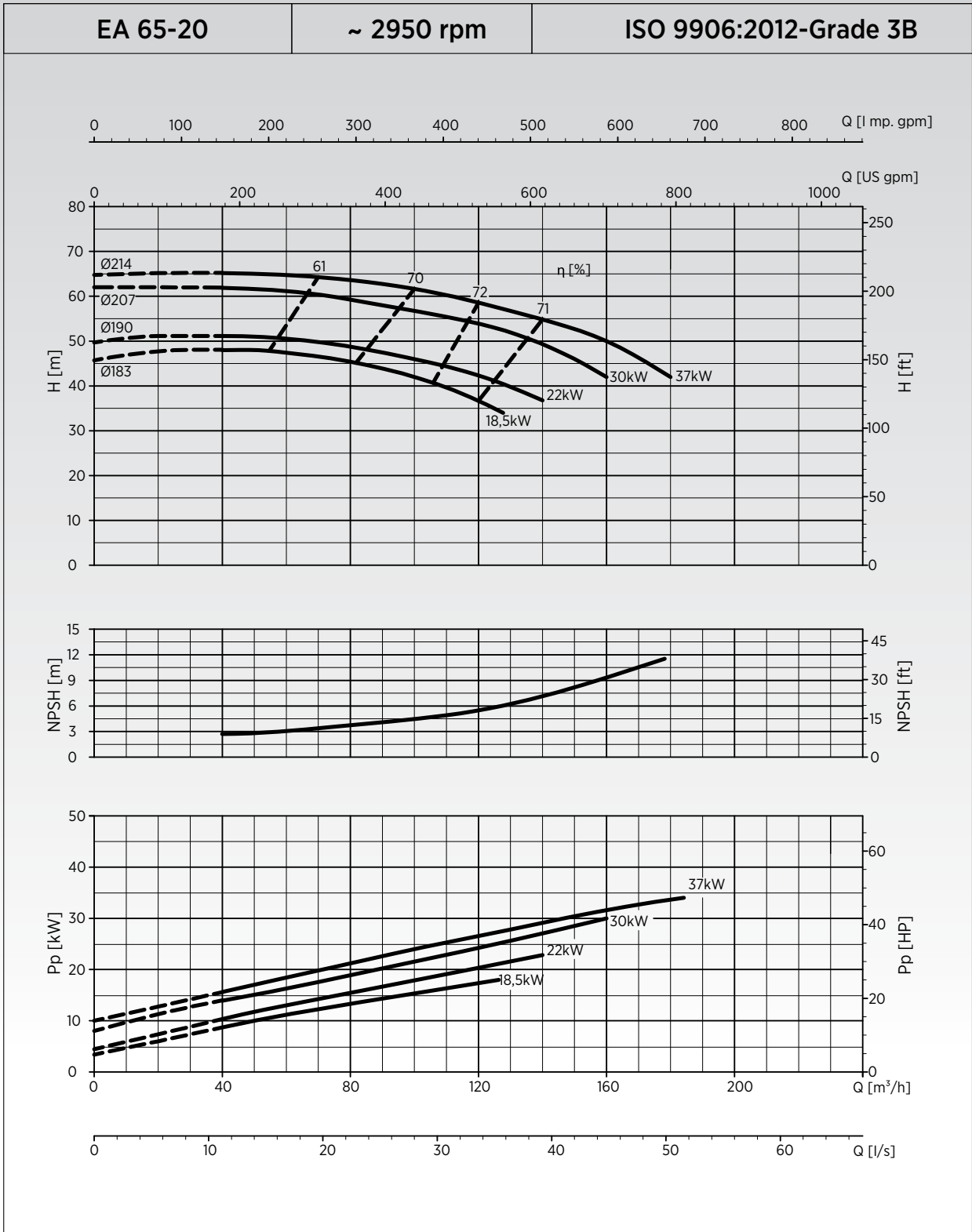
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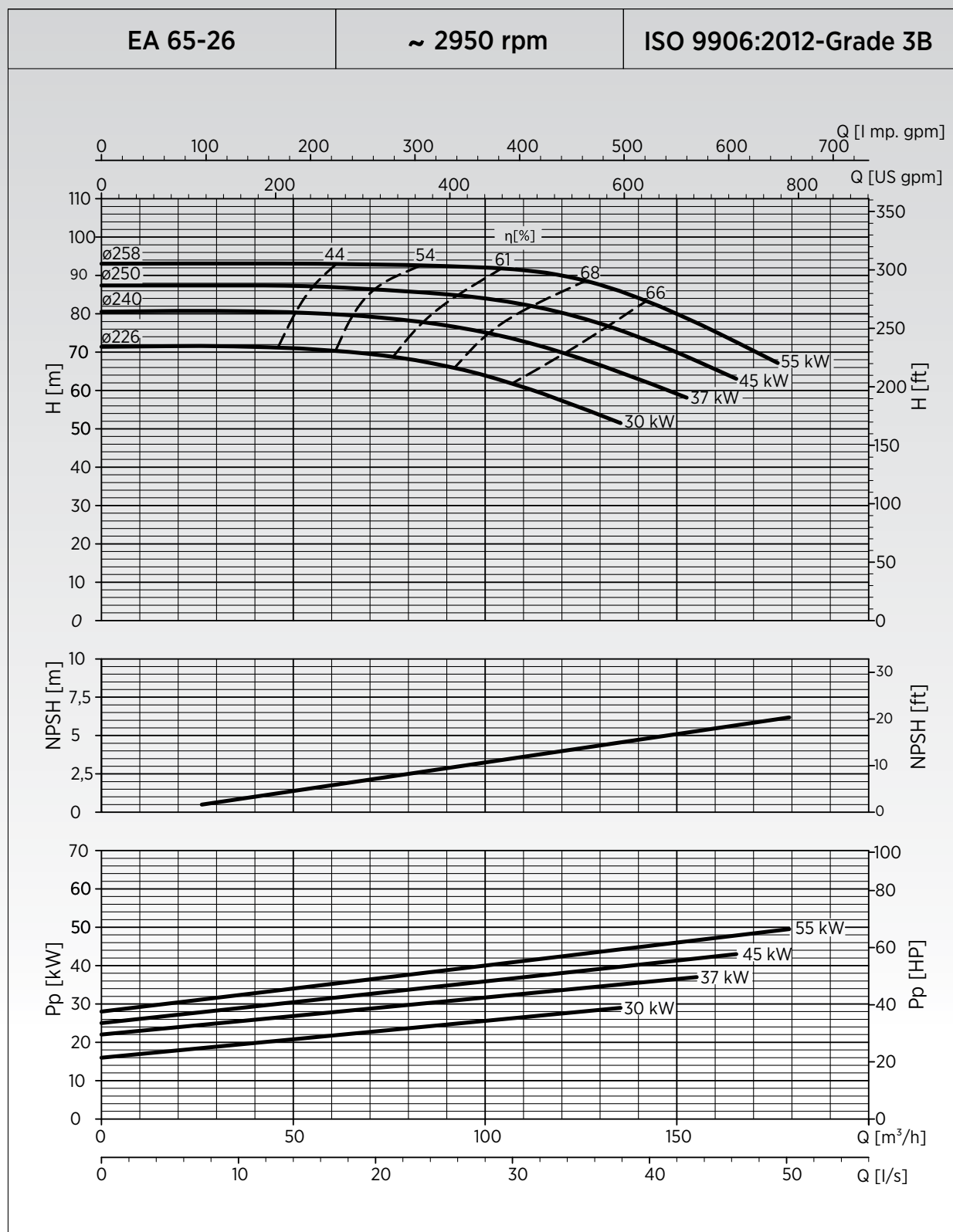
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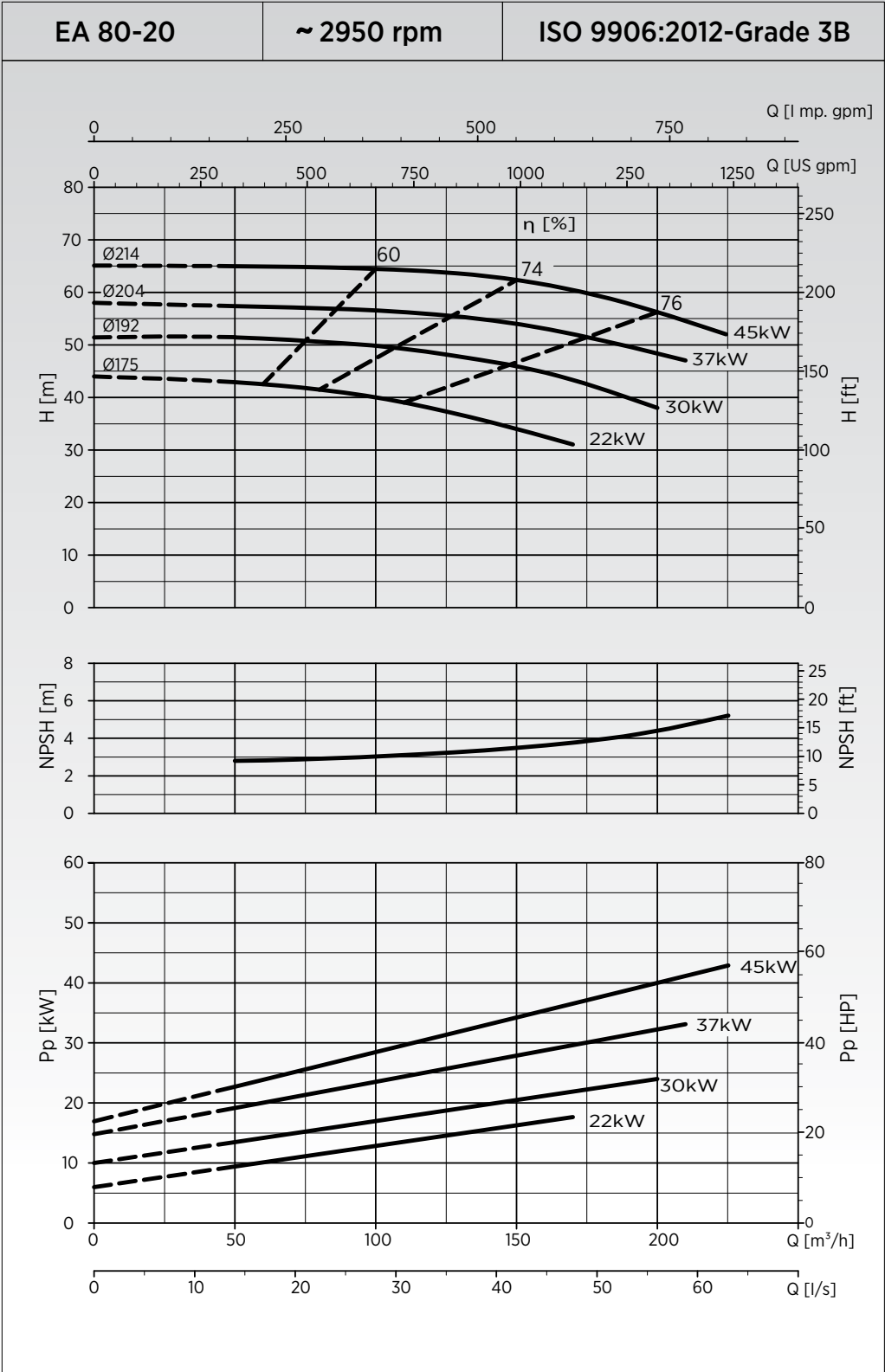
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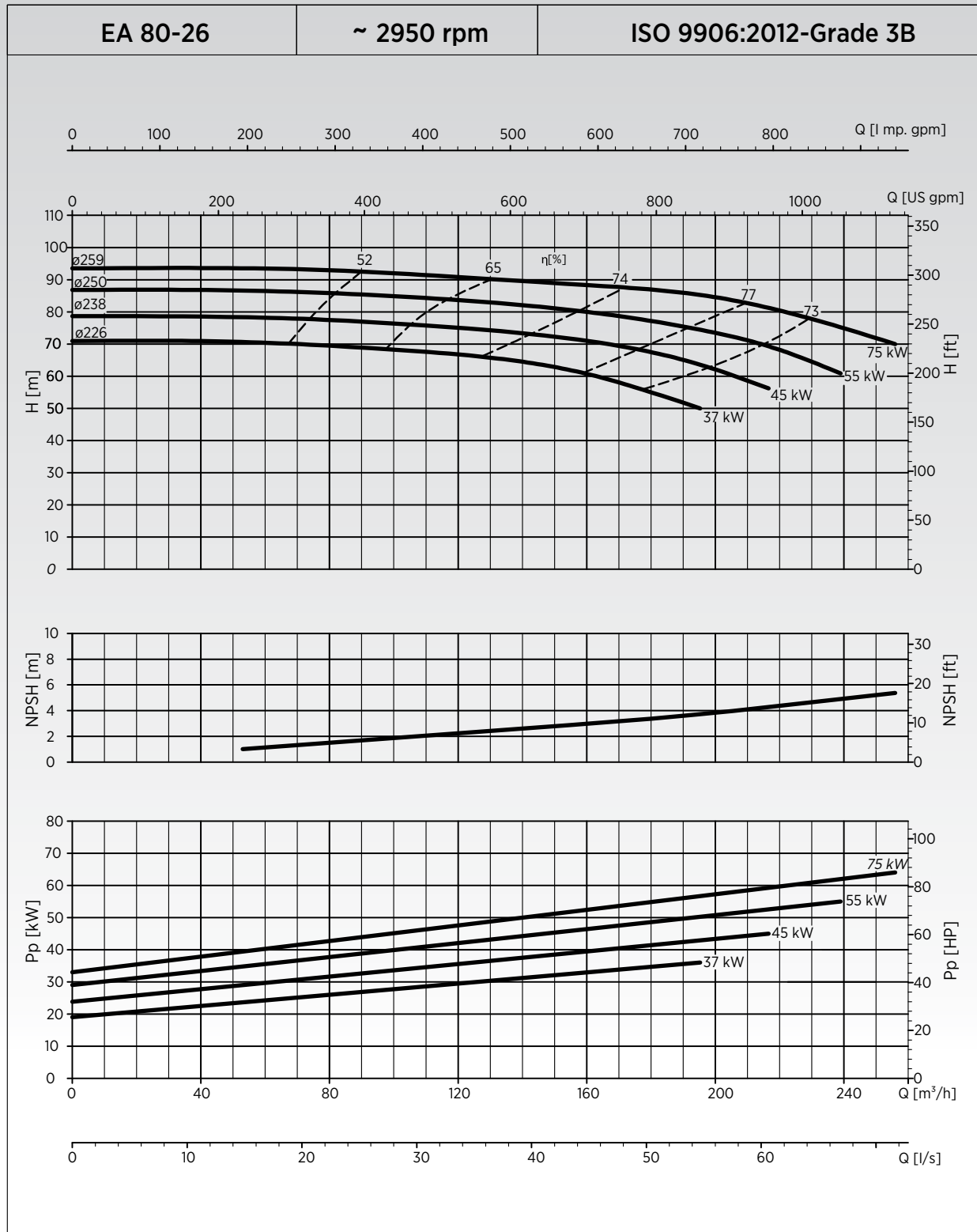
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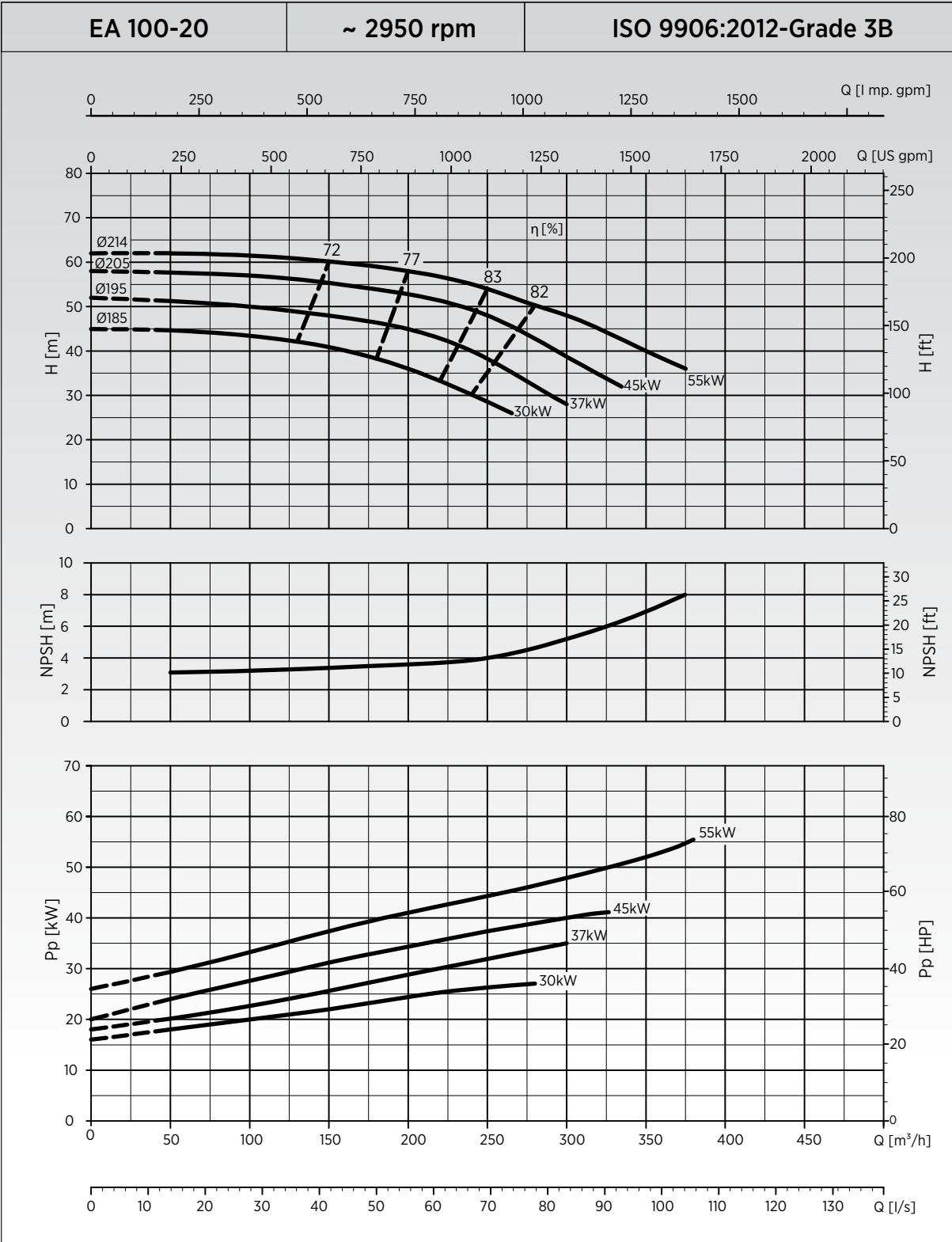
