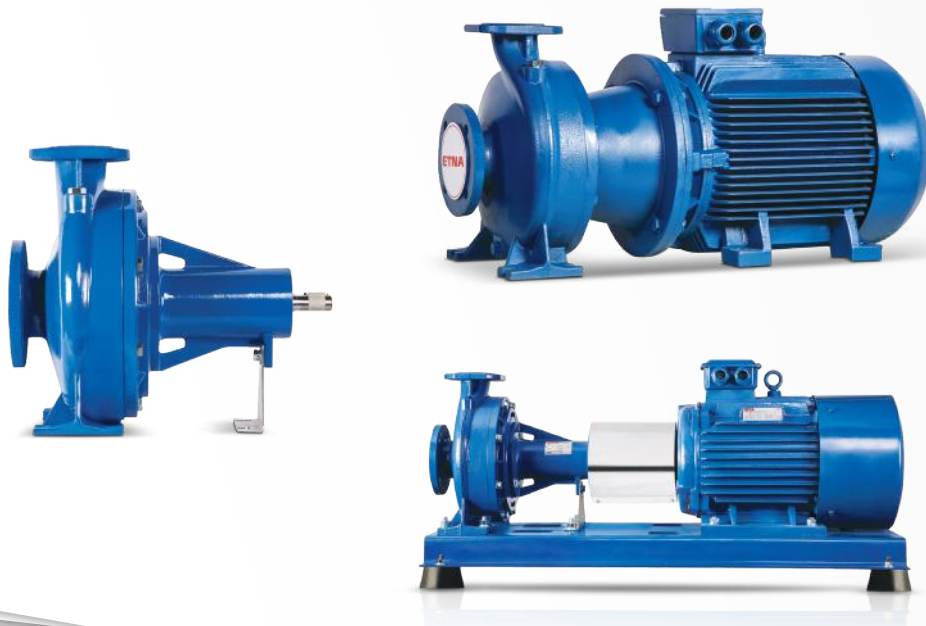




Horizontal Single-Stage Centrifugal Pumps EA Series - 60 Hz



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 percentage of glycol that can be added to the circulating water is 50%. In case of using glycol-water mixed fluid, please contact our company at the product selection stage.

TECHNICAL SPECIFICATIONS

Max. Flow Rate	: 620 m ³ /h
Max. Head	: 145 mwc
Motor Speed	: 1750 rpm (60 Hz) , 3550 rpm (60 Hz)
Connection	: DN 32 - DN 150
Power	: 1.1 kW - 250 kW
Power Supply	: 3 * 460V- 60 Hz
Maximum Operating Pressure	: 16 bar
Maximum Ambient Temperature	: 40°C
Temperature of Pumped Liquid	: -10°C ÷ +120°C
Protection Class	: IP55
Insulation Class	: Class F

Design Properties

Pump Body	: GG25 - Cast Iron
Shaft	: AISI 420 - Stainless Steel
Impeller Bronze)	: GG25- Cast Iron (ops. CuSn7
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

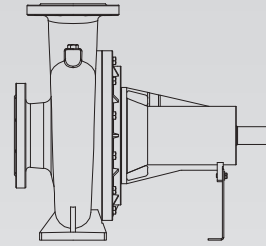
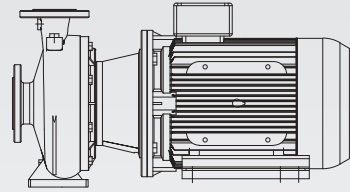
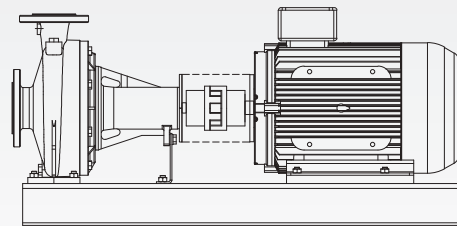
- Pump and electric motor supported with a bracket leg and a connection set on a chassis with a flexible coupling

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 PUMP SERIES SOUND PRESSURE LEVEL

PUMP TYPE	"POWER [kW]"	" SPEED [rpm]"	"SOUND PRESSURE LEVEL [dB(A)]"
EAS 32-20	1,1	1750	47
EAS 32-20	1,5	1750	48
EAS 32-20	2,2	1750	49
EAS 32-20	3	1750	50
EAS 32-26	2,2	1750	49
EAS 32-26	3	1750	50
EAS 32-26	4	1750	51
EAS 32-26	5,5	1750	52
EAS 40-20	1,1	1750	47
EAS 40-20	1,5	1750	48
EAS 40-20	2,2	1750	49
EAS 40-20	3	1750	50
EAS 40-26	3	1750	50
EAS 40-26	4	1750	51
EAS 40-26	5,5	1750	52
EAS 40-32	4	1750	51
EAS 40-32	7,5	1750	53
EAS 40-32	11	1750	54
EAS 50-20	1,5	1750	48
EAS 50-20	2,2	1750	49
EAS 50-20	3	1750	50
EAS 50-20	4	1750	51
EAS 50-26	4	1750	51
EAS 50-26	5,5	1750	52
EAS 50-26	7,5	1750	53
EAS 50-26	11	1750	54
EAS 50-32	7,5	1750	53
EAS 50-32	11	1750	54
EAS 50-32	15	1750	55
EAS 65-20	3	1750	50
EAS 65-20	4	1750	51
EAS 65-20	5,5	1750	52
EAS 65-20	7,5	1750	53
EAS 65-26	7,5	1750	53
EAS 65-26	11	1750	54
EAS 65-26	15	1750	55
EAS 65-32	11	1750	54

PUMP TYPE	"POWER [kW]"	" SPEED [rpm]"	"SOUND PRESSURE LEVEL [dB(A)]"
EAS 65-32	15	1750	55
EAS 65-32	18,5	1750	63
EAS 80-20	3	1750	50
EAS 80-20	4	1750	51
EAS 80-20	5,5	1750	52
EAS 80-20	7,5	1750	53
EAS 80-26	7,5	1750	53
EAS 80-26	11	1750	54
EAS 80-26	15	1750	55
EAS 80-26	18,5	1750	63
EAS 80-32	22	1750	74
EAS 80-32	30	1750	76
EAS 100-20	5,5	1750	52
EAS 100-20	7,5	1750	53
EAS 100-20	11	1750	54
EAS 100-20	15	1750	55
EAS 100-26	11	1750	54
EAS 100-26	15	1750	55
EAS 100-26	18,5	1750	63
EAS 100-32	18,5	1750	63
EAS 100-32	22	1750	74
EAS 100-32	30	1750	76
EAS 125-20	11	1750	54
EAS 125-20	15	1750	55
EAS 125-20	18,5	1750	63
EAS 125-20	22	1750	74
EAS 125-26	22	1750	74
EAS 125-26	30	1750	76
EAS 125-26	37	1750	76
EAS 125-26	45	1750	76
EAS 150-20	11	1750	54
EAS 150-20	15	1750	55
EAS 150-20	18,5	1750	63
EAS 150-20	30	1750	76
EAS 150-26	37	1750	76
EAS 150-26	45	1750	76
EAS 150-26	55	1750	77
EAS 150-26	75	1750	78

Sound pressure level measurements were made in a noiseless environment with 60 Hz electric motors.