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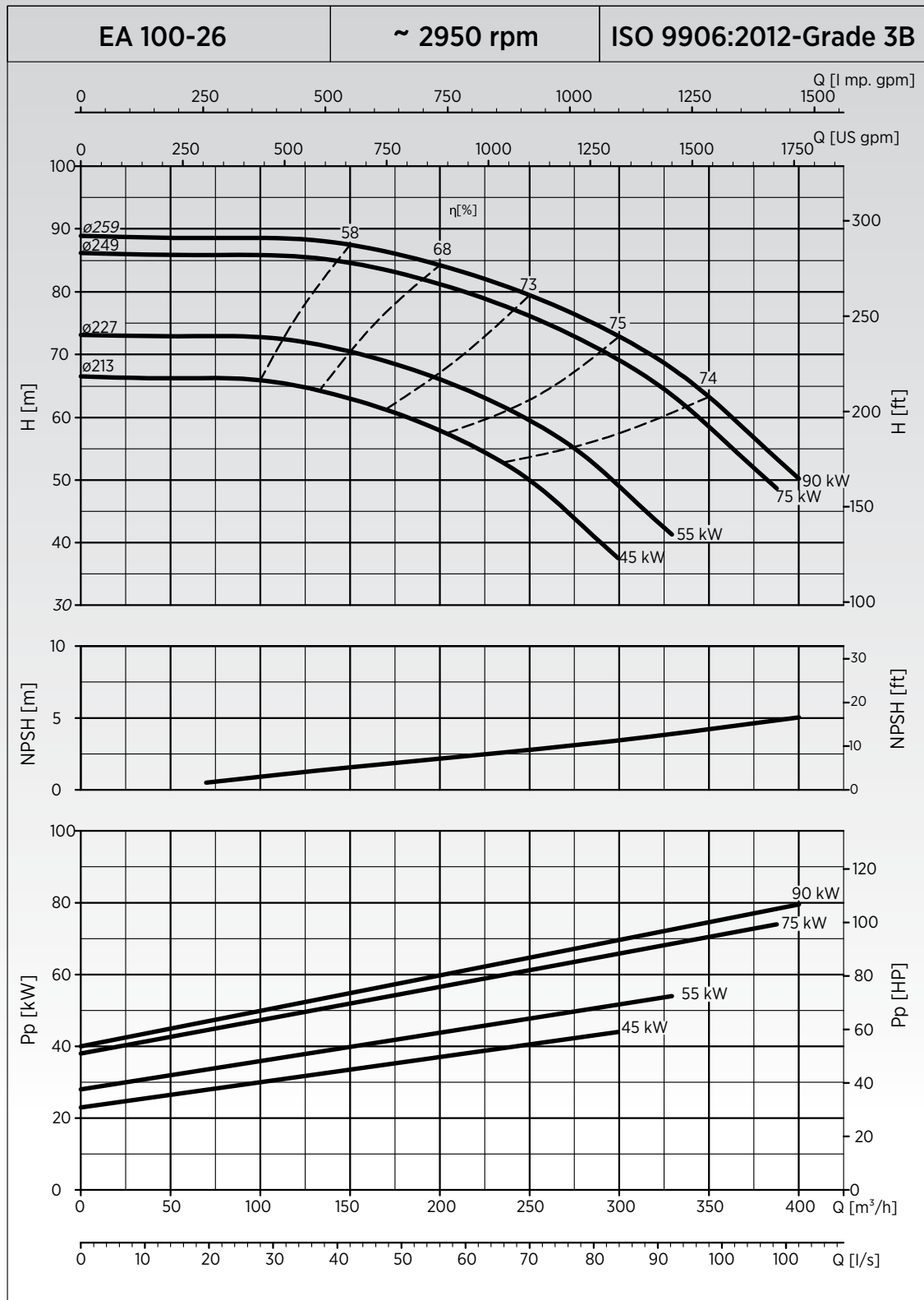
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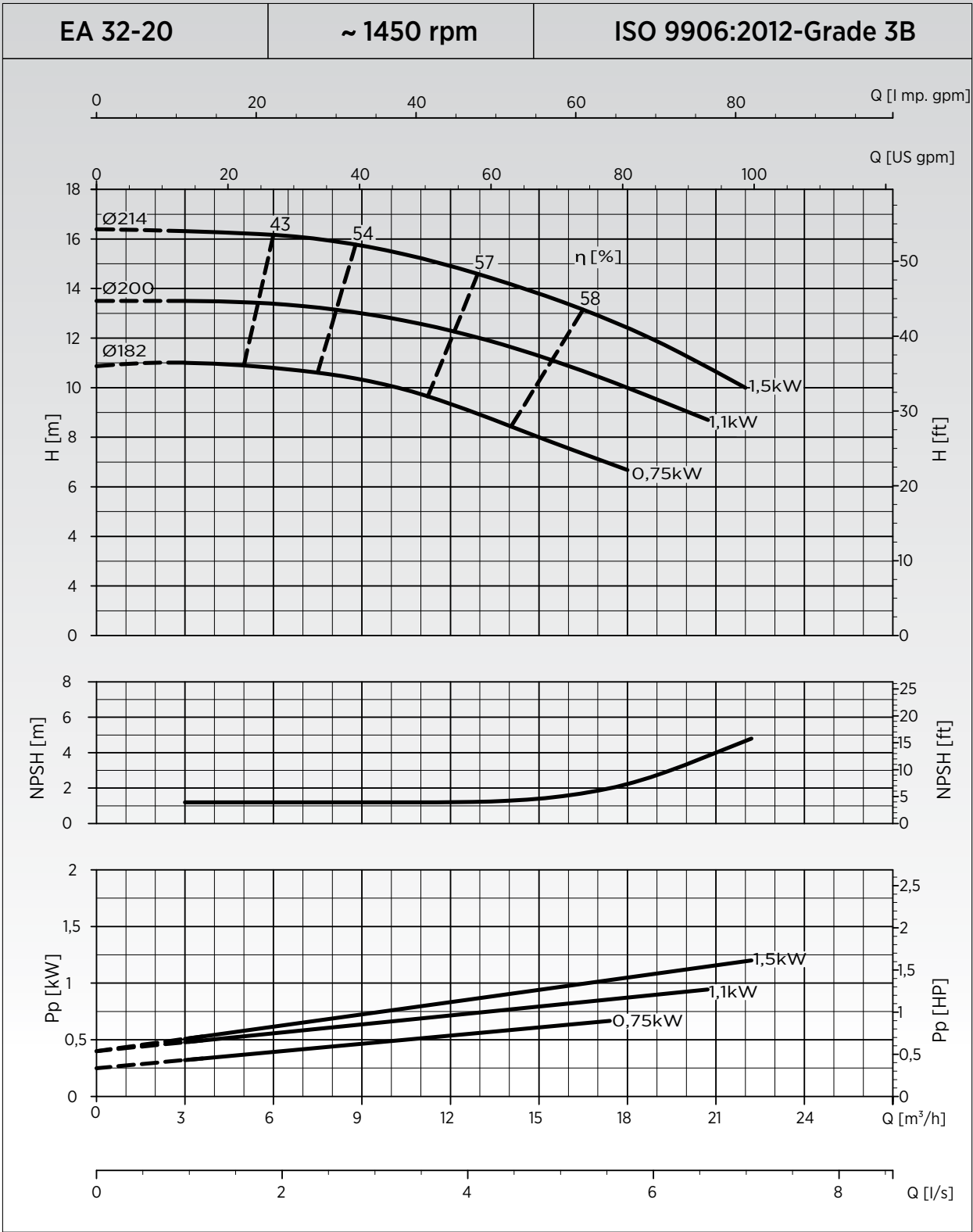
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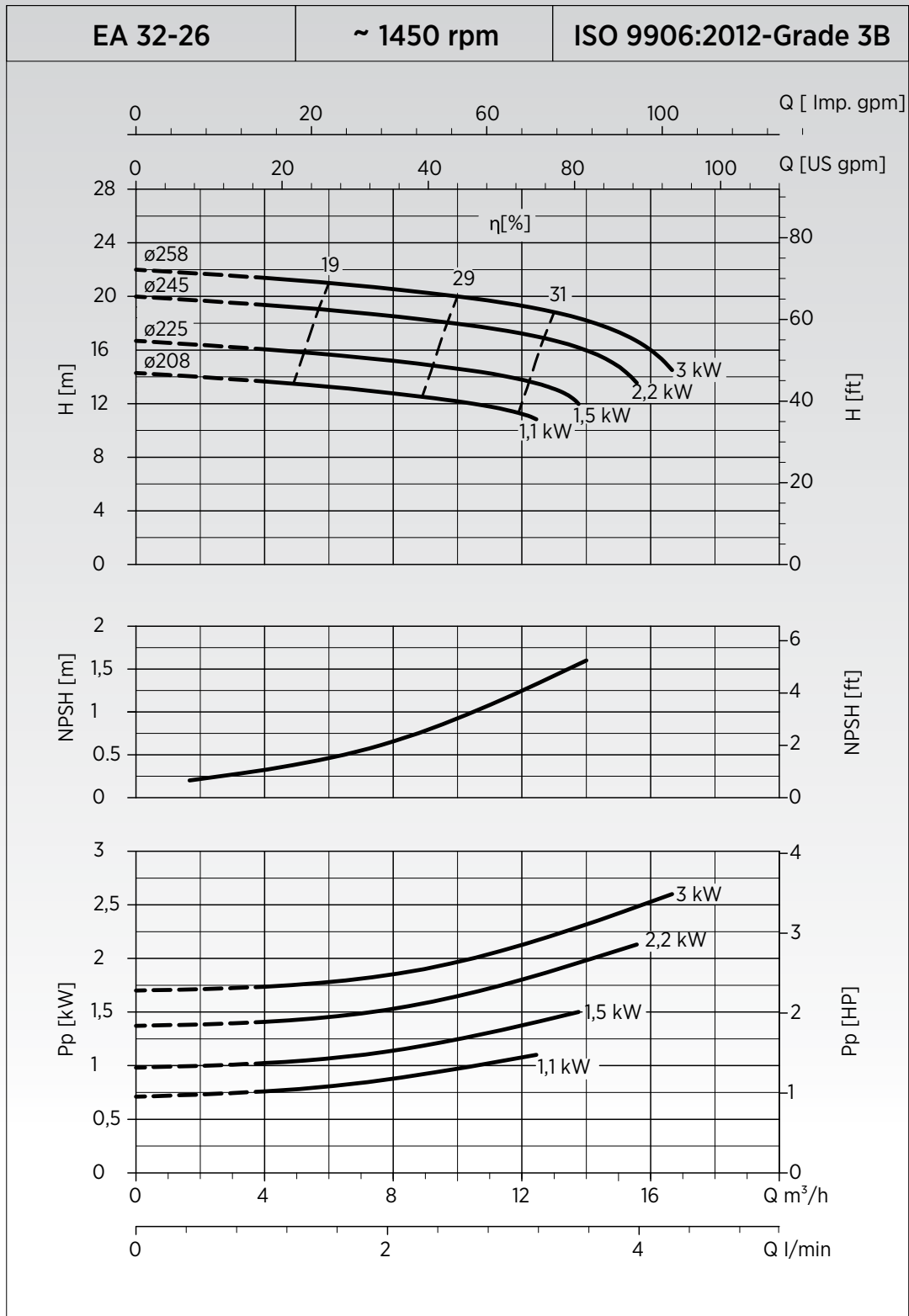
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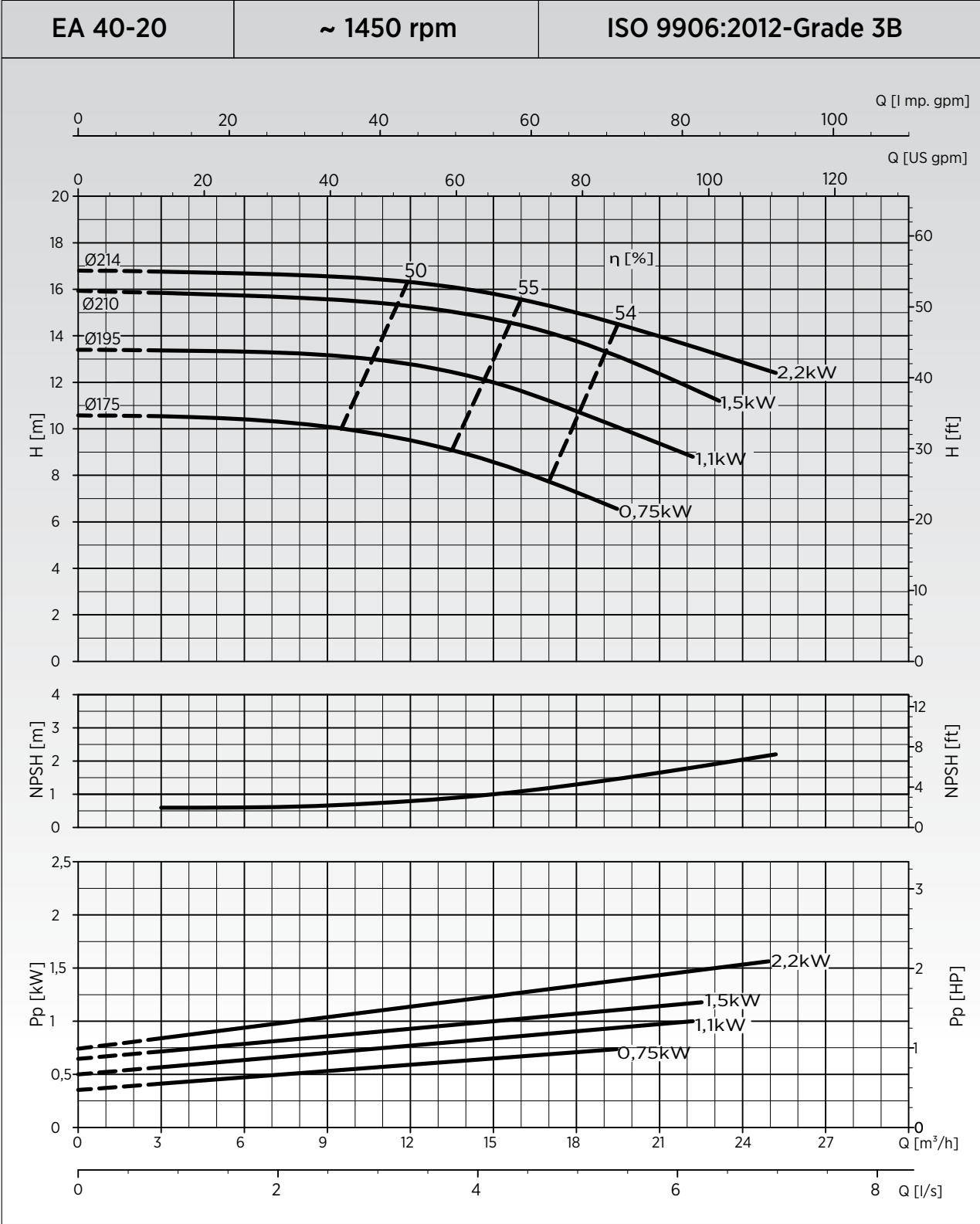
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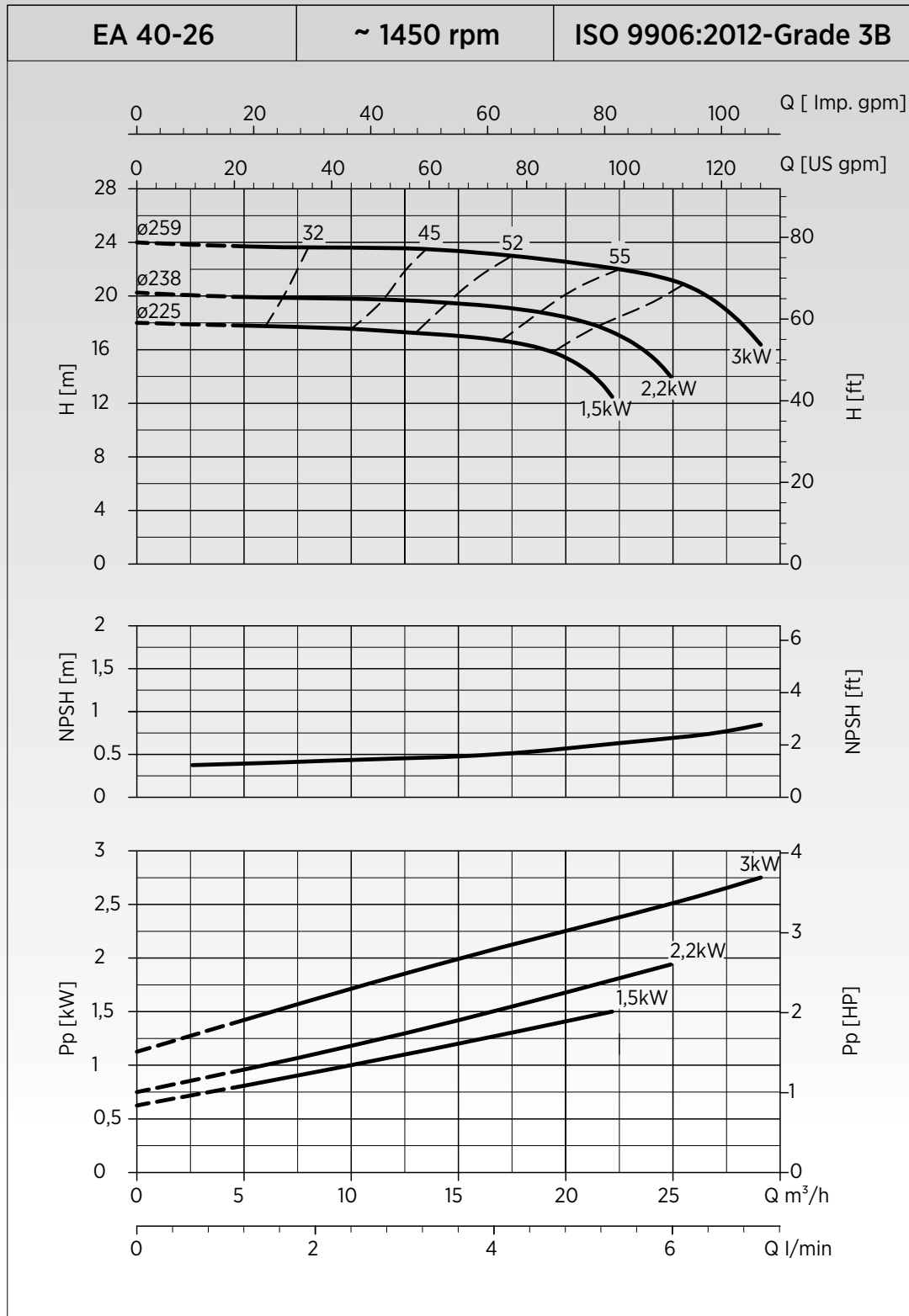
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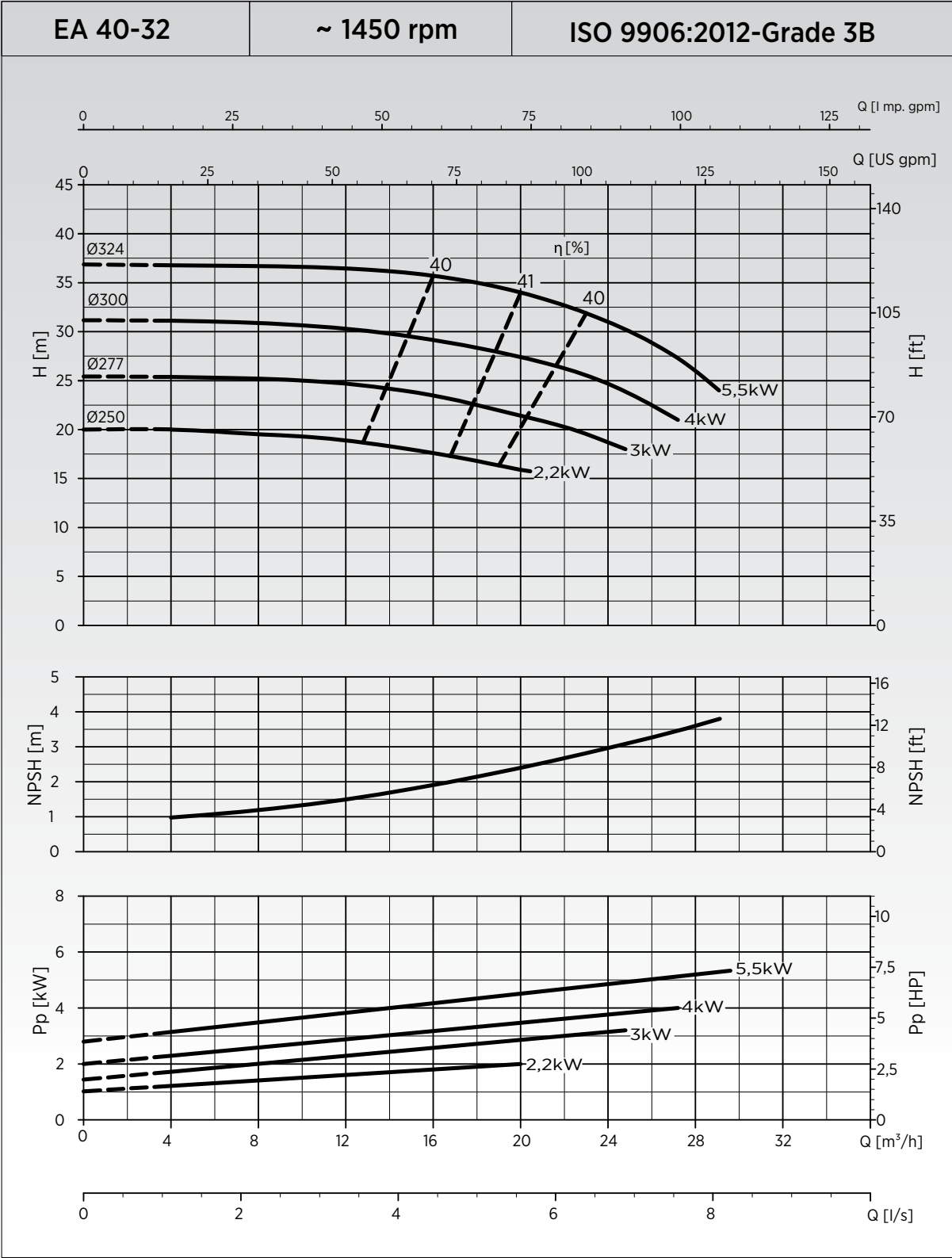
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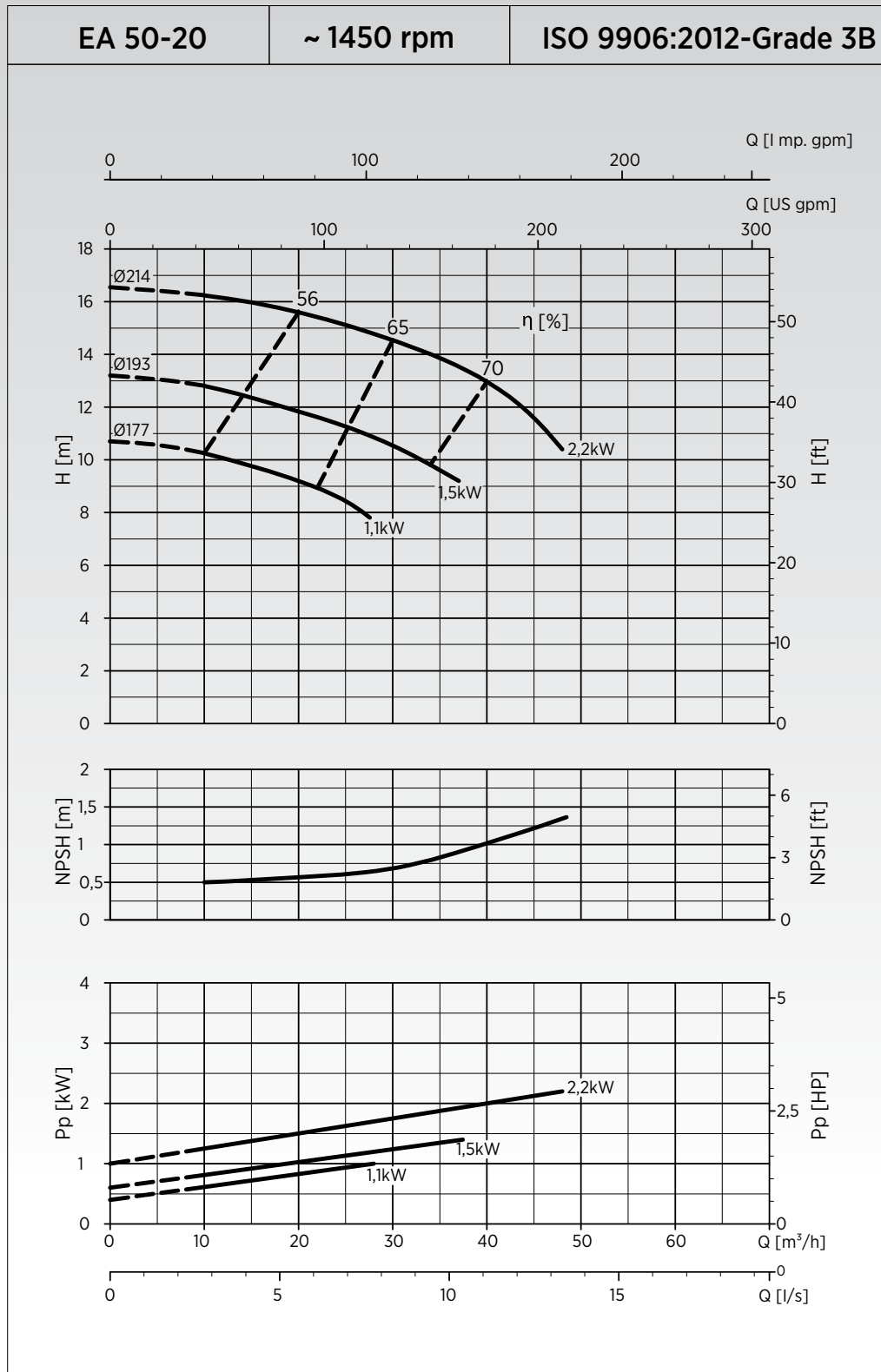
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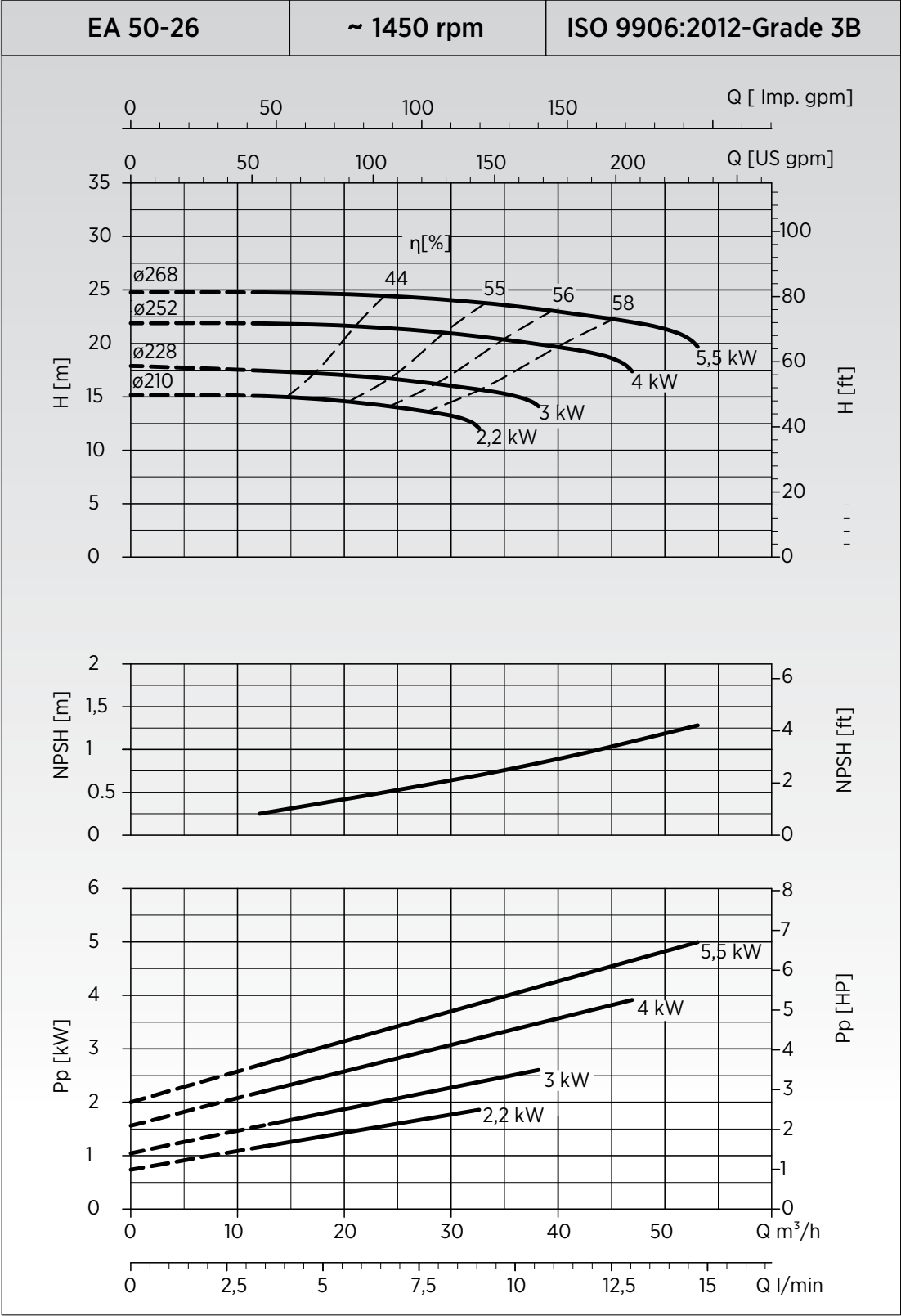
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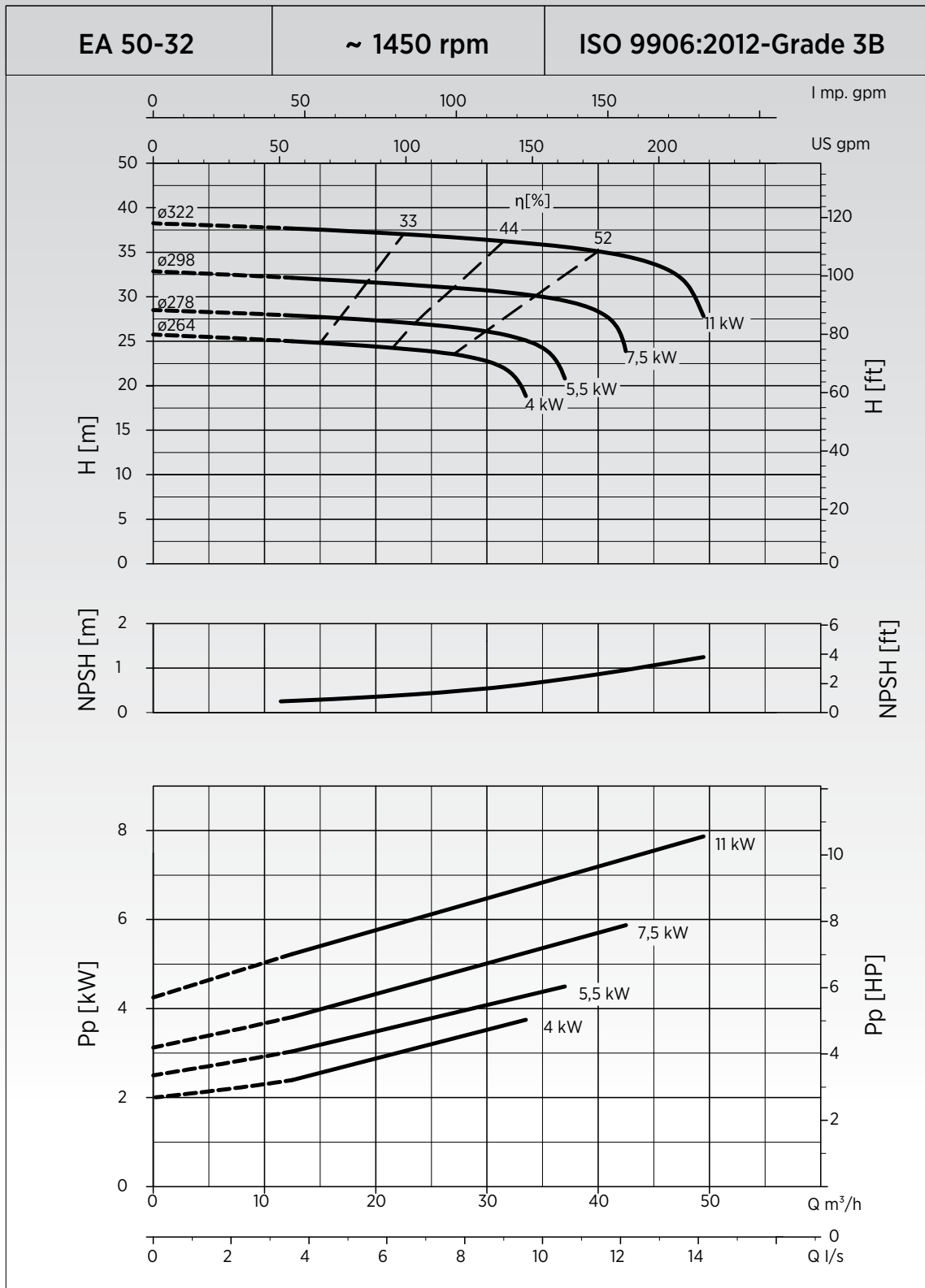
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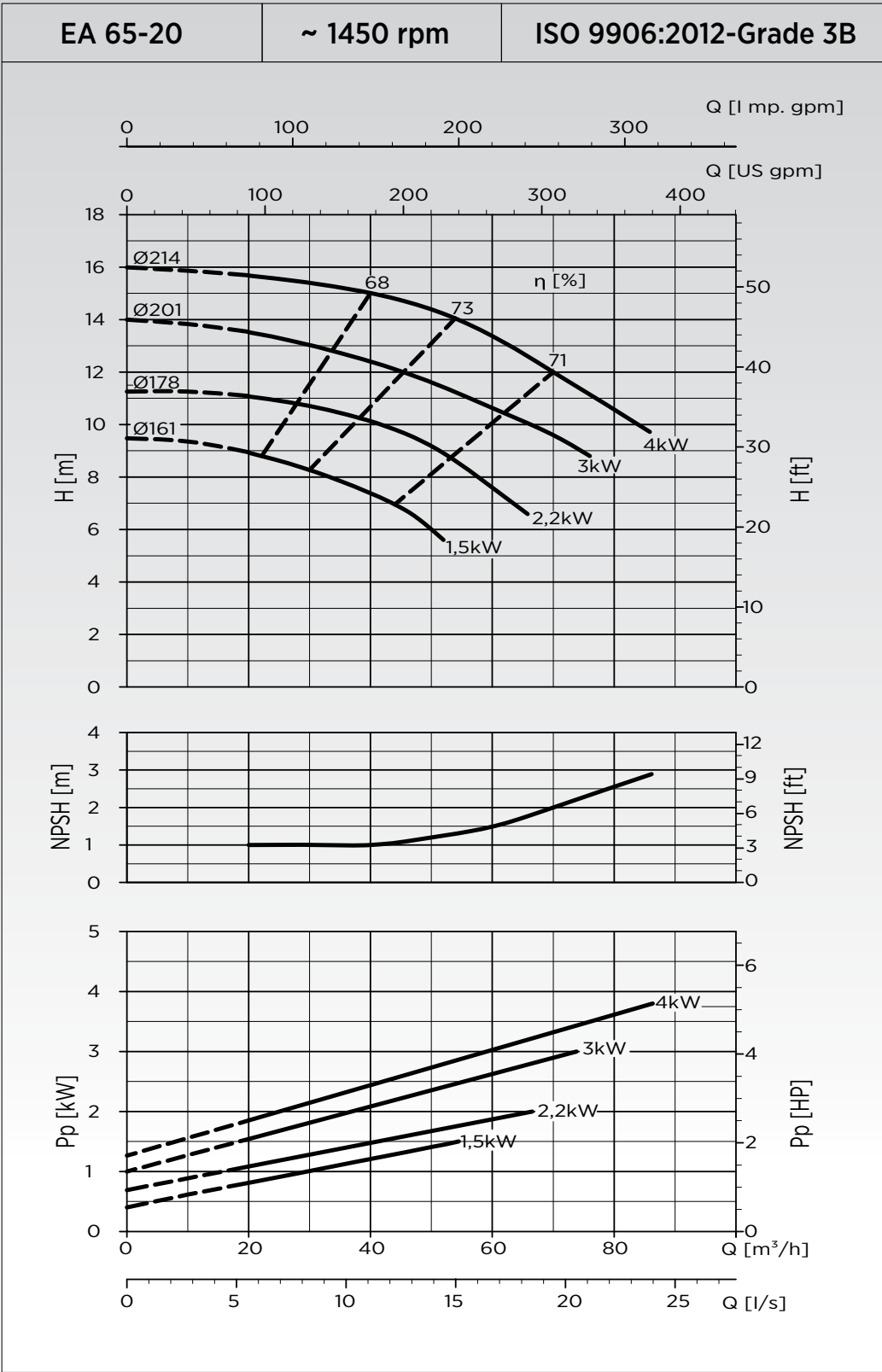