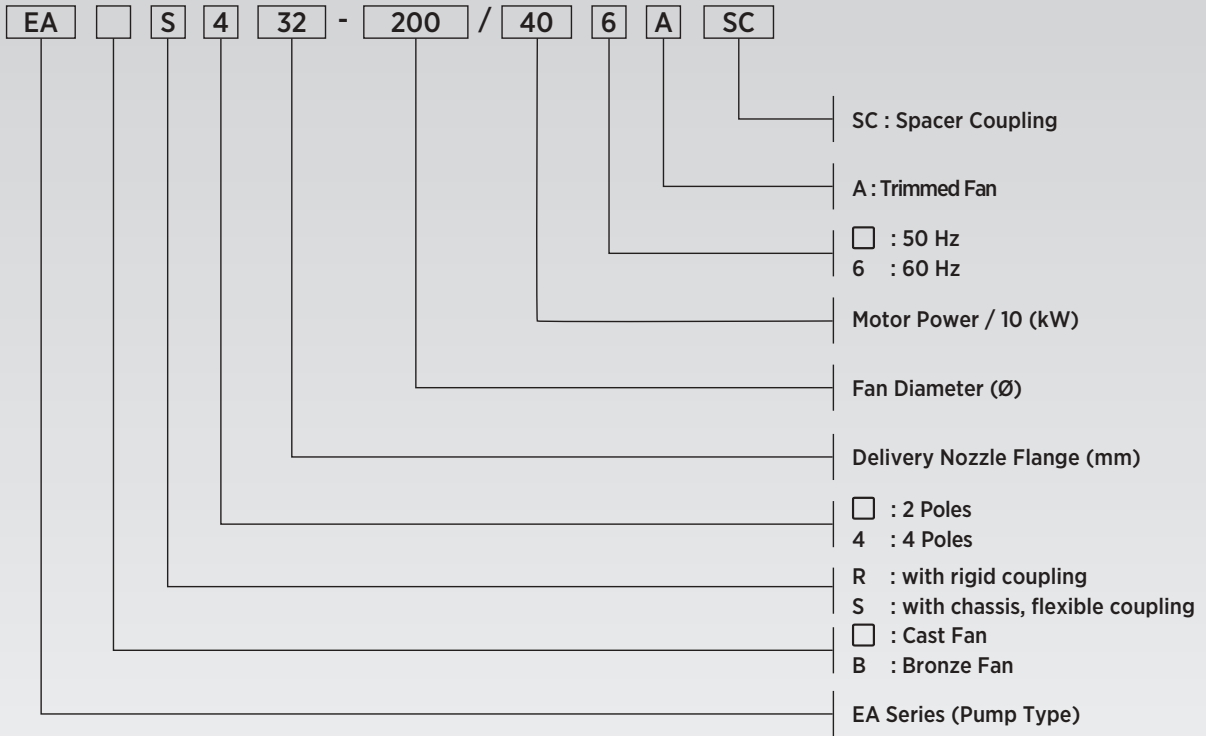
EA PUMP SERIES SOUND PRESSURE LEVEL

PUMP TYPE	"POWER [kW]"	" SPEED [rpm]"	"SOUND PRESSURE LEVEL [dB(A)]"
EA 32-20	11	3550	66
EA 32-20	15	3550	67
EA 32-20	18,5	3550	68
EAS 32-26	18,5	3550	68
EAS 32-26	22	3550	71
EAS 32-26	30	3550	72
EAS 32-26	37	3550	73
EAS 40-20	11	3550	66
EAS 40-20	15	3550	67
EAS 40-20	18,5	3550	68
EAS 40-20	22	3550	71
EAS 40-26	22	3550	71
EAS 40-26	30	3550	71
EAS 40-26	37	3550	73
EAS 40-26	45	3550	73
EAS 50-20	11	3550	66
EAS 50-20	15	3550	67
EAS 50-20	18,5	3550	68
EAS 50-20	22	3550	71
EAS 50-26	18,5	3550	68
EAS 50-26	22	3550	71
EAS 50-26	30	3550	73
EAS 50-26	37	3550	73
EAS 50-32	75	3550	75
EAS 50-32	90	3550	76
EAS 50-32	110	3550	77
EAS 50-32	132	3550	78
EAS 65-20	37	3550	73
EAS 65-20	45	3550	73
EAS 65-20	55	3550	74
EAS 65-20	75	3550	75
EAS 65-26	45	3550	73
EAS 65-26	55	3550	74
EAS 65-26	75	3550	75
EAS 65-26	90	3550	76
EAS 65-26	110	3550	77
EAS 65-32	90	3550	76
EAS 65-32	110	3550	77
EAS 65-32	132	3550	78
EAS 65-32	160	3550	78

PUMP TYPE	"POWER [kW]"	" SPEED [rpm]"	"SOUND PRESSURE LEVEL [dB(A)]"
EAS 80-20	55	3550	74
EAS 80-20	75	3550	75
EAS 80-20	90	3550	76
EAS 80-20	110	3550	77
EAS 80-26	55	3550	74
EAS 80-26	75	3550	75
EAS 80-26	90	3550	76
EAS 80-26	110	3550	77
EAS 80-32	160	3550	78
EAS 80-32	185	3550	80
EAS 80-32	200	3550	81
EAS 80-32	250	3550	82
EAS 100-20	45	3550	73
EAS 100-20	55	3550	74
EAS 100-20	75	3550	75
EAS 100-20	90	3550	76
EAS 100-20	110	3550	77
EAS 100-26	90	3550	76
EAS 100-26	110	3550	77
EAS 100-26	132	3550	78
EAS 100-26	160	3550	78
EAS 100-32	160	3550	78
EAS 100-32	185	3550	80
EAS 100-32	200	3550	81
EAS 100-32	250	3550	82
EAS 125-20	45	3550	73
EAS 125-20	55	3550	74
EAS 125-20	75	3550	75
EAS 125-20	90	3550	76
EAS 125-26	37	3550	73
EAS 125-26	45	3550	73
EAS 125-26	55	3550	74
EAS 125-26	75	3550	75
EAS 150-20	55	3550	74
EAS 150-20	75	3550	75
EAS 150-20	90	3550	76
EAS 150-20	110	3550	77
EAS 150-26	160	3550	78
EAS 150-26	185	3550	80
EAS 150-26	200	3550	81
EAS 150-26	250	3550	82

Sound pressure level measurements were made in a noiseless environment with 60 Hz electric motors.

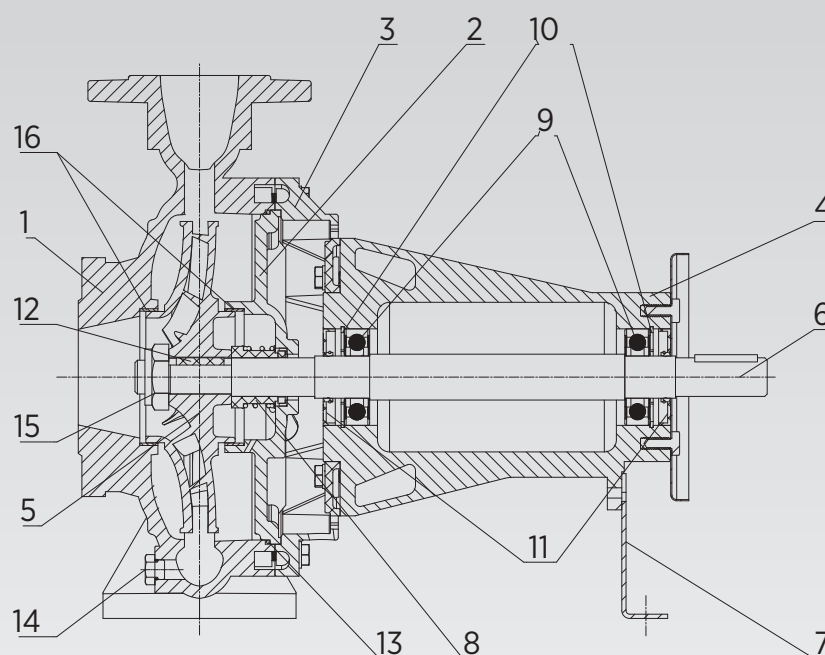
EA SERIES PUMP IDENTIFICATION CODE



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



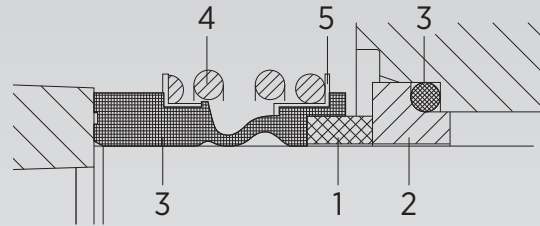
REF. N.	PART NAME	MATERIAL	STANDARDS	
			EUROPE	USA
1	Pump Body	Cast Iron	EN 1561 - GJL 250 (JL1040)	ASTM Class 35
2	Seal Body	Cast Iron	EN 1561 - GJL 250 (JL1040)	ASTM Class 35
3	Pump Flange	Cast Iron	EN 1561 - GJL 200 (JL1030)	ASTM Class 25
4	Bearing Body	Cast Iron	EN 1561 - GJL 200 (JL1030)	ASTM Class 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

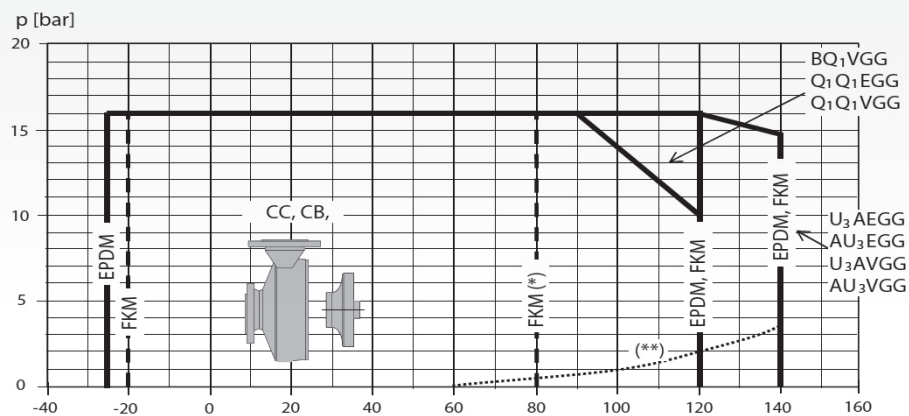
Positions 1-2	Position 3	Positions 4-5
B: Resin-Impregnated Carbon	E : EPDM	G : AISI 304
V: Ceramic	V : FKM (FPM)	
Q1: Silicon Carbide	P : NBR	
U3 : Tungsten Carbide		
A: Antimony-Impregnated Carbon		



Seal Type

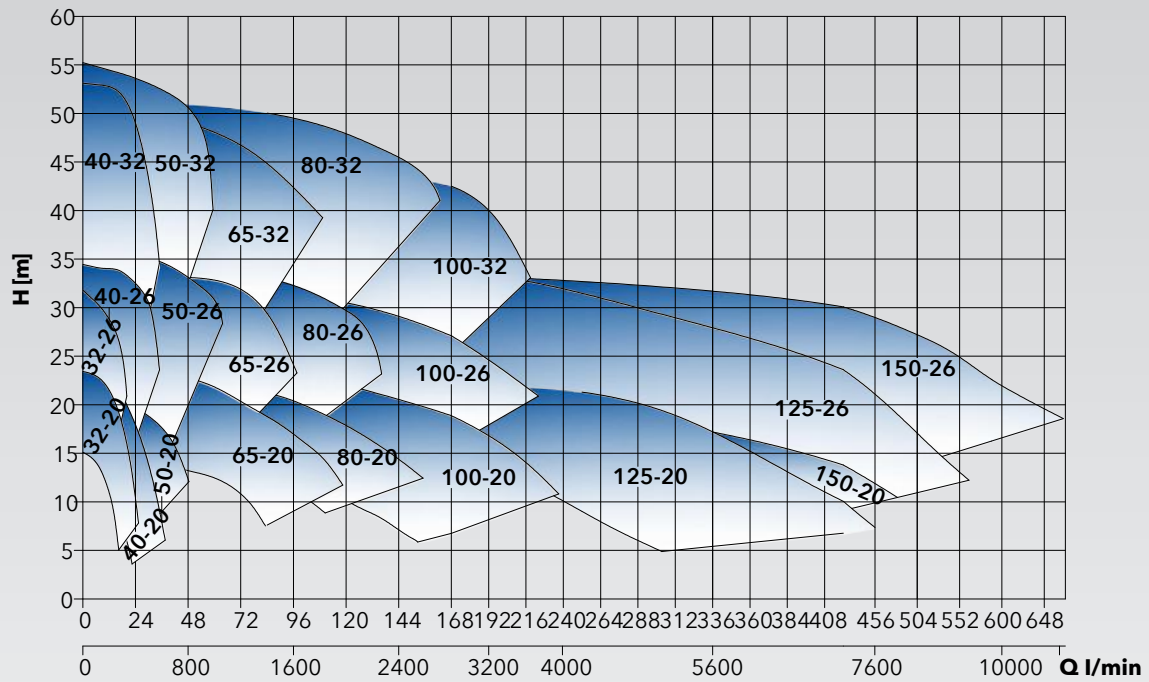
Type	Position					Temperature (°C)
	1	2	3	4	5	
	Rotating Part	Stationary Part	Elastics	Springs	Other Parts	
Standard Mechanical Seal						
B V E G G	B	V	E	G	G	-30/+120
Other Mechanical Seal Types						
V B V G G	V	B	V	G	G	-10/+120
Q ₁ B V G G	Q ₁	B	V	G	G	-10/+120
Q ₁ Q ₁ V G G	Q ₁	Q ₁	V	G	G	-10/+120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