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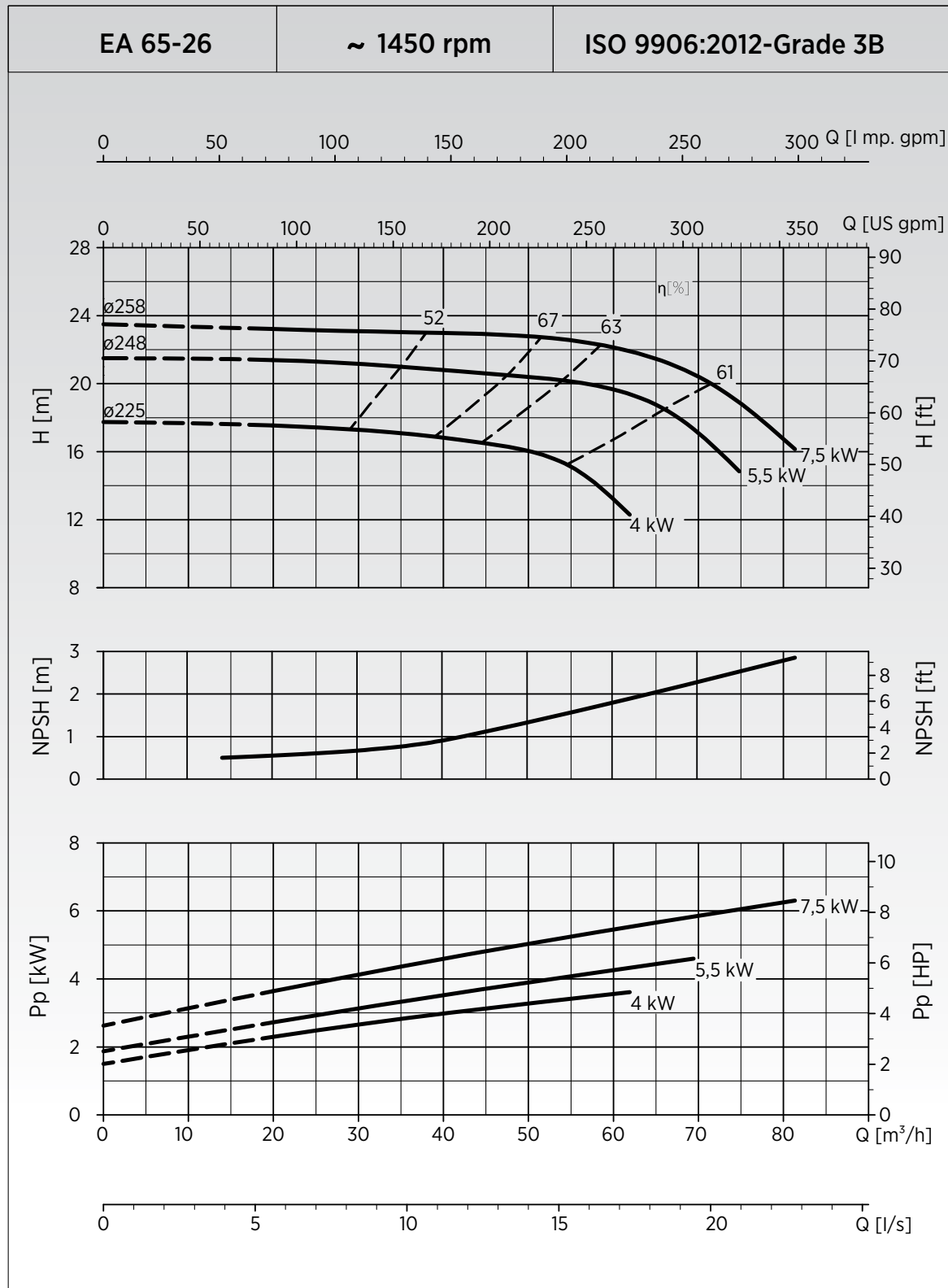
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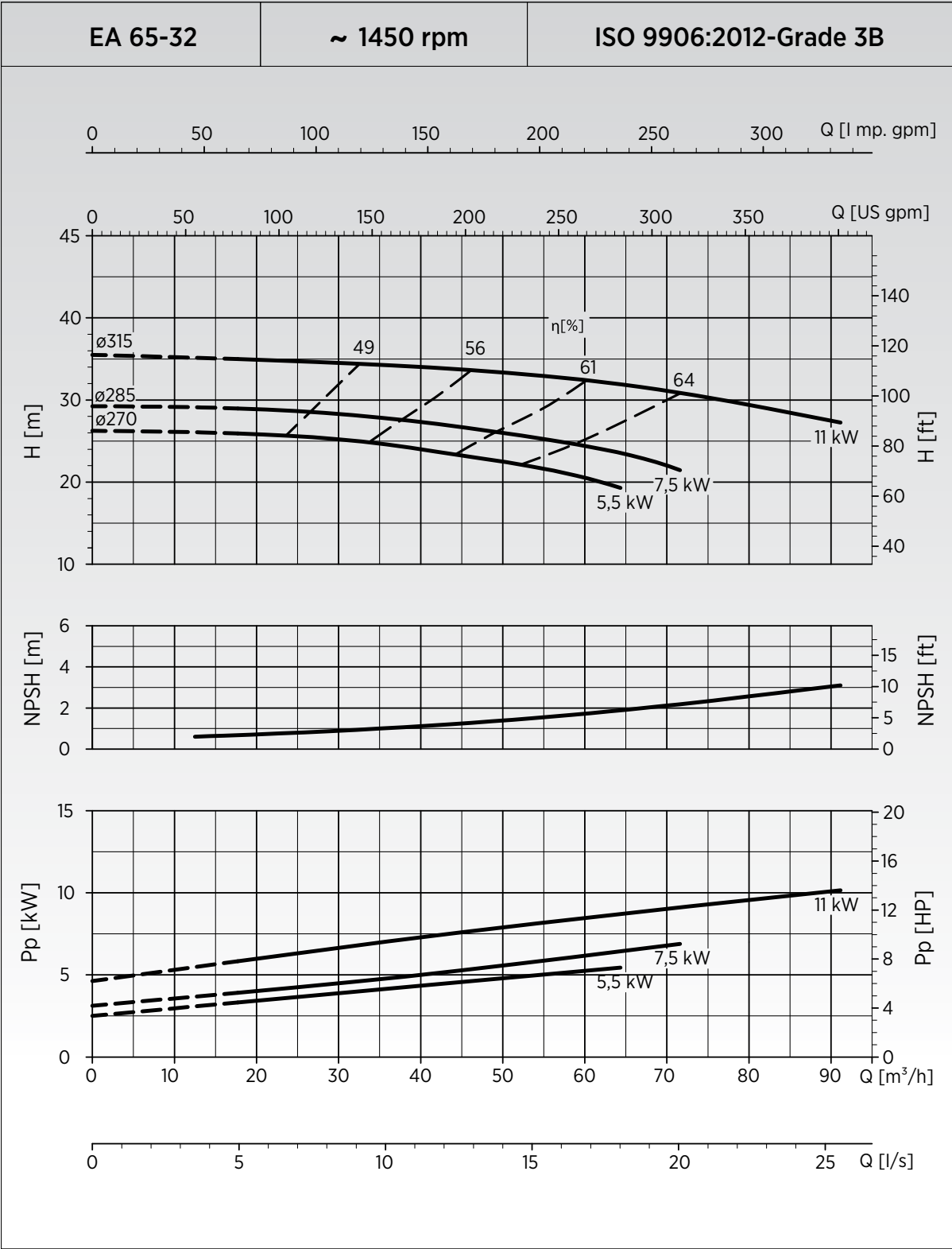
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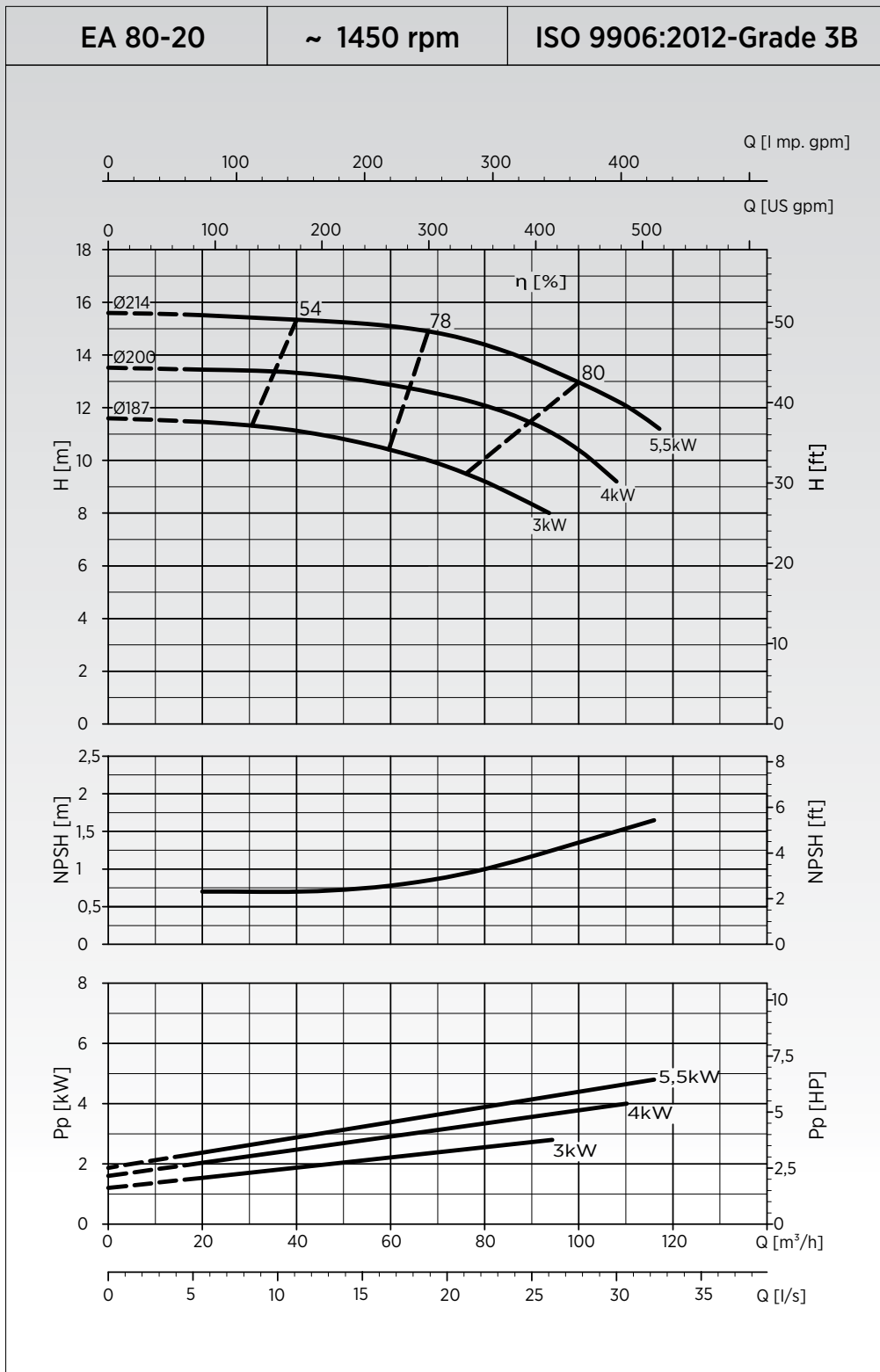
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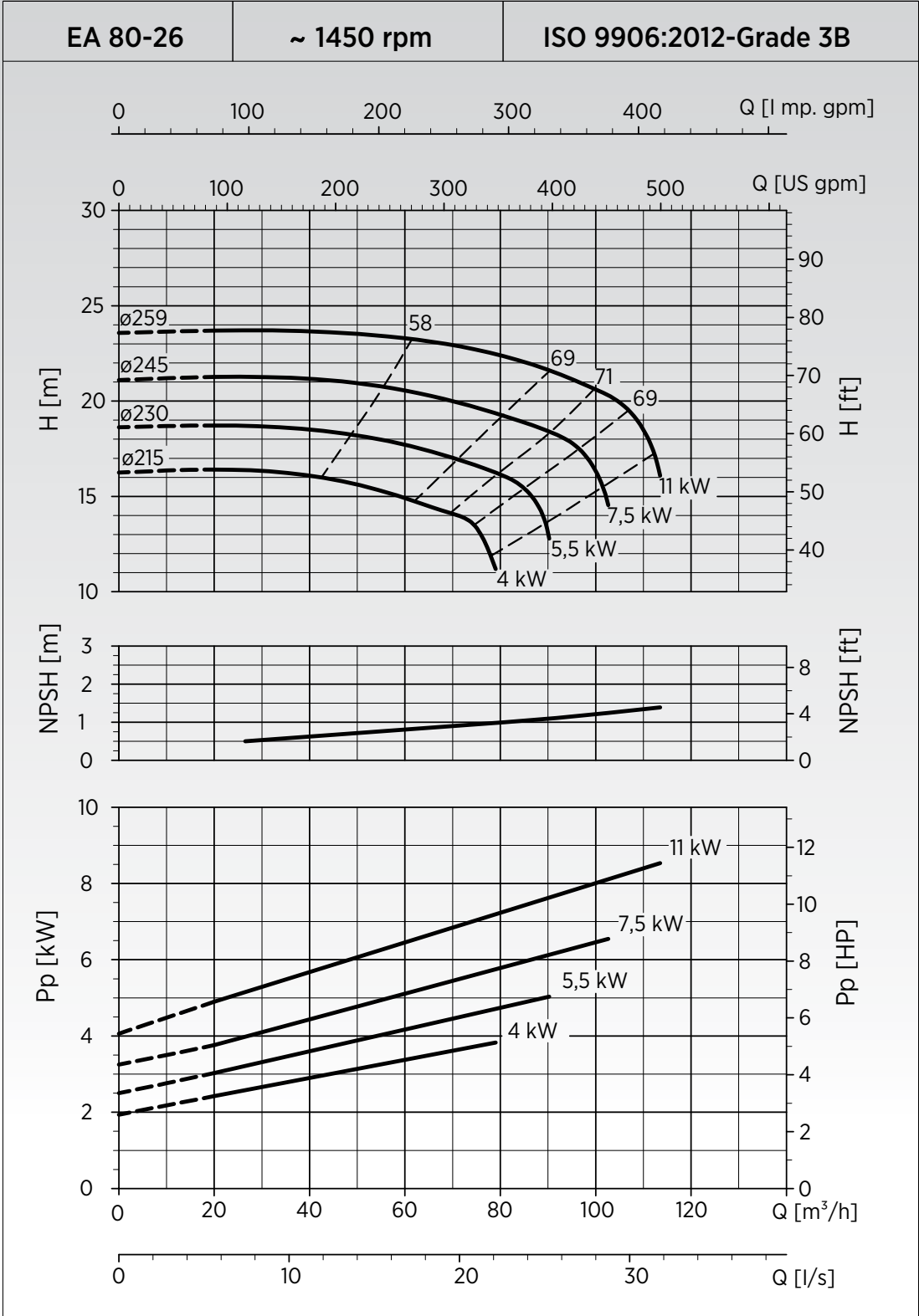
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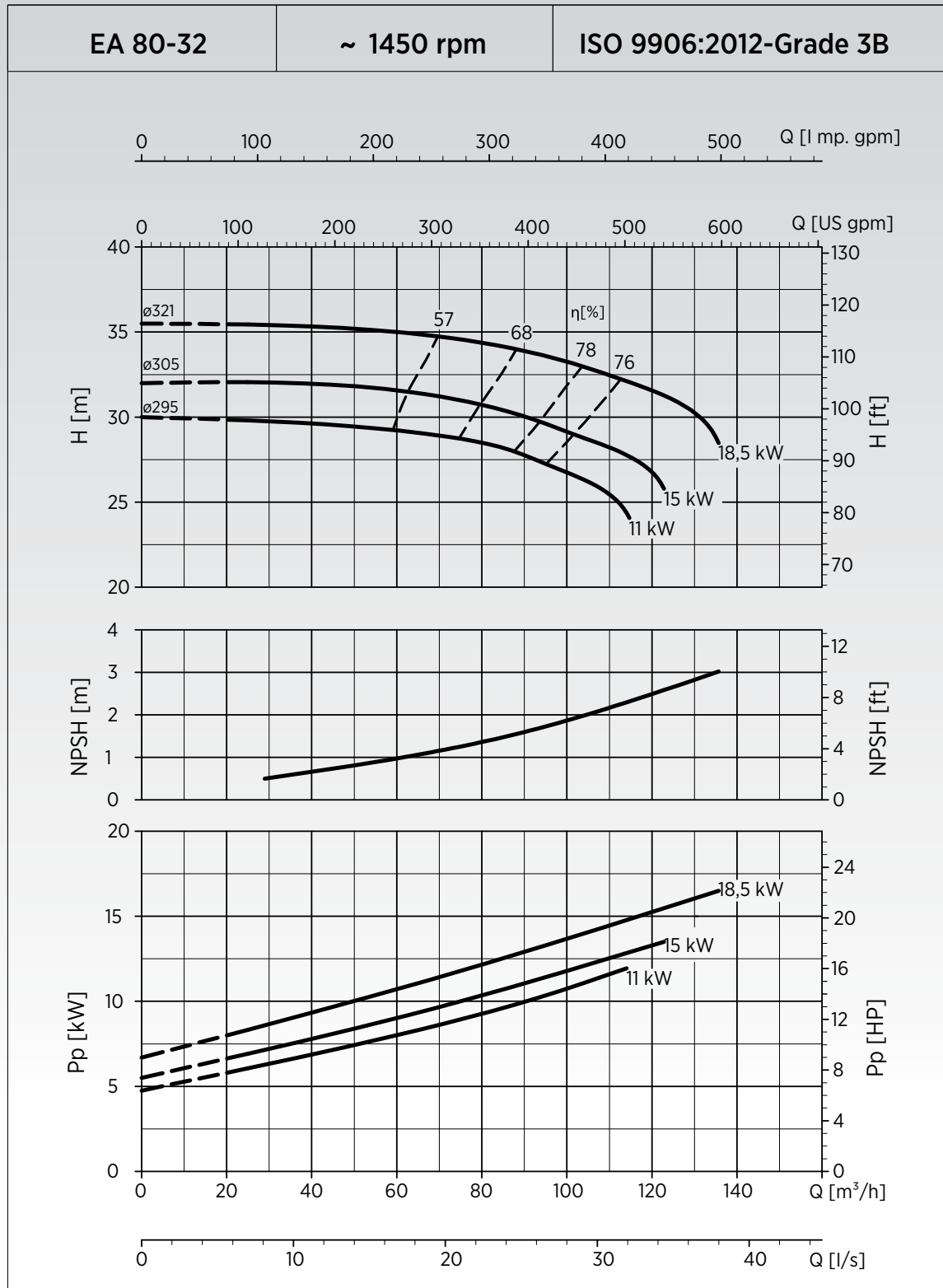