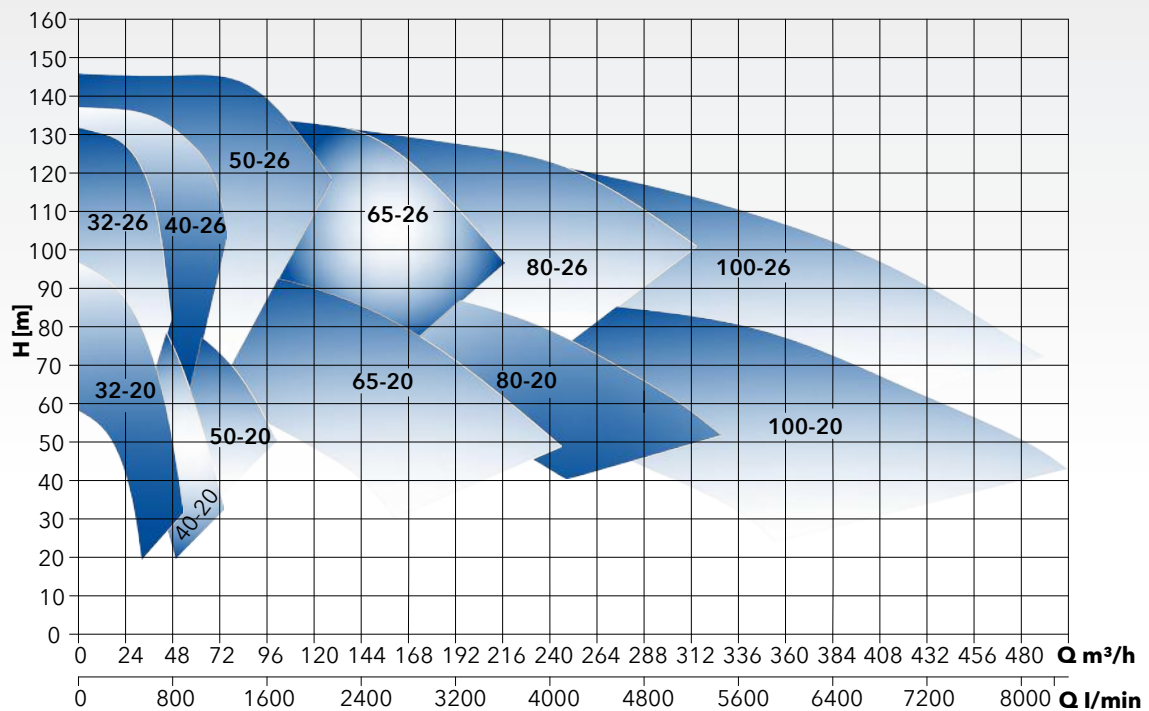


CC: Cast Iron Body, Cast Iron Fan
CB: Cast Iron Body, Bronze Fan

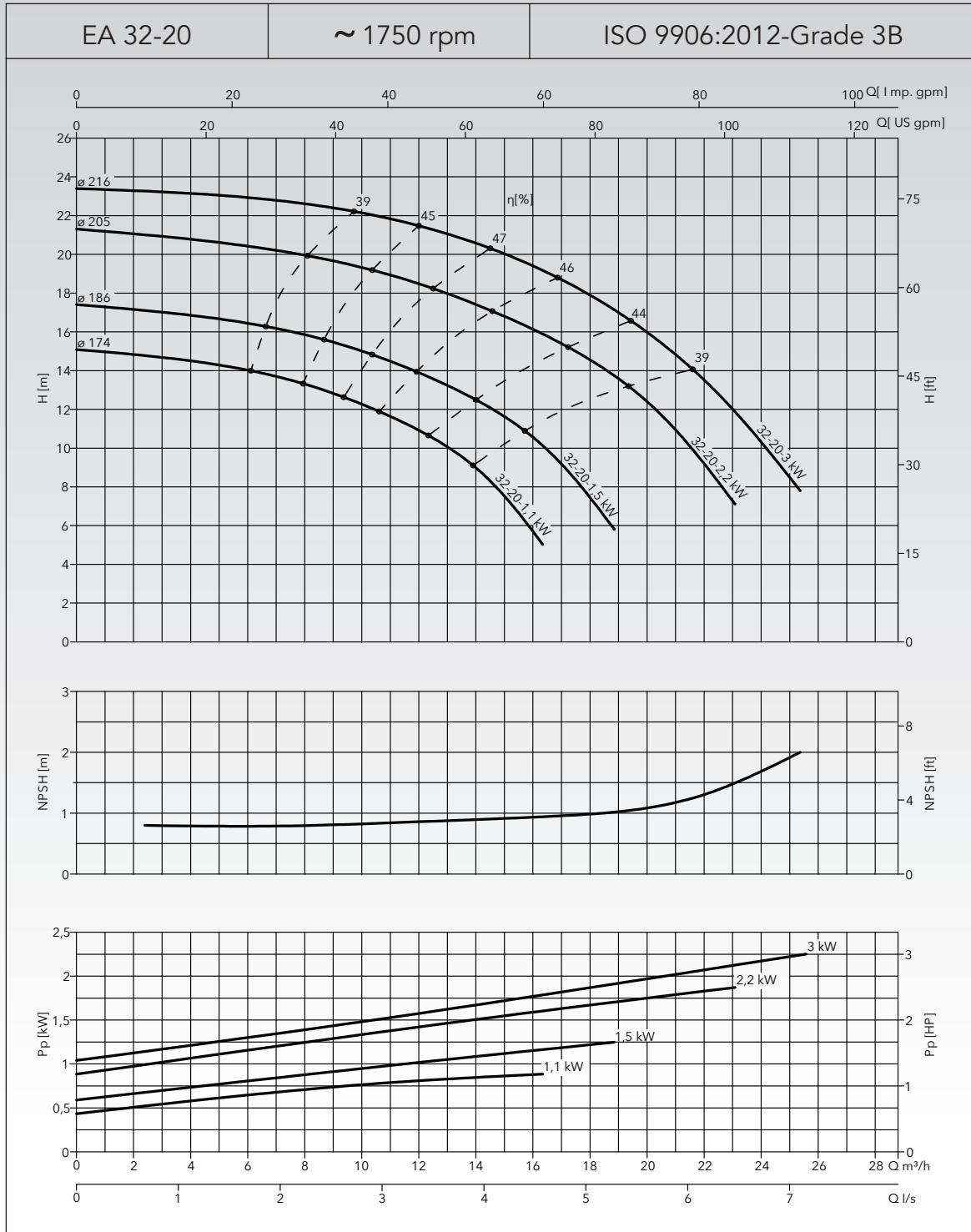
PERFORMANCE CURVES 60Hz, 2 POLES



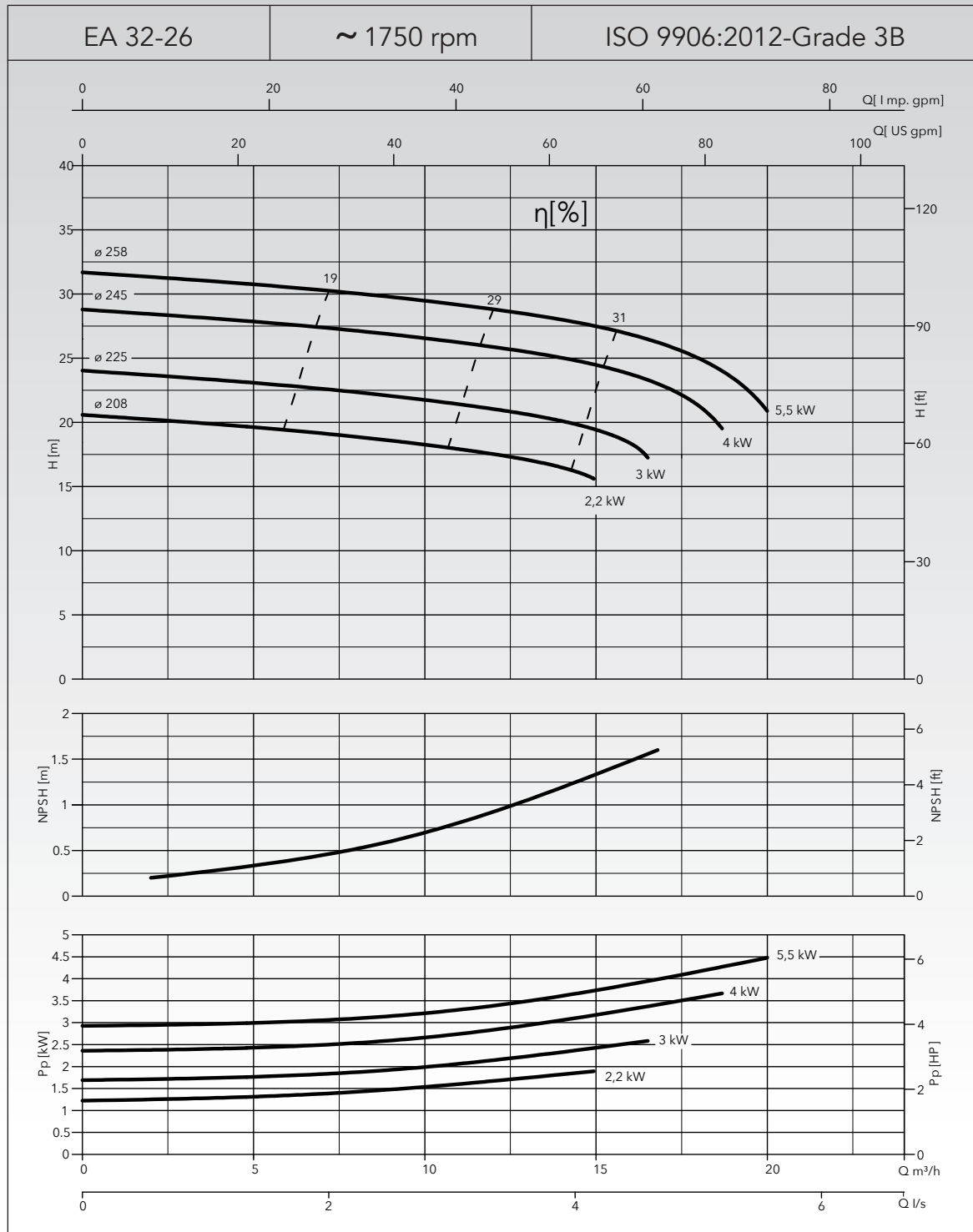
PERFORMANCE CURVES 60Hz, 4 POLES



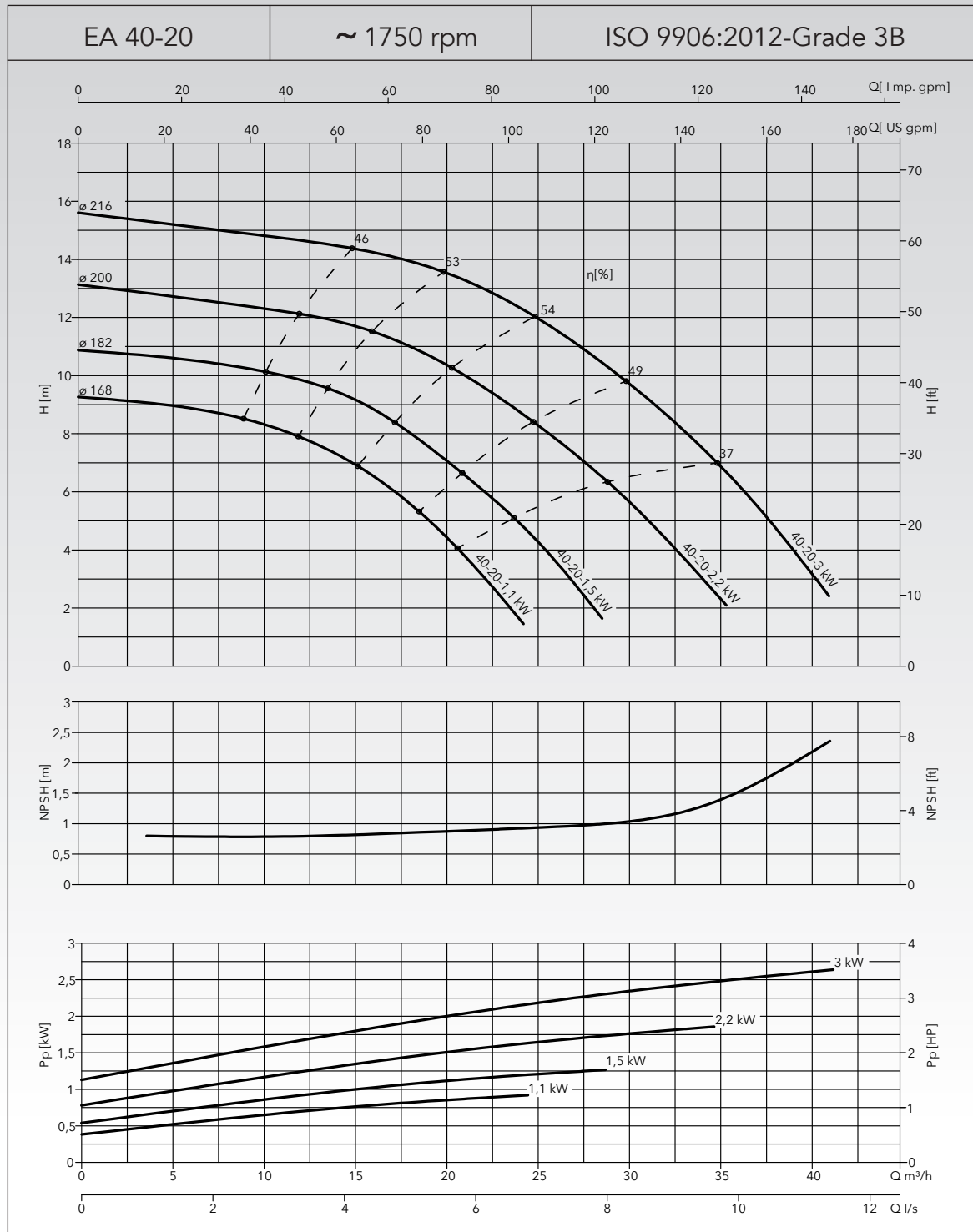
HYDRAULIC PERFORMANCE CURVES



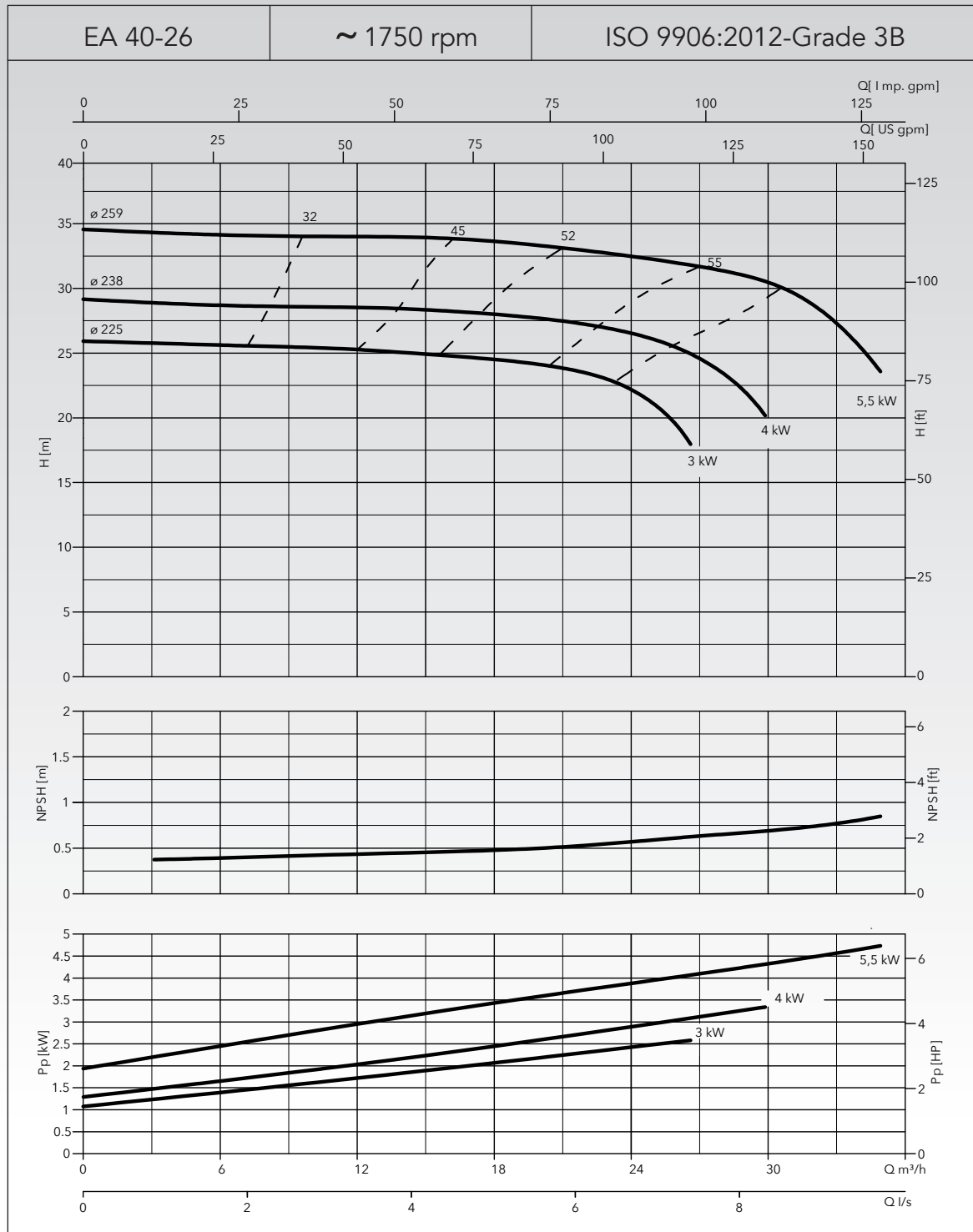
HYDRAULIC PERFORMANCE CURVES