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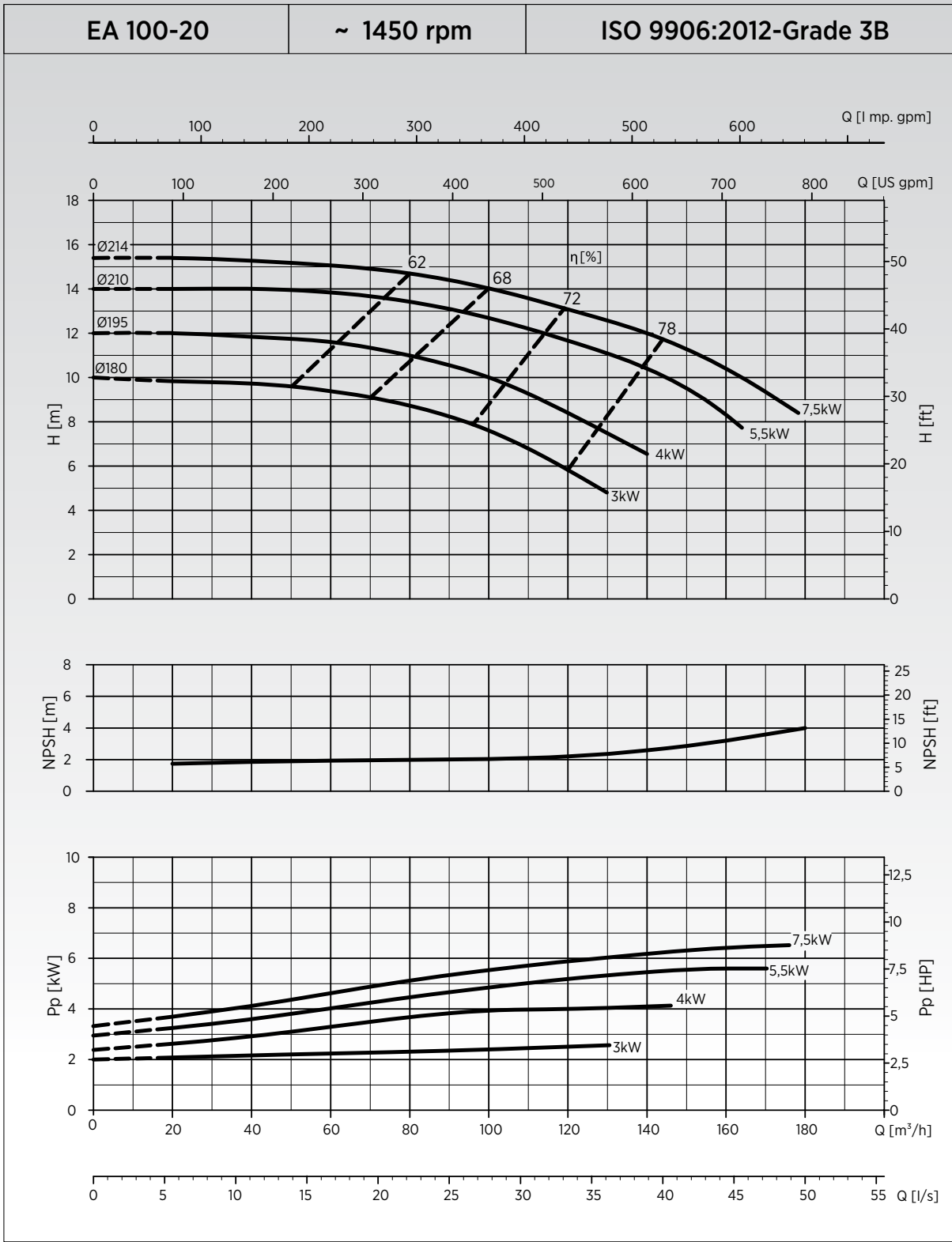
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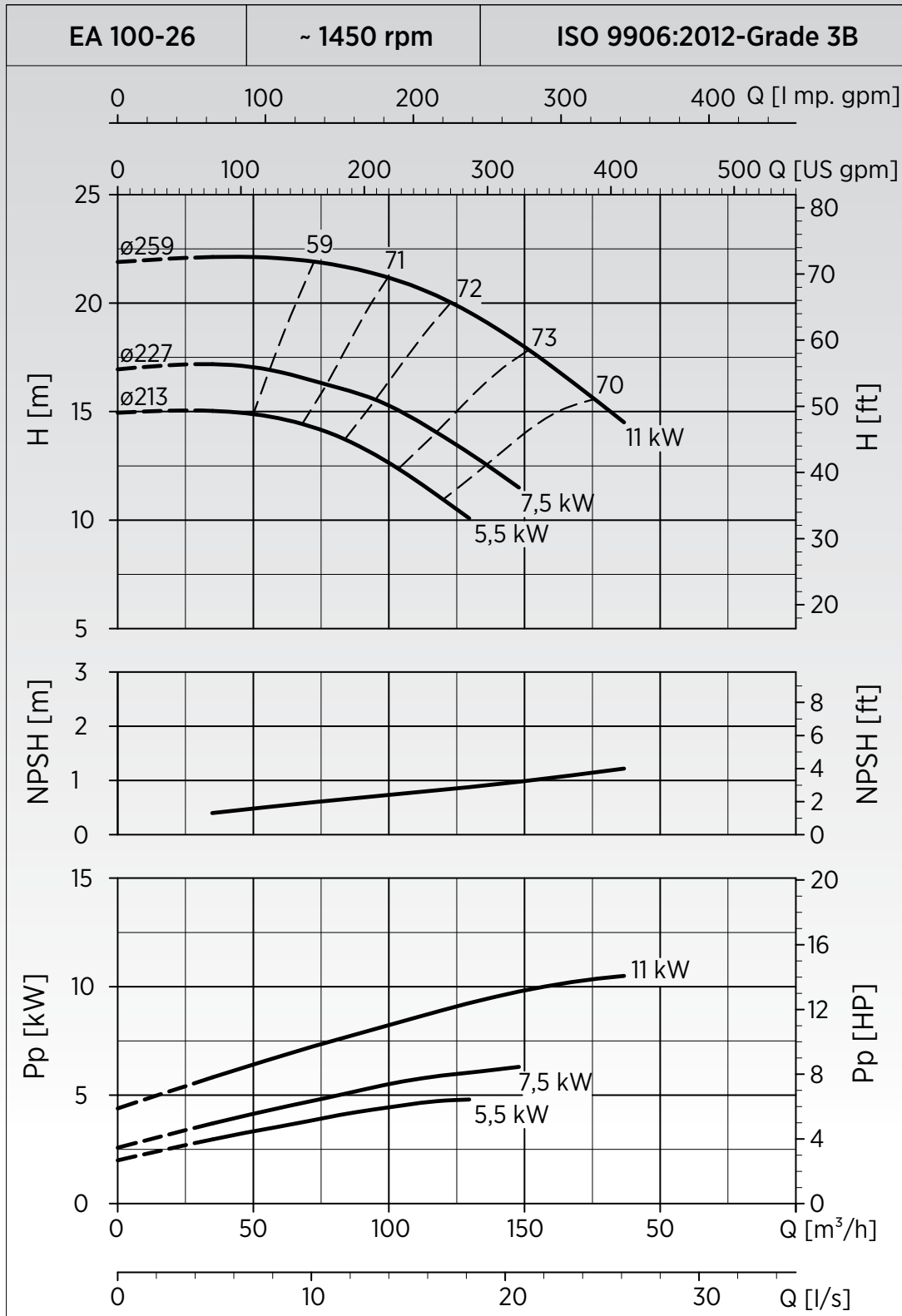
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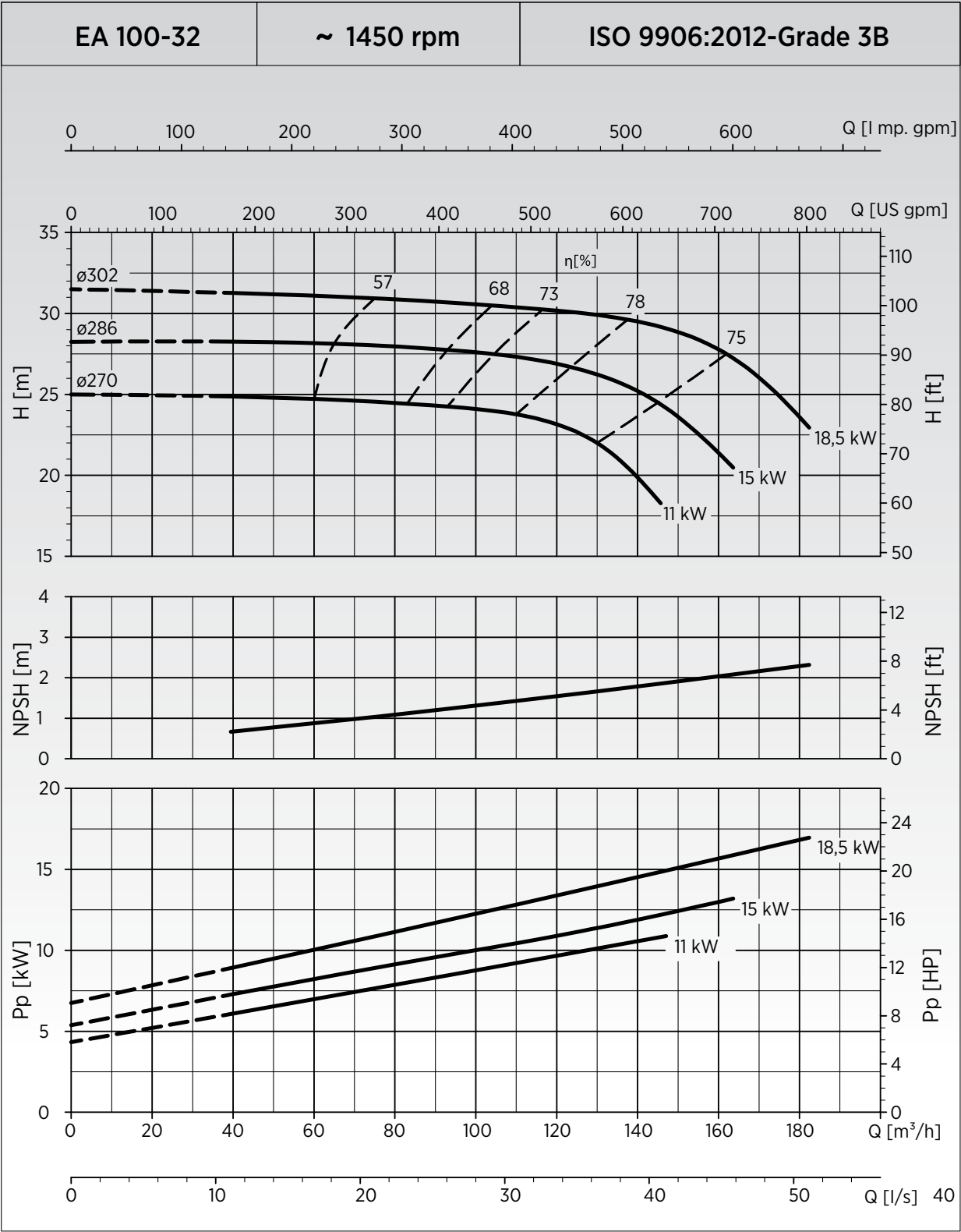
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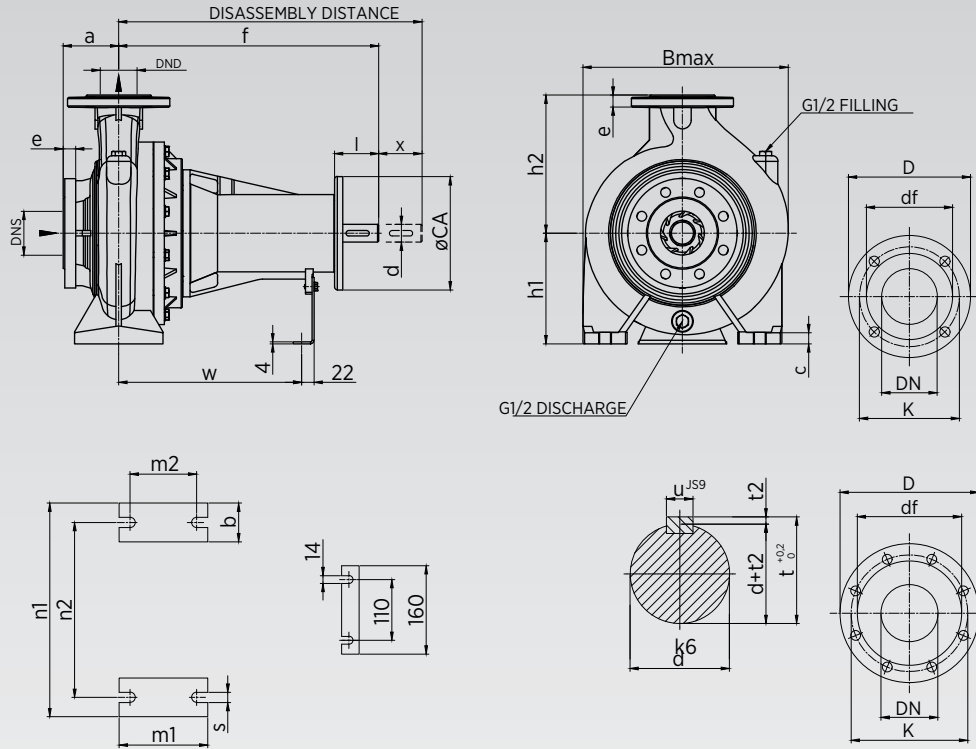
HYDRAULIC PERFORMANCE CURVES



HYDRAULIC PERFORMANCE CURVES



EA SERIES PUMP DIMENSIONS AND WEIGHTS

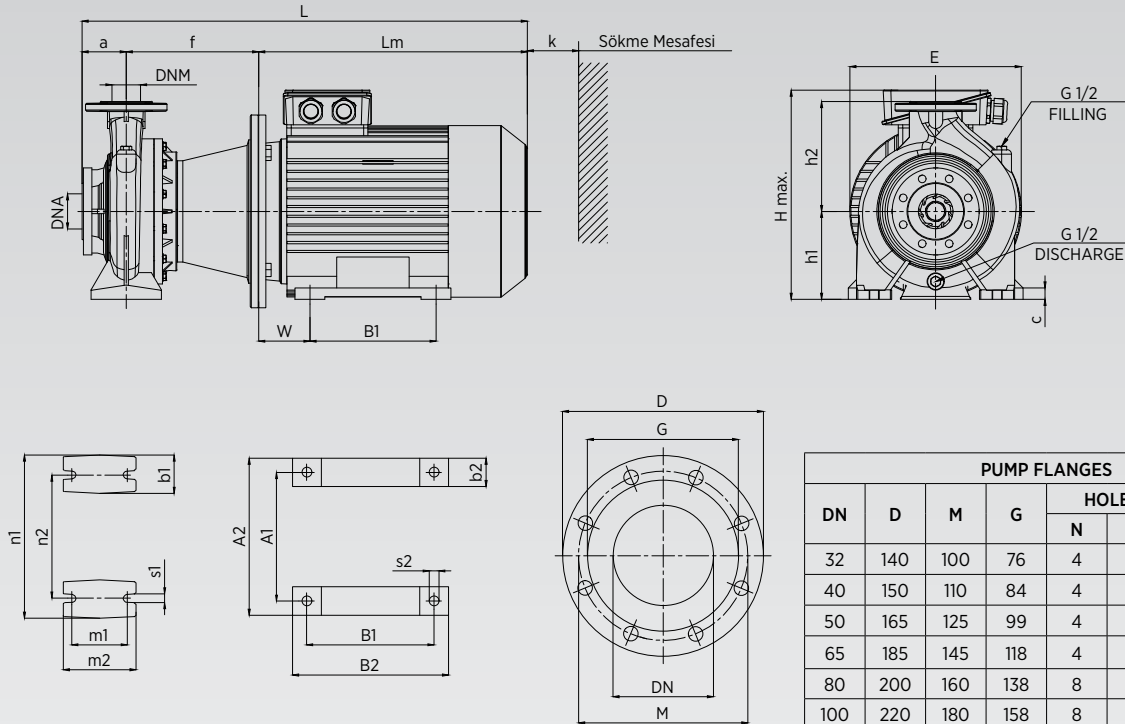


EN1092-2, PN 16 *						ASME B16.5 Class 150 RF *					
DN	D	K	e	df	L	DN	D	K	e	df	L
32	140	100	18	76	4x19	1 1/4	140	89	18	63,5	4x19
40	150	110	18	84	4x19	1 1/2	150	98,5	18	73	4x19
50	165	125	20	99	4x19	2	165	120,5	20	92	4x19
65	185	145	20	118	4x19	2 1/2	185	139,5	20	105	4x19
80	200	160	20	138	8x19	3	200	152,5	22	127	8x19
100	220	180	22	158	8x19	4	230	190,5	24	157	8x19
125	250	210	22	188	8x19	5	255	216	26	186	8x23
150	285	240	24	212	8x23	6	285	241,5	26	216	8x22

TOLERANCE TABLE		
DIAMETER	CODE	T. VALUES
ø24	k6	+0.015
		+0.002
ø32	k6	+0.018
		+0.002
ø42	k6	+0.018
		+0.002
8-10	JS9	+0.018
		-0.018
10-12	JS9	+0.0215
		-0.0215

PUMP MODEL	DIMENSIONS (mm)																					B	X	Weight (kg)													
	PUMP							FOOT							SHAFT																						
	DND	DNS	a	f	h1	h2	øCA	b	c	m1	m2	n1	n2	s	w	d	l	t	u																		
EA 32/20	32	50	80	360	160	180	205	50	14	100	70	240	190	14	260	24	50	27	8	250	100	41															
EA 32/26					180	225		65		125	90	320	255							330		53															
EA 40/20					160	180		50		100	70	265	215							280		45															
EA 40/26	40	65	100		180	225		65		125	95	320	255		340		58																				
EA 40/32					200	250		80		345	280	360	67																								
EA 50/20					160	200		50		100	70	265	215		280		48																				
EA 50/26	50	65	100	180	225	205	65	16	125	95	320	250	14	260	24	50	27	8	340	100	60																
EA 50/32				125	470						225	280							345		280	18	340	32	80	35	10	360	112	68							
EA 65/20				360	200						250	80							320		250	14	260	24	50	27	8	340	140	51							
EA 65/26	65	80	100	470	200	250	205	80	14	160	120	360	280	18	32	32	80	35	10	370	112	73,4															
EA 65/32					225	280						400	315							434		95															
EA 80/20					180	250						65	125							95		345	280	360	140	63											
EA 80/26	80	100	125		200	280		205	16	160	120	340	42	340						32	80	45,7	12	35	10	434	112	86									
EA 80/32					250	315																				400		315	370	112	111						
EA 100/20					200	280																				360		280	370	140	87						
EA 100/26	100	125	140	225	280	205	80	160	120	340	42	340	32		80	45	12	35	10							370	112	94									
EA 100/32				250	315																					400		315	370	140	117						
EA 125/20				125	150																					180		400	315	370	140	110					
EA 125/26	125	150	160	470	250	315	205	18	180	24	32			35						10	340	32	80	45	12	35	10	150									
EA 150/20																												280	375	100	200	150	500	400	24	540	160
EA 150/26																																					

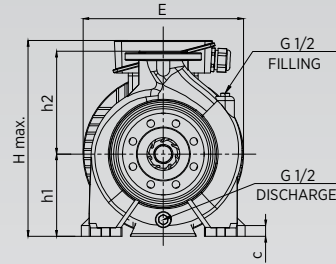
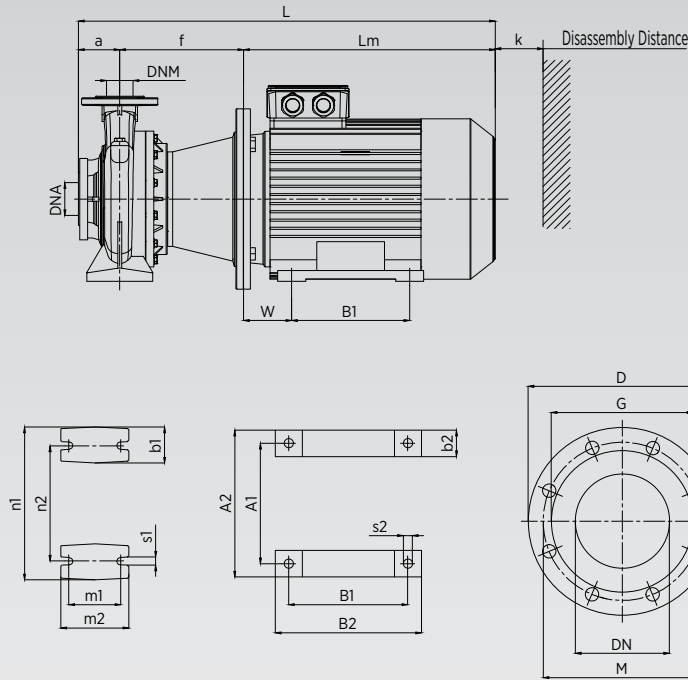
EAR SERIES PUMP DIMENSIONS AND WEIGHTS 50 Hz, 4 POLES (1450 rpm)



PUMP FLANGES						
DN	D	M	G	HOLE		MAX. Thickness
				N	ϕ	
32	140	100	76	4	18	18
40	150	110	84	4	18	18
50	165	125	99	4	18	20
65	185	145	118	4	18	20
80	200	160	138	8	18	22
100	220	180	158	8	18	22
125	250	210	188	8	18	22

PUMP TYPE	MOTOR		DIMENSIONS																										Weight (kg)								
	kW	DNM	DNA	a	f	w	h1	h2	b1	b2	c	m1	m2	n1	n2	s1	s2	A1	A2	B1	B2	Lm	E	H1 Max	H2 Max	L	k										
EAR 32/20	0.55	80M	50	32	80	165	50	160	180	50	15	70	100	240	190	14	15	125	160	100	125	38	244	250	340	489	150	53									
EAR 32/20	0.75						55	180	225	65	20	95	125	320	260			140	180		140	43	267			532											
EAR 32/20	1.1						55											413	56																		
EAR 32/26	1.1	5					490											330	405		758																
EAR 32/26	1.5	90L					65	50	100	195	160	200	65	20	70			100	265		212	18	160	200	140	175		47	490	330	405	758	87				
EAR 32/26	2.2	50																																509			
EAR 32/26	3	55	532																																		
EAR 40/20	0.75	80M	65	15	60	100										265	212			125							160							100	43	292	557
EAR 40/20	1.1	90S	55	160	180	140										180	100			43							267							280	340	532	
EAR 40/20	1.5	90L	65	160	200	140										180	100			43							292							330	405	758	
EAR 40/20	2.2	100L	80	40	100	195	160	200	65	20	70	100	265	212	18	160	200	140	175	47	550	330	405	758	88												
EAR 40/26	1.5	90L																								55	160	180	140	180	100	43	267	280	340	532	
EAR 40/26	2.2	100L																								65	160	200	140	180	100	43	292	330	405	758	
EAR 40/26	3	100L																								70	160	200	140	180	100	43	292	330	405	758	
EAR 50/20	1.1	90S																								55	160	200	140	180	100	43	267	280	340	532	
EAR 50/20	1.5	90L																								65	160	200	140	180	100	43	292	330	405	758	
EAR 50/20	2.2	100L	100	80	125	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	89											
EAR 50/20	3																										55	160	180	140	180	100	43	267	280	340	532
EAR 50/20	2.2																										65	160	200	140	180	100	43	292	330	405	758
EAR 50/26	2.2	70																									160	200	140	180	100	43	292	330	405	758	
EAR 50/26	3	70																									160	200	140	180	100	43	292	330	405	758	
EAR 50/26	4	112M																									65	160	200	140	180	100	43	292	330	405	758
EAR 50/26	5.5	132S	125	100	150	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	90											
EAR 50/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 65/20	1.5	90L																									55	160	200	140	180	100	43	267	280	340	532
EAR 65/20	2.2	100L																									65	160	200	140	180	100	43	292	330	405	758
EAR 65/20	3	100L																									70	160	200	140	180	100	43	292	330	405	758
EAR 65/20	4	112M																									65	160	200	140	180	100	43	292	330	405	758
EAR 65/26	4	112M	150	125	175	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	91											
EAR 65/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 65/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 65/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 65/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 65/26	5.5	65																									160	180	140	180	100	43	267	280	340	532	
EAR 80/20	3	100L	125	100	150	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	92											
EAR 80/20	4	112M																									65	160	180	140	180	100	43	267	280	340	532
EAR 80/20	5.5	132S																									70	160	200	140	180	100	43	292	330	405	758
EAR 80-26	4	112M																									65	160	180	140	180	100	43	267	280	340	532
EAR 80-26	5.5	132S																									70	160	200	140	180	100	43	292	330	405	758
EAR 80-26	5.5	132M																									65	160	180	140	180	100	43	267	280	340	532
EAR 80-26	7.5	132M	150	125	175	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	93											
EAR 100-20	3	100L																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-20	4	112M																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-20	5.5	132S																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-20	5.5	132S																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-20	7.5	132M																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-20	7.5	132M	125	100	150	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	94											
EAR 100-20	5.5	132S																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-20	5.5	132S																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-20	7.5	132M																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-26	5.5	132S																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-26	7.5	132M																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-26	7.5	132M	150	125	175	203	188	90	200	80	120	160	360	280	19	18	160	200	140	175	47	550	330	405	758	95											
EAR 100-26	11	160M																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-26	11	160M																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-26	11	160M																									65	160	180	140	180	100	43	267	280	340	532
EAR 100-26	11	160M																									70	160	200	140	180	100	43	292	330	405	758
EAR 100-26	11	160M																									65	160	180	140	180	100	43	267	280	340	532

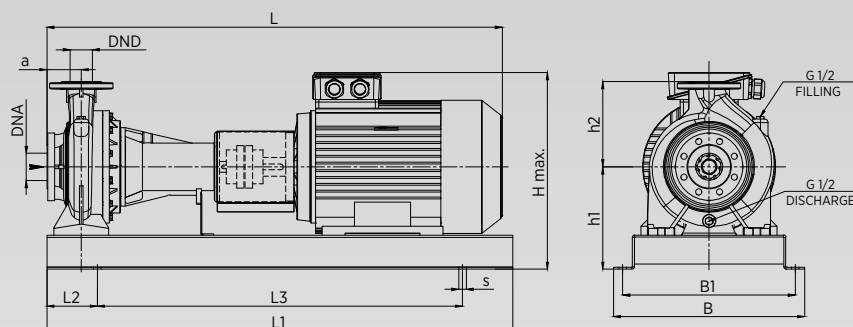
EAR SERIES PUMP DIMENSIONS AND WEIGHTS 50 Hz, 2 POLES (2950 rpm)



PUMP FLANGES						
DN	D	M	G	HOLE		MAX. Thickness
				N	ø	
32	140	100	76	4	18	18
40	150	110	84	4	18	18
50	165	125	99	4	18	20
65	185	145	118	4	18	20
80	200	160	138	8	18	22
100	220	180	158	8	18	22
125	250	210	188	8	18	22

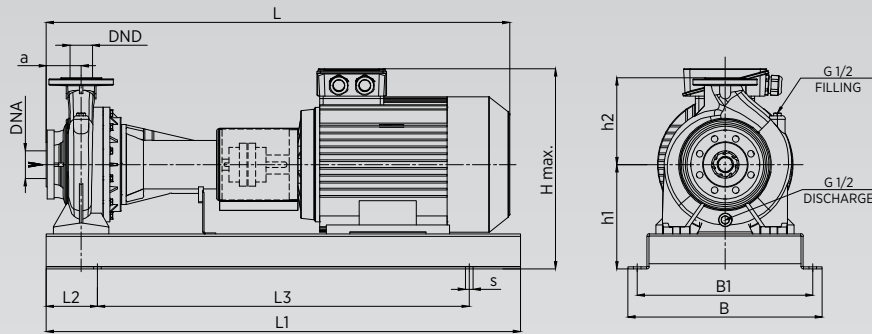
PUMP TYPE	MOTOR		DIMENSIONS																										Weight (kg)							
	kW	IEC	DNA	DNM	a	f	W	h1	h2	b1	c	m1	m2	n1	n2	s1	s2	A1	A2	B1	B2	b2	Lm	E	H max	L	k									
EAR 32/20	5.5	132S	50	32	80	195	90	160	180	50		70	100	240	190	14							361		340	636		76								
EAR 32/20	7.5					238	110																		476			794		81						
EAR 32/20	11	160M																										656		125						
EAR 32/26	7.5	132S				195	90																			361		405	816		91					
EAR 32/26	11	160M				240	110	180	225	65		95	125	320	260											476				135						
EAR 32/26	15																													142						
EAR 40/20	7.5	132S	65	40	100	195	90	160	180	65		60	100	265	212	19							361		340	656		84								
EAR 40/20	11	160M																													128					
EAR 40/20	15																														135					
EAR 40/26	11	160M						110																			476			815	141					
EAR 40/26	15																														148					
EAR 40/26	18.5	160L						180	225				95	125	244		260														163					
EAR 40/26	22	180M						120																			519		859		186					
EAR 40/26	30	200L						135																			555		895		223					
EAR 50/20	11	160M				50	65	100						75							19												131			
EAR 50/20	15	160M																																		138
EAR 50/20	18.5	160L							240		110	160	200				70	100	265	212											476		360	815		153
EAR 50/20	22	180M																																		176
EAR 50/26	18.5	160L			120																						519		380	858	166					
EAR 50/26	22	180M			110																						476			815	226					
EAR 50/26	22	180M			120																						519			858	189					
EAR 50/26	30	200L			135																						555		405	894	245					
EAR 50/26	37								180	225		95	125			250															245					
EAR 65/20	18.5	160L	80	65	100				110																		476				815	159				
EAR 65/20	22	180M									120																			519			858	182		
EAR 65/20	30	200L									135																			555			894	219		
EAR 65/26	22	180M						247	120																519			866	201							
EAR 65/26	30	200L																											238							
EAR 65/26	37					253	135																		555		450	908	257							
EAR 65/26	45	225M						150		200																			299							
EAR 65/26	55	250M						170																	625		475	978	333							
EAR 65/26	75	280M						190			250														644		500	1027	350							
EAR 65/26	90					283	190																		885		450	1268	377							
EAR 80/20	22	180M				100	80	100	247	120			80						19							519			891	198						
EAR 80/20	30	200L																															235			
EAR 80/20	37																													255						
EAR 80/20	45	225M																									625			1003	295					
EAR 80-26	37	200L	253	135					180																						268					
EAR 80-26	45	225M																									555		480	933	310					
EAR 80-26	55	250M																									625		505	1003	345					
EAR 80-26	75	280M																									644		530	1052	365					
EAR 80-26	90		283	190																											389					
EAR 100-20	30	200L																									885		480	1293	250					
EAR 100-20	37		253	135					200																		555			933	270					
EAR 100-20	45	225M																													310					
EAR 100-20	55	250M																				625		505	1003	345										
EAR 100-20	75	280M																				644			1052	367										
EAR 100-20	90		283	190																						45										
EAR 100-26	45	225M																								320										
EAR 100-26	55	250M																				625			1018	355										
EAR 100-26	75	280M																				644			1067	380										
EAR 100-26	90		283	190		225																				420										

EAS SERIES PUMP DIMENSIONS AND WEIGHTS 50 Hz, 4 POLES (1450 rpm)