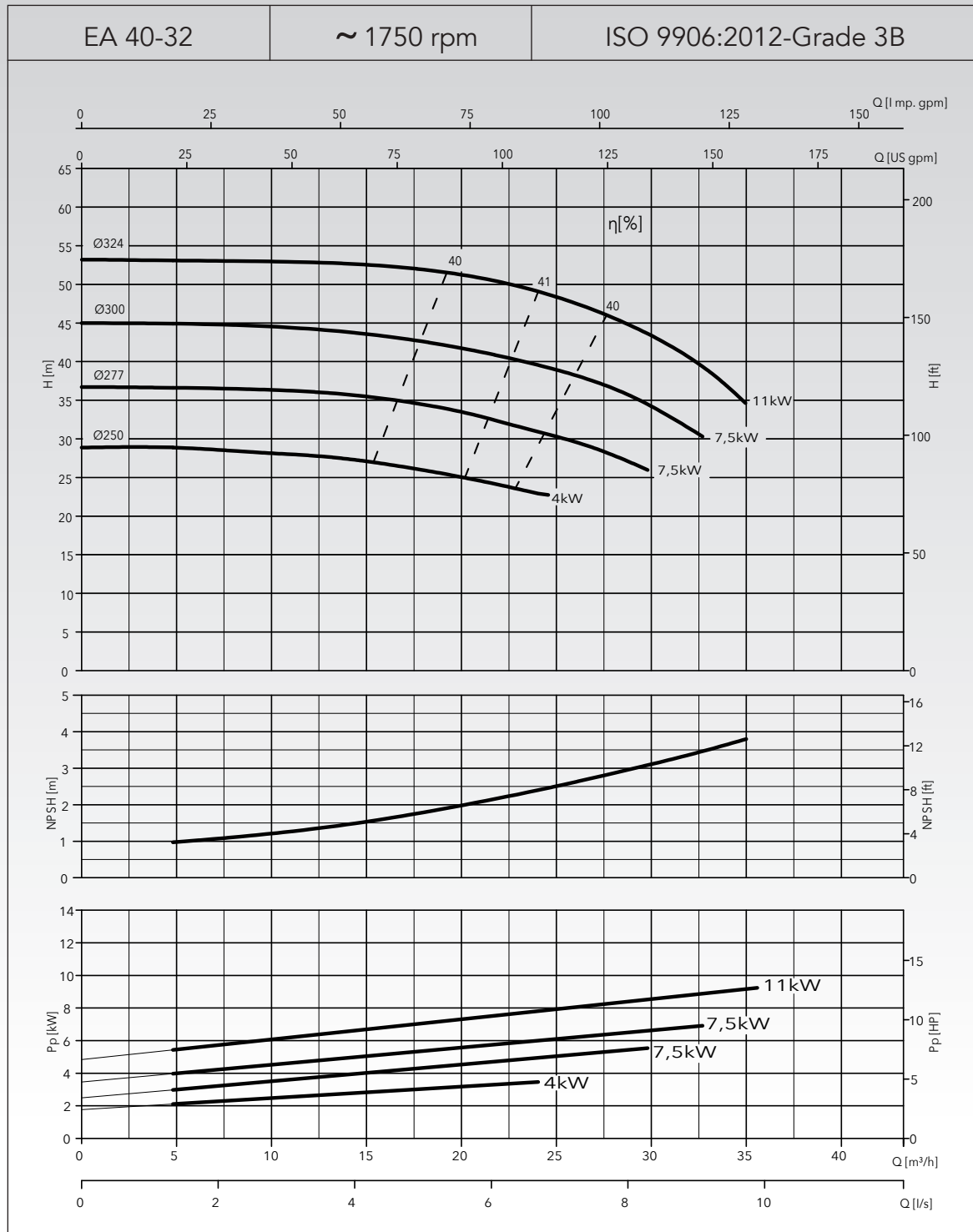
HYDRAULIC PERFORMANCE CURVES



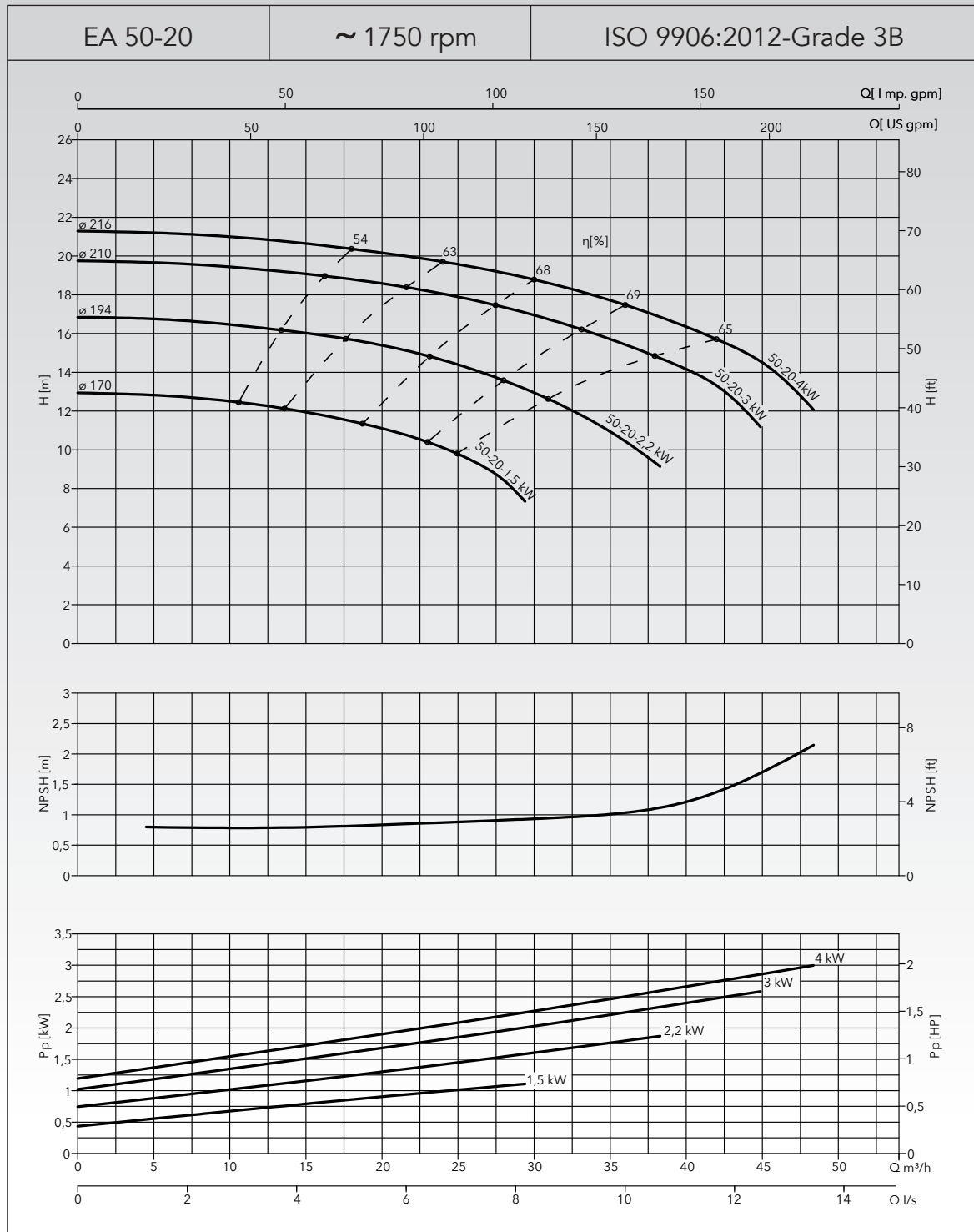
HYDRAULIC PERFORMANCE CURVES



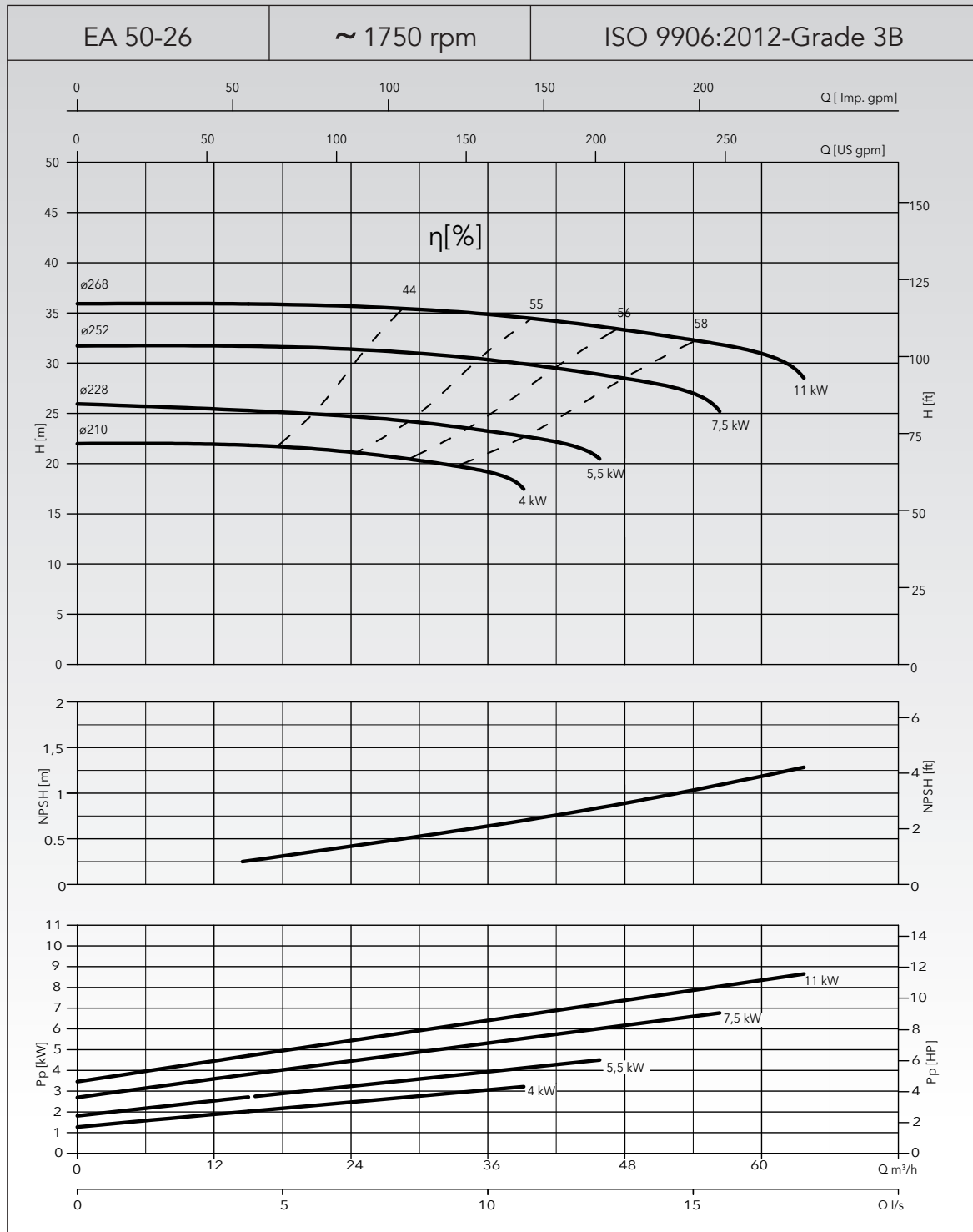