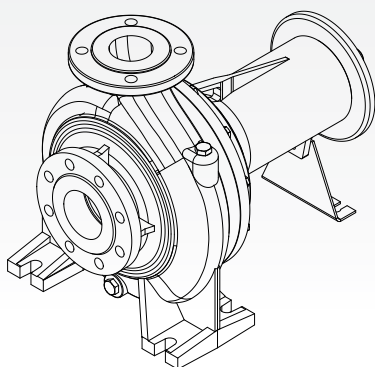
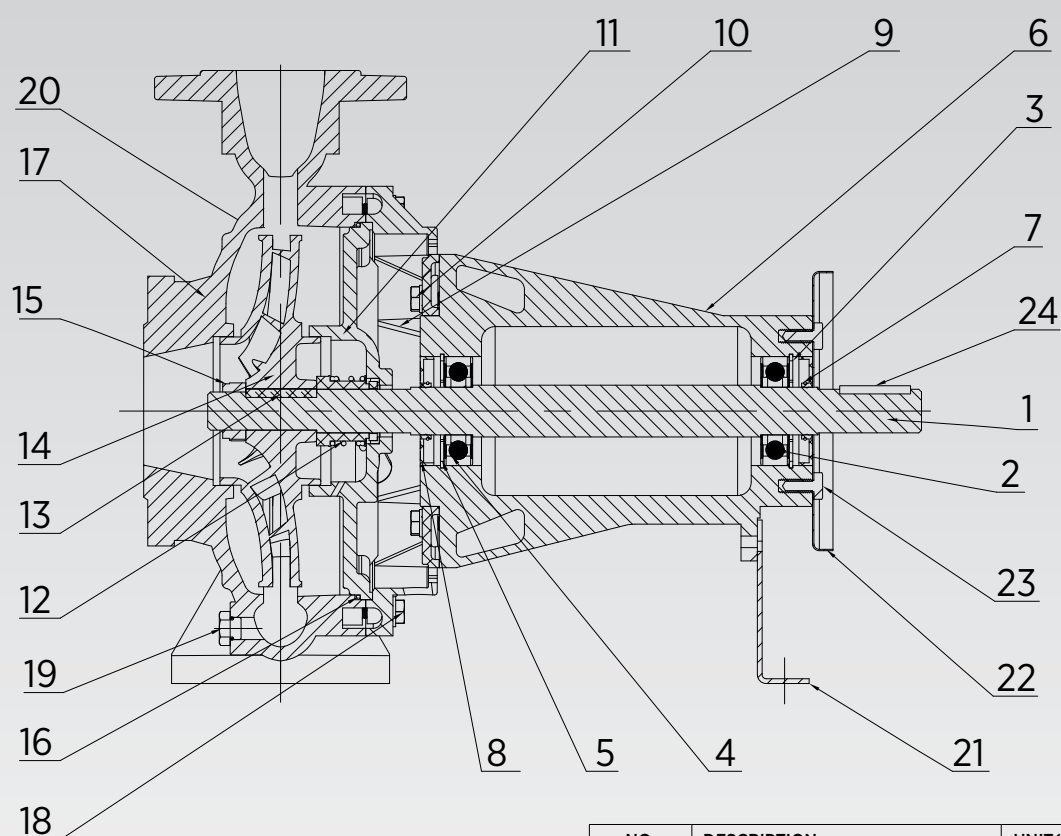
PUMP TYPE	DIMENSIONS																							
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	H Max											
EAS 32-20 / 0,75	32	50	80	210	225	380	340	710	740	50	640	22	435											
EAS 32-20 / 1,1								740																
EAS 32-20 / 1,5								770																
EAS 32-20 / 2,2								790	810				455											
EAS 32-26 / 1,1								230						815	785									
EAS 32-26 / 1,5														860										
EAS 32-26 / 2,2											945			840	740									
EAS 32-26 / 3	40	65	100	210		440	400	1090	990		890		435											
EAS 40-20 / 5,5								790	785		685													
EAS 40-20 / 7,5								815																
EAS 40-20 / 11								860																
EAS 40-20 / 15				815																				
EAS 40-26 / 1,5				860																				
EAS 40-26 / 2,2				880																				
EAS 40-26 / 3				945				840						740										
EAS 40-32 / 2,2				50				65	125		210			440	400	815	760	660	435					
EAS 40-32 / 3																860								
EAS 40-32 / 4																880								
EAS 40-32 / 5,5																815	785			685				
EAS 40-32 / 7,5	860																							
EAS 40-32 / 11	880																							
EAS 50-20 / 2,2	230		440			400	1090				990		890			22	455							
EAS 50-20 / 3							1010				940		840											
EAS 50-20 / 4							1080				1120		1020											
EAS 50-26 / 2,2							815				785		685											
EAS 50-26 / 3	860																							
EAS 50-26 / 4	880																							
EAS 50-26 / 5,5	945	940		840																				
EAS 50-32 / 4	990	965		865																				
EAS 50-32 / 5,5	1055	1020		500																				
EAS 50-32 / 7,5	65	80		100			230		480		440		1080	1120	1020		455							
EAS 50-32 / 11													1225	1120	1020									
EAS 65-20 / 2,2			815			785							685											
EAS 65-20 / 3			860																					
EAS 65-20 / 4			880																					
EAS 65-20 / 5,5			250			520	480	945					940	840	475									
EAS 65-26 / 4								990					965	865										
EAS 65-26 / 5,5								1055					1020	500										
EAS 65-26 / 7,5			80					100					125	275		440		400	1080	1120	1020	455		
EAS 65-32 / 5,5	1225	1120		1020																				
EAS 65-32 / 7,5	995	940		840																				
EAS 65-32 / 11	1010																							
EAS 80-20 / 3	1080								1120		1020													
EAS 80-20 / 4	1010																							
EAS 80-20 / 5,5	1080																							
EAS 80-20 / 7,5	250			520		480	1010		1120		1020			475										
EAS 80-26 / 4							1080																	
EAS 80-26 / 5,5			1225																					
EAS 80-26 / 7,5	300		560				520	1245	1170				1070		610									
EAS 80-26 / 11								1260																
EAS 80-32 / 11								1320																
EAS 80-32 / 15	125	150						140	300							520	480	1410	1350	1250				
EAS 80-32 / 18,5																		1245						
EAS 100-20 / 4																		1260						
EAS 100-20 / 5,5				250		620			580		1320			1255				1155						
EAS 100-20 / 7,5											1410			1350				1250						
EAS 100-20 / 11											1245													
EAS 100-26 / 5,5			275				520				480		1260	1120	1020			580						
EAS 100-26 / 7,5													1320											
EAS 100-26 / 11													1410											
EAS 100-32 / 11			300										560	520					1245	1170	1070	610		
EAS 100-32 / 15																			1260					
EAS 100-32 / 18,5	1320																							
EAS 125-20 / 7,5	150	200	160	330				620								580	1410		1350	1250				
EAS 125-20 / 11																	1245							
EAS 125-20 / 15						1260																		
EAS 125-26 / 15				300		520			480								1320		1120	1020			580	
EAS 125-26 / 18,5																	1410							1350
EAS 125-26 / 22							1245																	
EAS 125-26 / 30				330			560			520	1260	1170			1070		610							
EAS 150-20 / 7,5											1320													
EAS 150-20 / 11											1410													
EAS 150-20 / 15											1245													
EAS 150-26 / 11											1260													
EAS 150-26 / 15	300		520	480	1320			1120			1020	580												
EAS 150-26 / 18,5					1410								1350	1250										
EAS 150-26 / 22					1245																			
EAS 150-26 / 30	330				560	520		1260	1170				1070	610										
EAS 150-26 / 18,5								1320																
EAS 150-26 / 22								1410																
EAS 150-26 / 30							1245																	
							1260																	

EAS SERIES PUMP DIMENSIONS AND WEIGHTS 50 Hz, 2 POLES (2950 rpm)



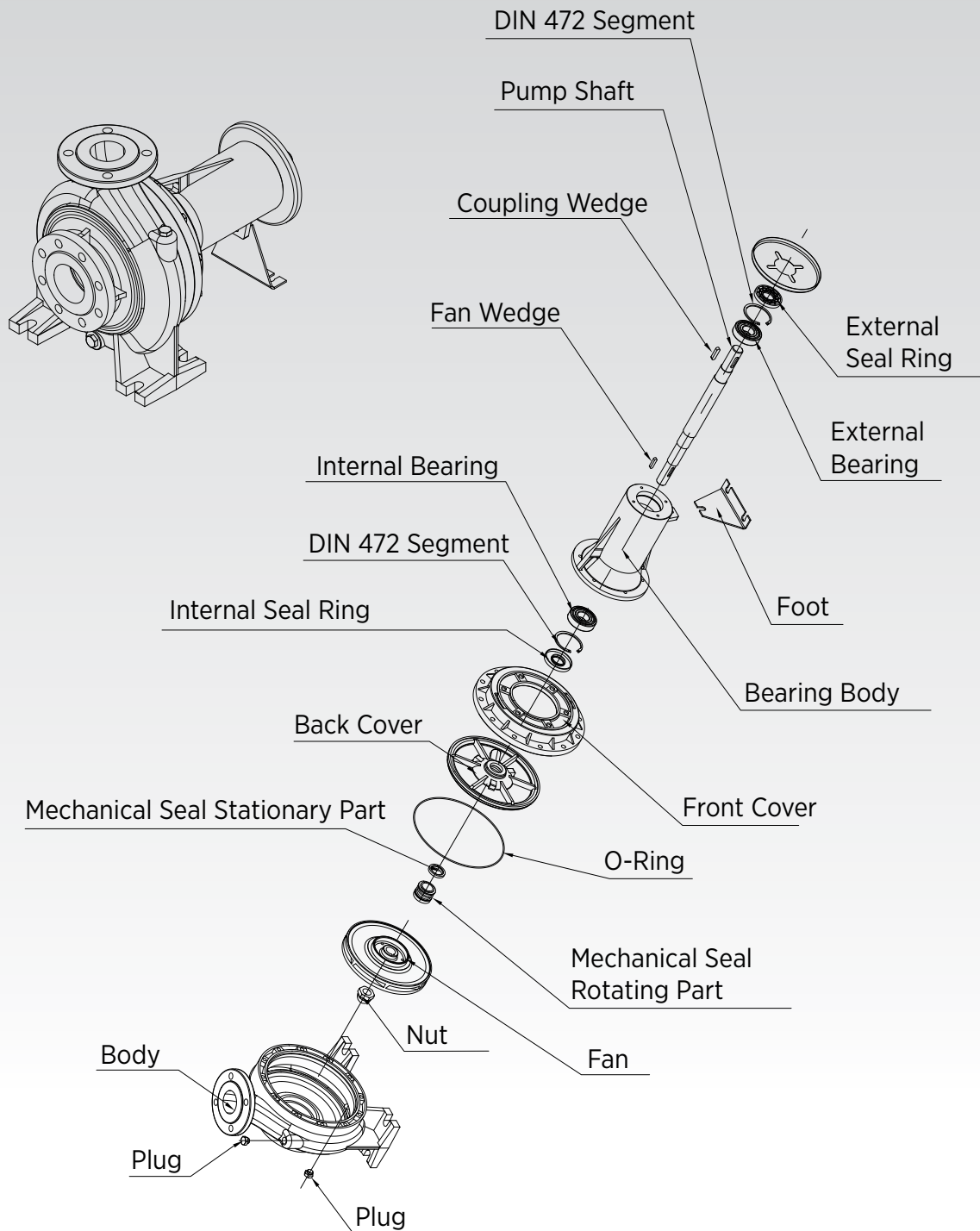
PUMP TYPE	DIMENSIONS																				
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	H Max								
EAS 32-20 / 5,5	32	50	80	210	225	440	400	925	840	50	740	22	435								
EAS 32-20 / 7,5								1070	990					890	455						
EAS 32-20 / 11																1090	1040	470			
EAS 32-26 / 15			230	440				400	1090		990		890						470		
EAS 32-26 / 11														210	500	460	945			840	740
EAS 32-26 / 15																		100			
EAS 32-26 / 18,5	230	500	460	1150		1040	940	455													
EAS 32-26 / 22									210	440	400		1090	990	890	470					
EAS 40-20 / 5,5																	230	500	460	1150	1040
EAS 40-20 / 7,5	210	440	400	1090		990	890	435													
EAS 40-20 / 11									230	500	460		1150	1040	940	470					
EAS 40-20 / 15																	210	440	400	1090	990
EAS 40-20 / 18,5	230	500	460	1150		1040	940	470													
EAS 40-20 / 22									230	500	460		1150	1040	940	435					
EAS 50-20 / 15																	230	500	460	1150	1040
EAS 50-20 / 18,5	230	500	460	1150		1040	940	435													
EAS 50-20 / 22									230	500	460		1150	1040	940	470					
EAS 50-20 / 30																	230	500	460	1150	1040
EAS 50-26 / 18,5	230	500	460	1150		1040	940	470													
EAS 50-26 / 22									230	500	460		1150	1040	940	530					
EAS 50-26 / 30																	230	500	460	1150	1040
EAS 50-26 / 37	230	500	460	1150		1040	940	550													
EAS 50-26 / 45									230	500	460		1150	1040	940	560					
EAS 50-32 / 37																	230	500	460	1150	1040
EAS 50-32 / 45	230	500	460	1150		1040	940	830													
EAS 50-32 / 55									230	500	460		1150	1040	940	455					
EAS 50-32 / 75																	230	500	460	1150	1040
EAS 65-20 / 15	230	500	460	1150		1040	940	530													
EAS 65-20 / 18,5									230	500	460		1150	1040	940	560					
EAS 65-20 / 22																	230	500	460	1150	1040
EAS 65-20 / 30	230	500	460	1150	1040	940	830														
EAS 65-20 / 37								230	500	460	1150	1040	940	470							
EAS 65-20 / 45															230	500	460	1150	1040	940	530
EAS 65-26 / 30	230	500	460	1150	1040	940	560														
EAS 65-26 / 37								230	500	460	1150	1040	940	620							
EAS 65-26 / 45															230	500	460	1150	1040	940	830
EAS 65-26 / 55	230	500	460	1150	1040	940	470														
EAS 65-32 / 45								230	500	460	1150	1040	940	530							
EAS 65-32 / 55															230	500	460	1150	1040	940	560
EAS 65-32 / 75	230	500	460	1150	1040	940	620														
EAS 65-32 / 90								230	500	460	1150	1040	940	830							
EAS 80-20 / 22															230	500	460	1150	1040	940	470
EAS 80-20 / 30	230	500	460	1150	1040	940	530														
EAS 80-20 / 37								230	500	460	1150	1040	940	560							
EAS 80-20 / 45															230	500	460	1150	1040	940	620
EAS 80-20 / 55	230	500	460	1150	1040	940	830														
EAS 80-26 / 37								230	500	460	1150	1040	940	470							
EAS 80-26 / 45															230	500	460	1150	1040	940	530
EAS 80-26 / 55	230	500	460	1150	1040	940	560														
EAS 80-26 / 75								230	500	460	1150	1040	940	620							
EAS 80-26 / 90															230	500	460	1150	1040	940	830
EAS 80-32 / 90	230	500	460	1150	1040	940	470														
EAS 80-32 / 110								230	500	460	1150	1040	940	530							
EAS 80-32 / 132															230	500	460	1150	1040	940	560
EAS 80-32 / 160	230	500	460	1150	1040	940	620														
EAS 100-20 / 37								230	500	460	1150	1040	940	830							
EAS 100-20 / 45															230	500	460	1150	1040	940	1065
EAS 100-20 / 55	230	500	460	1150	1040	940	530														
EAS 100-20 / 75								230	500	460	1150	1040	940	560							
EAS 100-26 / 45															230	500	460	1150	1040	940	620
EAS 100-26 / 55	230	500	460	1150	1040	940	830														
EAS 100-26 / 75								230	500	460	1150	1040	940	470							
EAS 100-26 / 90															230	500	460	1150	1040	940	530
EAS 100-32 / 90	230	500	460	1150	1040	940	560														
EAS 100-32 / 110								230	500	460	1150	1040	940	620							
EAS 100-32 / 132															230	500	460	1150	1040	940	830
EAS 100-32 / 160	230	500	460	1150	1040	940	1065														
EAS 125-20 / 45								230	500	460	1150	1040	940	530							
EAS 125-20 / 55															230	500	460	1150	1040	940	560
EAS 125-20 / 75	230	500	460	1150	1040	940	620														
EAS 125-20 / 90								230	500	460	1150	1040	940	830							

EA BARESHAFT PUMP ASSEMBLY



NO.	DESCRIPTION	UNIT(S)
1	PUMP SHAFT	1
2	BEARING OUTSIDE	1
3	SEGMENT OUTSIDE - DIN 472	1
4	BEARING INSIDE	1
5	SEGMENT INSIDE - DIN 472	1
6	BEARING BODY	1
7	SEAL RING OUTSIDE	1
8	SEAL RING INSIDE	1
9	FRONT COVER	1
10	BOLT WASHER GROUP	6
11	MECHANICAL SEAL BODY	1
12	MECHANICAL SEAL SET	1
13	FAN WEDGE	1
14	FAN	1
15	FAN FASTENING NUT	1
16	O-RING	1
17	BODY	1
18	BODY ATTACHMENT GROUP	12
19	PLUG	1
20	PLUG	1
21	FOOT	1
22	FLANGE	4
23	BOLT GROUP	1
24	COUPLING WEDGE	1

EA BARESHAFT PUMP ASSEMBLY



TECHNICAL APPENDIX

The minimum operating values are limited with the start of cavitation formed in the suction end of the pump.

Cavitation means the fluid pressure to locally drop down to a critical level or the local pressure to become equal or slightly lower than the vaporization pressure due to the formation of gaps full of vapor inside the fluid.

When these gaps full of vapor arrive to spots with higher pressure through flow, the vapor in these gaps condensates.

These gaps hit each other and create pressure waves on internal walls. This causes a stress cycle and an increasing deformation and abrasion.

This phenomenon is characterized as a metallic sound created by a hammer hitting the internal walls and called the 'start-up cavitation phase'.