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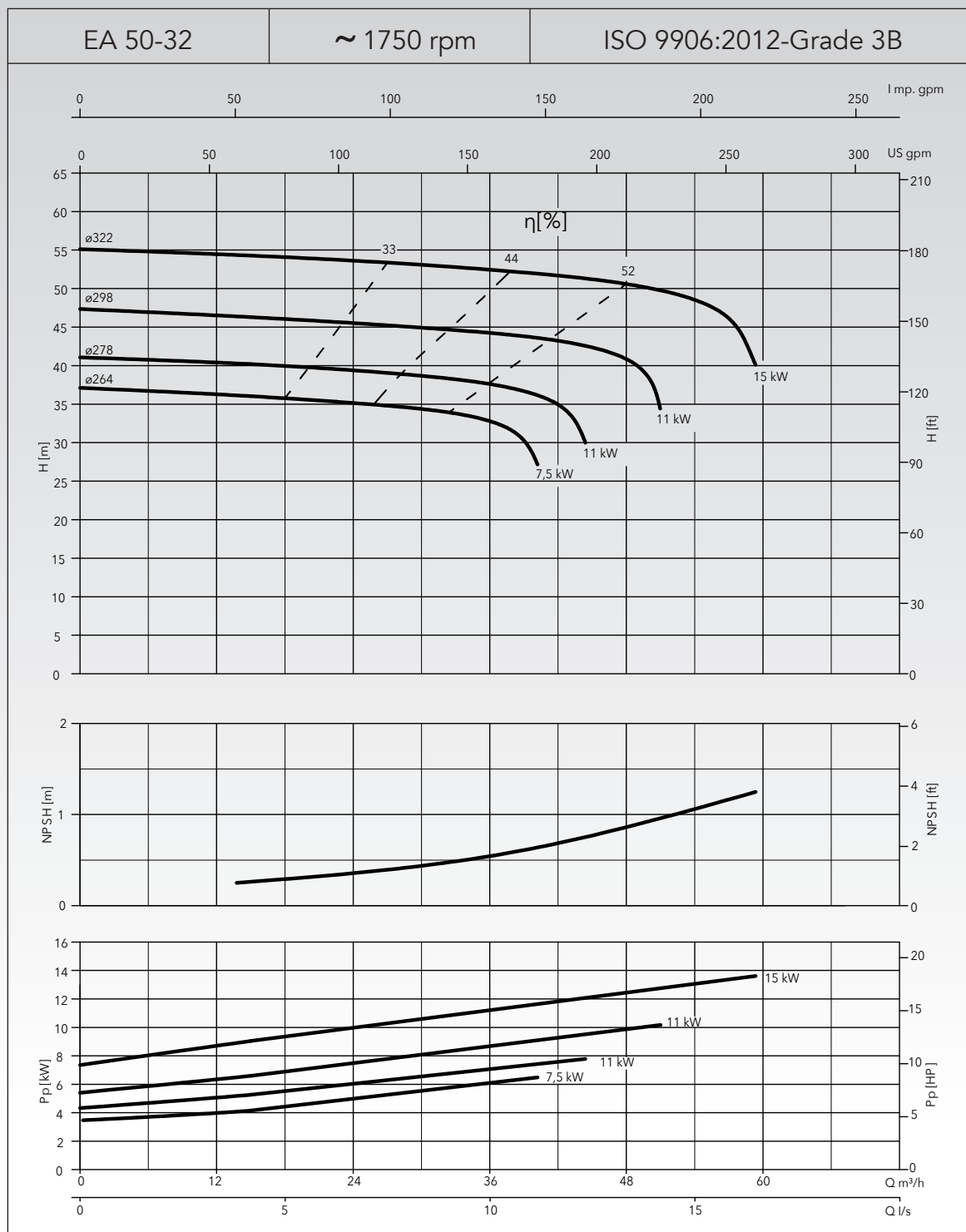
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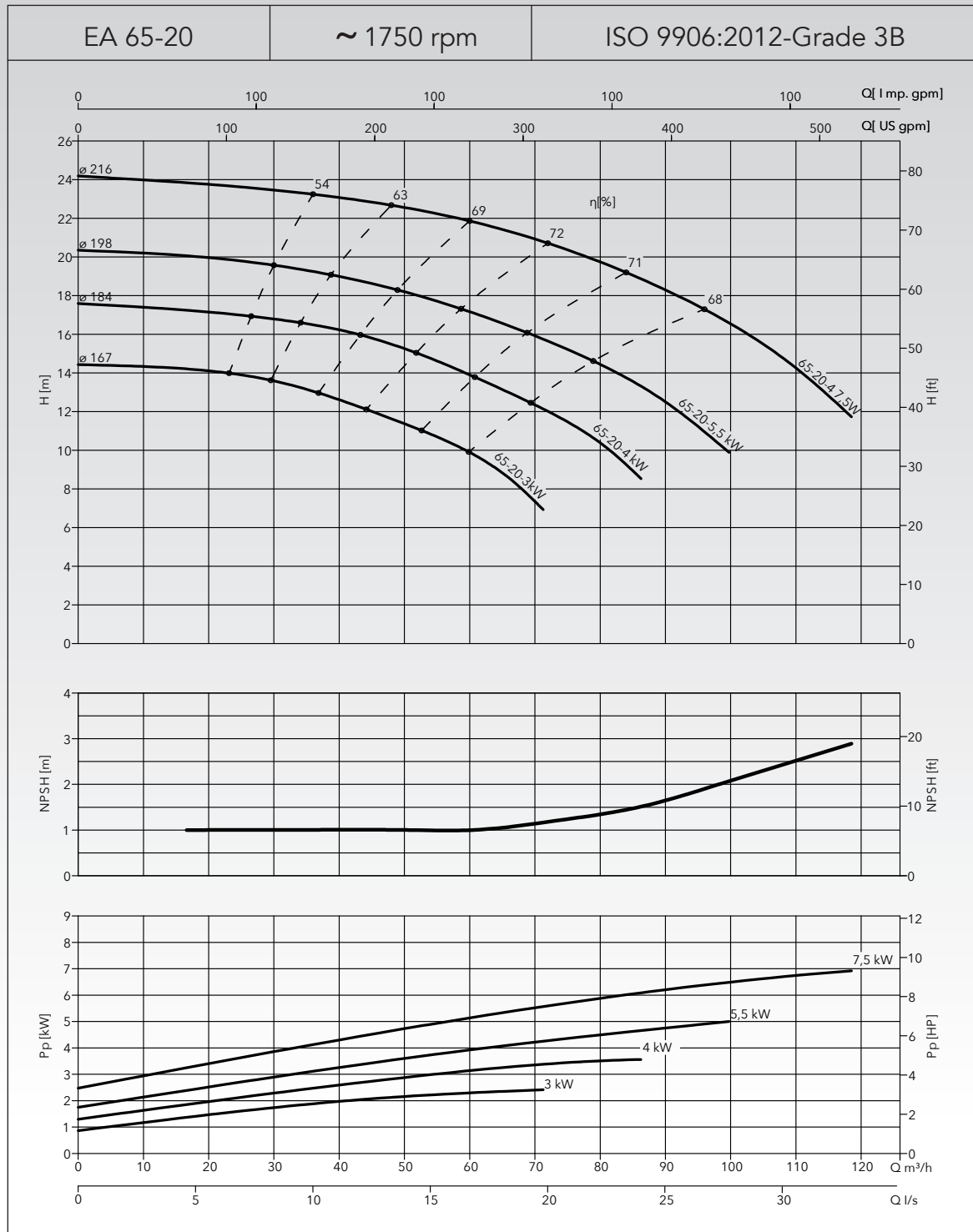
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