The damage caused by cavitation causes the ambient temperature to increase due to electrochemical corrosion and plastic deformation of internal walls. Metals that are resistant to heat and corrosion are alloyed steels. The conditions triggering cavitation may be identified by calculating the total suction head. In technical literature:

NPSH (Net Positive Suction Head)

NPSH is the total energy measured under the cavitation start-up conditions, excluding the evaporation pressure (expressed in m) at the pump inlet. (expressed in m)

The following formula is used to find the static suction head (hz) under safe pump assembly conditions:

$$hp + hz \geq hz (NPSHr + 0.5) + hf + h_{pv}$$

hp: the absolute pressure applied to the free liquid surface in the suction tank. (expressed in m), hp is the quotient between the absolute pressure and the specific weight of the liquid.

hz: the suction head between the free liquid surface and the pump axis in the suction tank. (expressed in m), hz is negative if the liquid level is lower than the pump axis.

hf: total of suction line and accessories, valve and check valve elbows etc. friction (flow) resistances.

h_{pv}: evaporation pressure of the fluid under operating conditions. (expressed in m), h_{pv} is the quotient between the evaporation pressure and the specific weight of the liquid.

0,5: Safety factor. (for safety)

For assemblies, maximum possible suction head depends on atmospheric pressure values. (for example: the altitude of the pump's location above the sea level and the temperature of the fluid) As a reference to the users, the following table indicates the hydraulic suction loss in the given altitudes above sea level for 4 °C water, and similarly the thermal loss.

Water Temperature (°C)	20	40	60	80	90	110	120
Suction Loss (m)	0,2	0,7	2,0	5,0	7,4	15,4	21,5

Altitude Above Sea Level (m)	500	1000	1500	2000	2500	3000
Suction Loss (m)	0,55	1,1	1,65	2,2	2,75	3,3

EXAMPLE

Let us make the following calculation:

Water Temperature : 15 °C $\gamma = 0,9992$
 Flow Rate : 50 m³ / h
 Delivery Head : 67 m
 Suction Head : 3,5 m

Selected pump EA 50/26 - Required NPSHr at 50 m³ / h is = 2 m

For 15 °C water
 $h_p = P_a / \gamma = 10,33$ m
 $h_{pv} = P_v / \gamma = 0,174$ m (0.01704 bar)
 $h_f = 3,5$ m total loss in the suction line
 (1 elbow and 1 check valve)
 $h_z = 3,5$ m
 if we put this into our formula;

$10,33 + (-3,5) \geq (2 + 0,5) + 3,4 + 0,174$
 then
 $6,83 > 6$ m

The result is:
 pump can perform suction.

DESCRIPTION

γ = Specific weight of the liquid 15 °C = 0.9992 = 1
 (from evaporation pressure table)

P_a = Atmospheric pressure = barometric pressure =
 1013hPa = 1.013 bar (directly from meteorology)
 1 bar = 10.2 m
 1.013 x 10.2 = 10.33 m

h_{pv} = 15 °C $P_v = 0,01704$ bar (from evaporation
 pressure table) 0.01704 bar x 10.2 m

$0,1738 / 0,9992 = 0,174$ m

h_z = 3.5 m suction head

h_f = (suction pipe ø65 3.5 m pipe + 90° wide elbow +
 check valve) flow resistances

From flat pipe flow resistance and armature loss table:

For 50 m³ / h ø65 pipe, 100 m pipe loss is not given
 in the table, but based on interpolation calculation
 method;

On the table, for 48 m³ / h, the loss is $h_r = 42$ m

On the table, for 54 m³ / h, the loss is $h_r = 52$ m

For $54 - 48 = 6$ m³, the loss is $52 - 42 = 10$ m

For $10/6 = 1,66$ x 2 m³, the loss is $h_r = 2 \times 1,66 = 3,32$ m

For 50 m³ / h, the loss is $h_r = 42 + 3,32 = 45,3$
 (for 100 m pipe)

For 1 m pipe, the loss is $45 / 100 = 0,453$ m

ø 65 3.5 m pipe loss = $3,5 \times 0,453 = 1,59$ m

ø 65 90° wide elbow = $0,9 \times 0,453 = 0,4$ m

ø 65 Check valve = $3 \times 0,453 = 1,4$ m

$h_f = 1,59 + 0,4 + 1,4 = 3,4$ m

FRICTION LOSS IN 100 M STRAIGHT PIPE **CAST IRON PIPE (HAZEN-WILLIAMS FORMULA C=100)**

FLOW RATE		NOMINAL DIAMETER as mm and inch																		
m ³ /h	l/min		15 1/2"	20 3/4"	25 1"	32 1 1/4"	40 1 1/2"	50 2"	65 2 1/2"	80 3"	100 4"	125 5"	150 6"	175 7"	200 8"	250 10"	300 12"	350 14"	400 16"	
0,6	10	v h	0,94 16	0,53 3,94	0,34 1,33	0,21 0,40	0,13 0,13		The hr values must be multiplied by 0.71 for galvanized and painted steel pipes, 0.54 for stainless steel or copper pipes, 0.47 for PVC or PE pipes.											
0,9	15	v h	1,42 33,9	0,80 8,35	0,51 2,82	0,31 0,85	0,20 0,29													
1,2	20	v h	1,89 57,7	1,06 14,21	0,68 4,79	0,41 1,44	0,27 0,49	0,17 0,16												
1,5	25	v h	2,36 87,2	1,33 21,5	0,85 7,24	0,52 2,18	0,33 0,73	0,21 0,25												
1,8	30	v h	2,83 122	1,59 30,1	1,02 10,1	0,62 3,05	0,40 1,03	0,25 0,35												
2,1	35	v h	3,30 162	1,86 40,0	1,19 13,5	0,73 4,06	0,46 1,37	0,30 0,46												
2,4	40	v h		2,12 51,2	1,36 17,3	0,83 5,19	0,53 1,75	0,34 0,59		0,20 0,16										
3	50	v h		2,65 77,4	1,70 26,1	1,04 7,85	0,66 2,65	0,42 0,89		0,25 0,25										
3,6	60	v h		3,18 108	2,04 36,6	1,24 11,0	0,80 3,71	0,51 1,25		0,30 0,35										
4,2	70	v h		3,72 144	2,38 48,7	1,45 14,6	0,93 4,93	0,59 1,66		0,35 0,46										
4,8	80	v h		4,25 185	2,72 62,3	1,66 18,7	1,06 6,32	0,68 2,13	0,40 0,59											
5,4	90	v h			3,06 77,5	1,87 23,3	1,19 7,85	0,76 2,65	0,45 0,74	0,30 0,27										
6	100	v h			3,40 94,1	2,07 28,3	1,33 9,54	0,85 3,22	0,50 0,90	0,33 0,33										
7,5	125	v h			4,25 142	2,59 42,8	1,66 14,4	1,06 4,86	0,63 1,36	0,41 0,49										
9	150	v h				3,11 59,9	1,99 20,2	1,27 6,82	0,75 1,90	0,50 0,69	0,32 0,23									
10,5	175	v h				3,63 79,7	2,32 26,9	1,49 9,07	0,88 2,53	0,58 0,92	0,37 0,31									
12	200	v h				4,15 102	2,65 34,4	1,70 11,6	1,01 3,23	0,66 1,18	0,42 0,40									
15	250	v h				5,18 154	3,32 52,0	2,12 17,5	1,26 4,89	0,83 1,78	0,53 0,60	0,34 0,20								
18	300	v h					3,98 72,8	2,55 24,6	1,51 6,85	1,00 2,49	0,64 0,84	0,41 0,28								
24	400	v h					5,31 124	3,40 41,8	2,01 11,66	1,33 4,24	0,85 1,43	0,54 0,48	0,38 0,20							
30	500	v h					6,63 187	4,25 63,2	2,51 17,6	1,66 6,41	1,06 2,16	0,68 0,73	0,47 0,30							
36	600	v h						5,10 88,6	3,02 24,7	1,99 8,98	1,27 3,03	0,82 1,02	0,57 0,42	0,42 0,20						
42	700	v h						5,94 118	3,52 32,8	2,32 11,9	1,49 4,03	0,95 1,36	0,66 0,56	0,49 0,26						
48	800	v h						6,79 151	4,02 42,0	2,65 15,3	1,70 5,16	1,09 1,74	0,75 0,72	0,55 0,34						
54	900	v h						7,64 188	4,52 52,3	2,99 19,0	1,91 6,41	1,22 2,16	0,85 0,89	0,62 0,42						
60	1000	v h						5,03 63,5	3,32 23,1	2,12 7,79	1,36 2,63	0,94 1,08	0,69 0,51	0,53 0,27						
75	1250	v h						6,28 96,0	4,15 34,9	2,65 11,8	1,70 3,97	1,18 1,63	0,87 0,77	0,66 0,40						
90	1500	v h						7,54 134	4,98 48,9	3,18 16,5	2,04 5,57	1,42 2,29	1,04 1,08	0,80 0,56						
105	1750	v h						8,79 179	5,81 65,1	3,72 21,9	2,38 7,40	1,65 3,05	1,21 1,44	0,93 0,75						
120	2000	v h						6,63 83,3	4,25 28,1	2,72 9,48	1,89 3,90	1,39 1,84	1,06 0,96	0,68 0,32						
150	2500	v h						8,29 126	5,31 42,5	3,40 14,3	2,36 5,89	1,73 2,78	1,33 1,45	0,85 0,49						
180	3000	v h							6,37 59,5	4,08 20,1	2,83 8,26	2,08 3,90	1,59 2,03	1,02 0,69	0,71 0,28					
210	3500	v h							7,43 79,1	4,76 26,7	3,30 11,0	2,43 5,18	1,86 2,71	1,19 0,91	0,83 0,38					
240	4000	v h							8,49 101	5,44 34,2	3,77 14,1	2,77 6,64	2,12 3,46	1,36 1,17	0,94 0,48					
300	5000	v h									6,79 51,6	4,72 21,2	3,47 10,0	2,65 5,23	1,70 1,77	1,18 0,73				
360	6000	v h									8,15 72,3	5,66 29,8	4,16 14,1	3,18 7,33	2,04 2,47	1,42 1,02				
420	7000	v h										6,61 39,6	4,85 18,7	3,72 9,75	2,38 3,29	1,65 1,35	1,21 0,64			
480	8000	v h										7,55 50,7	5,55 23,9	4,25 12,49	2,72 4,21	1,89 1,73	1,39 0,82			
540	9000	v h										8,49 63,0	6,24 29,8	4,78 15,5	3,06 5,24	2,12 2,16	1,56 1,02	1,19 0,53		
600	10000	v h											6,93 36,2	5,31 18,9	3,40 6,36	2,36 2,62	1,73 1,24	1,33 0,65		

FRICTION LOSS

TABLE FOR THE FLOW RESISTANCES IN ELBOWS, CHECK VALVES AND VALVES

Flow resistance is calculated based on the following table using the equivalent pipe length method.

ACCESSORY TYPE	DN											
	25	32	40	50	65	80	100	125	150	200	250	300
	E value pipe length (m)											
45° Elbow	0,2	0,2	0,4	0,4	0,6	0,6	0,9	1,1	1,5	1,9	2,4	2,8
90° Elbow	0,4	0,6	0,9	1,1	1,3	1,5	2,1	2,6	3,0	3,9	4,7	5,8
90° Wide Elbow	0,4	0,4	0,4	0,6	0,9	1,1	1,3	1,7	1,9	2,8	3,4	3,9
Sleeve T or Cross-Piece	1,1	1,3	1,7	2,1	2,6	3,2	4,3	5,3	6,4	7,5	10,7	12,8
Valve	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
Check Valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9

- The table is for Hazen Williams coefficient, and C equals to 100 (cast iron pipe installation)
- The coefficient for steel pipe installations is 1.41
- The coefficient for stainless steel, copper pipe and galvanized cast iron pipe installations is 1.85
- When an equivalent pipe length is identified, the friction resistance is obtained from the flow resistance table.
- The given values are approximate values for models and especially for valves and check valves, and should be compared with the values provided by the manufacturer.

EVAPORATION PRESSURE Pv and Y SPECIFIC WEIGHT OF WATER

t	T	Pv	Y
°C	K	bar	kg/dm ³
0	273,15	0,00611	0,9998
1	274,15	0,00657	0,9999
2	275,15	0,00706	0,9999
3	276,15	0,00758	0,9999
4	277,15	0,00813	1,0000
5	278,15	0,00872	1,0000
6	279,15	0,00935	1,0000
7	280,15	0,01001	0,9999
8	281,15	0,01072	0,9999
9	282,15	0,01147	0,9998
10	283,15	0,01227	0,9997
11	284,15	0,01312	0,9997
12	285,15	0,01401	0,9996
13	286,15	0,01497	0,9994
14	287,15	0,01597	0,9993
15	288,15	0,01704	0,9992
16	289,15	0,01817	0,9990
17	290,15	0,01936	0,9988
18	291,15	0,02062	0,9987
19	292,15	0,02196	0,9985
20	293,15	0,02337	0,9983
21	294,15	0,024850	0,9981
22	295,15	0,02642	0,9978
23	296,15	0,02808	0,9976
24	297,15	0,02982	0,9974
25	298,15	0,03166	0,9971
26	299,15	0,03360	0,9968
27	300,15	0,03564	0,9966
28	301,15	0,03778	0,9963
29	302,15	0,04004	0,9960
30	303,15	0,04241	0,9957
31	304,15	0,04491	0,9954
32	305,15	0,04753	0,9951
33	306,15	0,05029	0,9947
34	307,15	0,05318	0,9944
35	308,15	0,05622	0,9940
36	309,15	0,05940	0,9937
37	310,15	0,06274	0,9933
38	311,15	0,06624	0,9930
39	312,15	0,06991	0,9927
40	313,15	0,07375	0,9923
41	314,15	0,07777	0,9919
42	315,15	0,08198	0,9915
43	316,15	0,08639	0,9911
44	317,15	0,09100	0,9907
45	318,15	0,09582	0,9902
46	319,15	0,10086	0,9898
47	320,15	0,10612	0,9894
48	321,15	0,11162	0,9889
49	322,15	0,11736	0,9884
50	323,15	0,12335	0,9880
51	324,15	0,12961	0,9876
52	325,15	0,13613	0,9871
53	326,15	0,14293	0,9862
54	327,15	0,15002	0,9862

t	T	Pv	Y
°C	K	bar	kg/dm ³
55	328,15	0,15741	0,9857
56	329,15	0,16511	0,9852
57	330,15	0,17313	0,9846
58	331,15	0,18147	0,9842
59	332,15	0,19016	0,9837
60	333,15	0,1992	0,9832
61	334,15	0,2086	0,9826
62	335,15	0,2184	0,9821
63	336,15	0,2286	0,9816
64	337,15	0,2391	0,9811
65	338,15	0,2501	0,9805
66	339,15	0,2615	0,9799
67	340,15	0,2733	0,9793
68	341,15	0,2856	0,9788
69	342,15	0,2984	0,9782
70	343,15	0,3116	0,9777
71	344,15	0,3253	0,9770
72	345,15	0,3396	0,9765
73	346,15	0,3543	0,9760
74	347,15	0,3696	0,9753
75	348,15	0,3855	0,9748
76	349,15	0,4019	0,9741
77	350,15	0,4189	0,9735
78	351,15	0,4365	0,9729
79	352,15	0,4547	0,9723
80	353,15	0,4736	0,9716
81	354,15	0,4931	0,9710
82	355,15	0,5133	0,9704
83	356,15	0,5342	0,9697
84	357,15	0,5557	0,9691
85	358,15	0,5780	0,9684
86	359,15	0,6011	0,9678
87	360,15	0,6249	0,9671
88	361,15	0,6495	0,9665
89	362,15	0,6749	0,9658
90	363,15	0,7011	0,9652
91	364,15	0,7281	0,9644
92	365,15	0,7561	0,9638
93	366,15	0,7849	0,9630
94	367,15	0,8146	0,9624
95	368,15	0,8453	0,9616
96	369,15	0,8769	0,9610
97	370,15	0,9094	0,9602
98	371,15	0,9430	0,9596
99	372,15	0,9776	0,9586
100	373,15	1,0133	0,9581
102	375,15	1,0878	0,9567
104	377,15	1,1668	0,9552
106	379,15	1,2504	0,9537
108	381,15	1,3390	0,9522
110	383,15	1,4327	0,9507
112	385,15	1,5316	0,9491
114	387,15	1,6362	0,9476
116	389,15	1,7465	0,9460
118	391,15	1,8628	0,9445

t	T	Pv	Y
°C	K	bar	kg/dm ³
120	393,15	1,9854	0,9429
122	395,15	2,1145	0,9412
124	397,15	2,2504	0,9396
126	399,15	2,3933	0,9379
128	401,15	2,5435	0,9362
130	403,15	2,7013	0,9346
132	405,15	2,867	0,9328
134	407,15	3,041	0,9311
136	409,15	3,223	0,9294
138	411,15	3,414	0,9276
140	413,15	3,614	0,9258
145	418,15	4,155	0,9214
155	428,15	5,433	0,9121
160	433,15	6,181	0,9073
165	438,15	7,008	0,9024
170	443,15	7,920	0,8973
175	448,15	8,924	0,8921
180	453,15	10,027	0,8869
185	458,15	11,233	0,8815
190	463,15	12,551	0,8760
195	468,15	13,987	0,8704
200	473,15	15,550	0,8647
205	478,15	17,243	0,8588
210	483,15	19,077	0,8528
215	488,15	21,060	0,8467
220	493,15	23,198	0,8403
225	498,15	25,501	0,8339
230	503,15	27,976	0,8273
235	508,15	30,632	0,8205
240	513,15	33,478	0,8136
245	518,15	36,523	0,8065
250	523,15	39,776	0,7992
255	528,15	43,246	0,7916
260	533,15	46,943	0,7839
265	538,15	50,877	0,7759
270	543,15	55,058	0,7678
275	548,15	59,496	0,7593
280	553,15	64,202	0,7505
285	558,15	69,186	0,7415
290	563,15	74,461	0,7321
295	568,15	80,037	0,7223
300	573,15	85,927	0,7122
305	578,15	92,144	0,7017
310	583,15	98,70	0,6906
315	588,15	105,61	0,6791
320	593,15	112,89	0,6669
325	598,15	120,56	0,6541
330	603,15	128,63	0,6404
340	613,15	146,05	0,6102
350	623,15	165,35	0,5743
360	633,15	186,75	0,5275
370	643,15	210,54	0,4518
374,15	647,30	221,20	0,3154

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