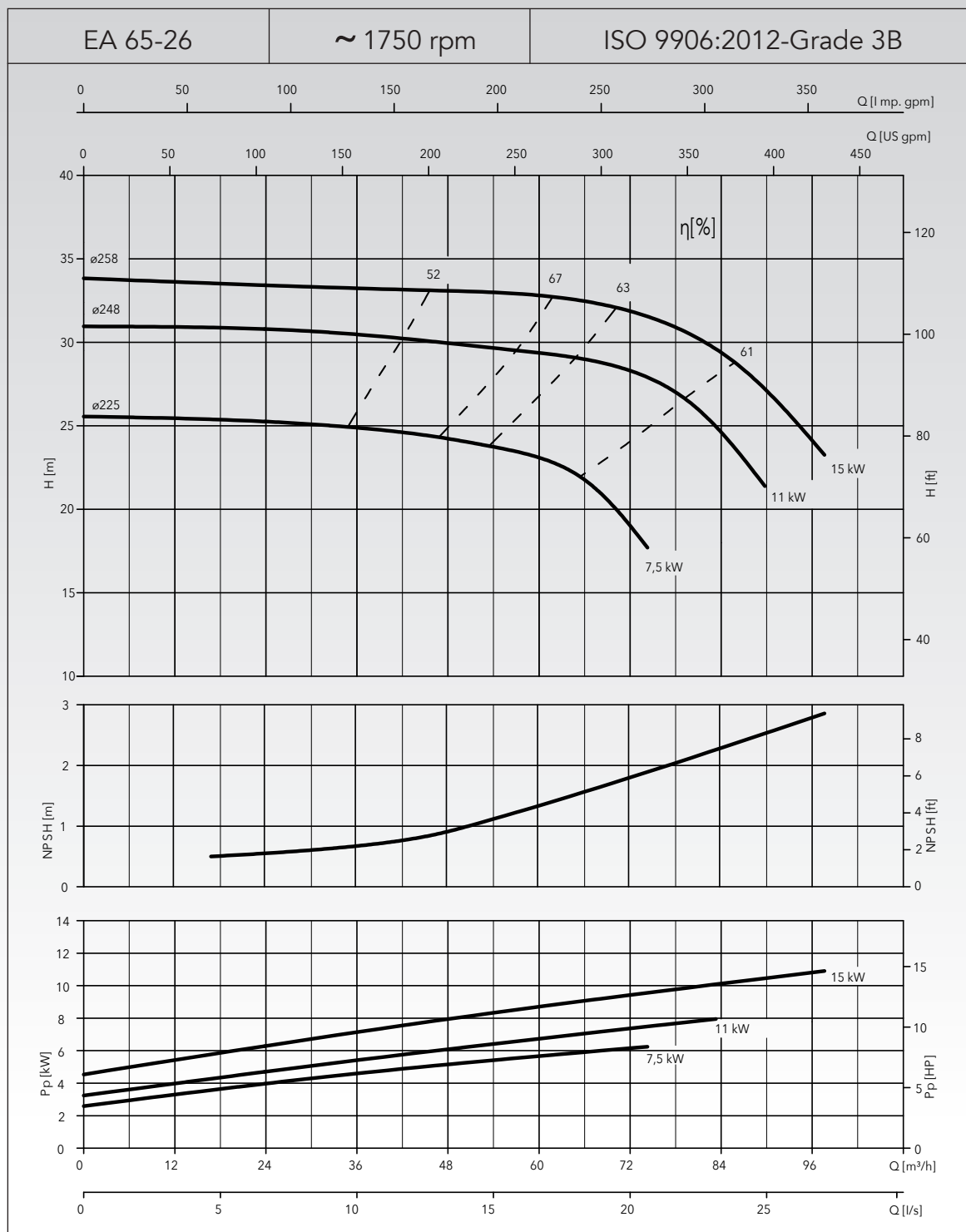
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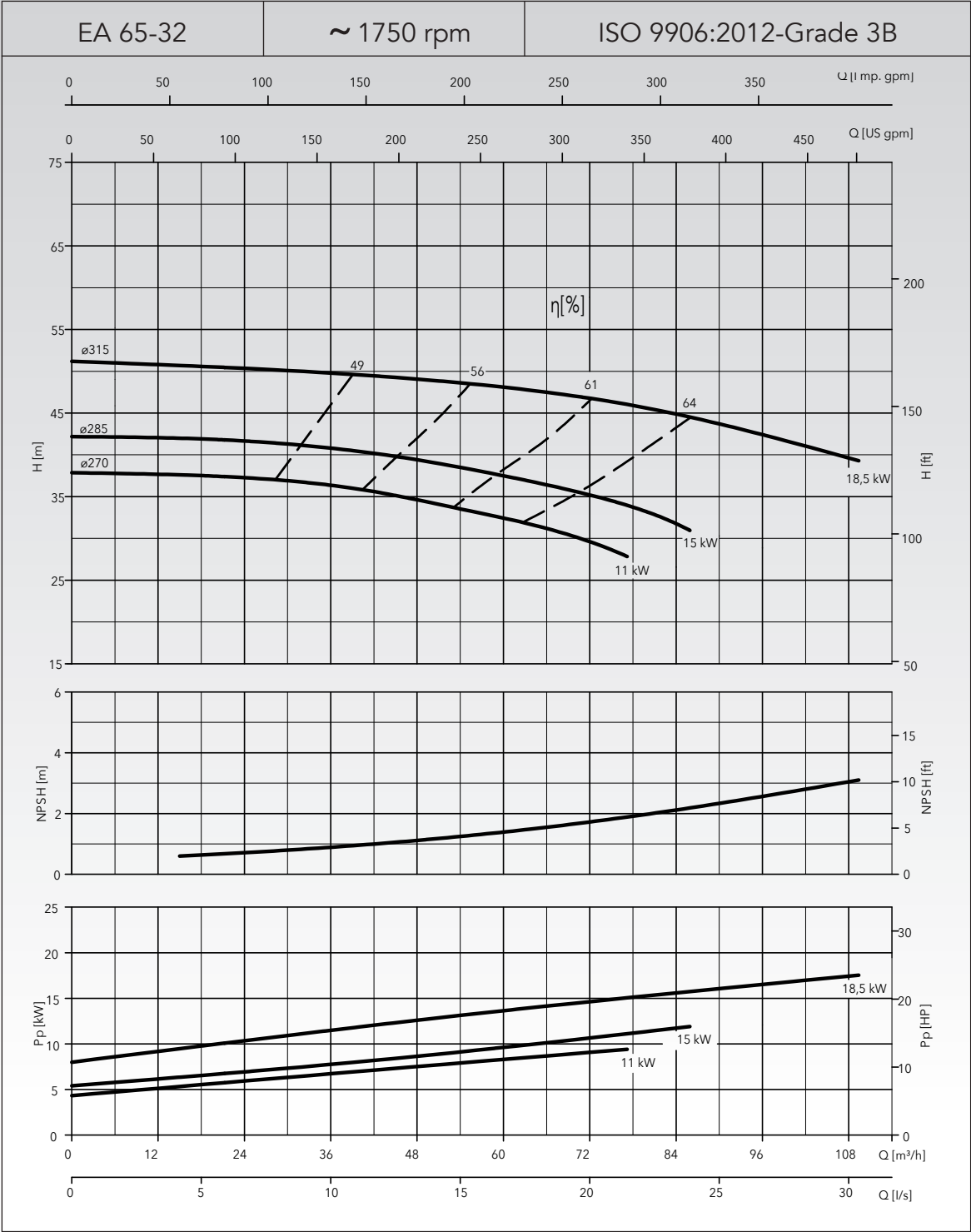
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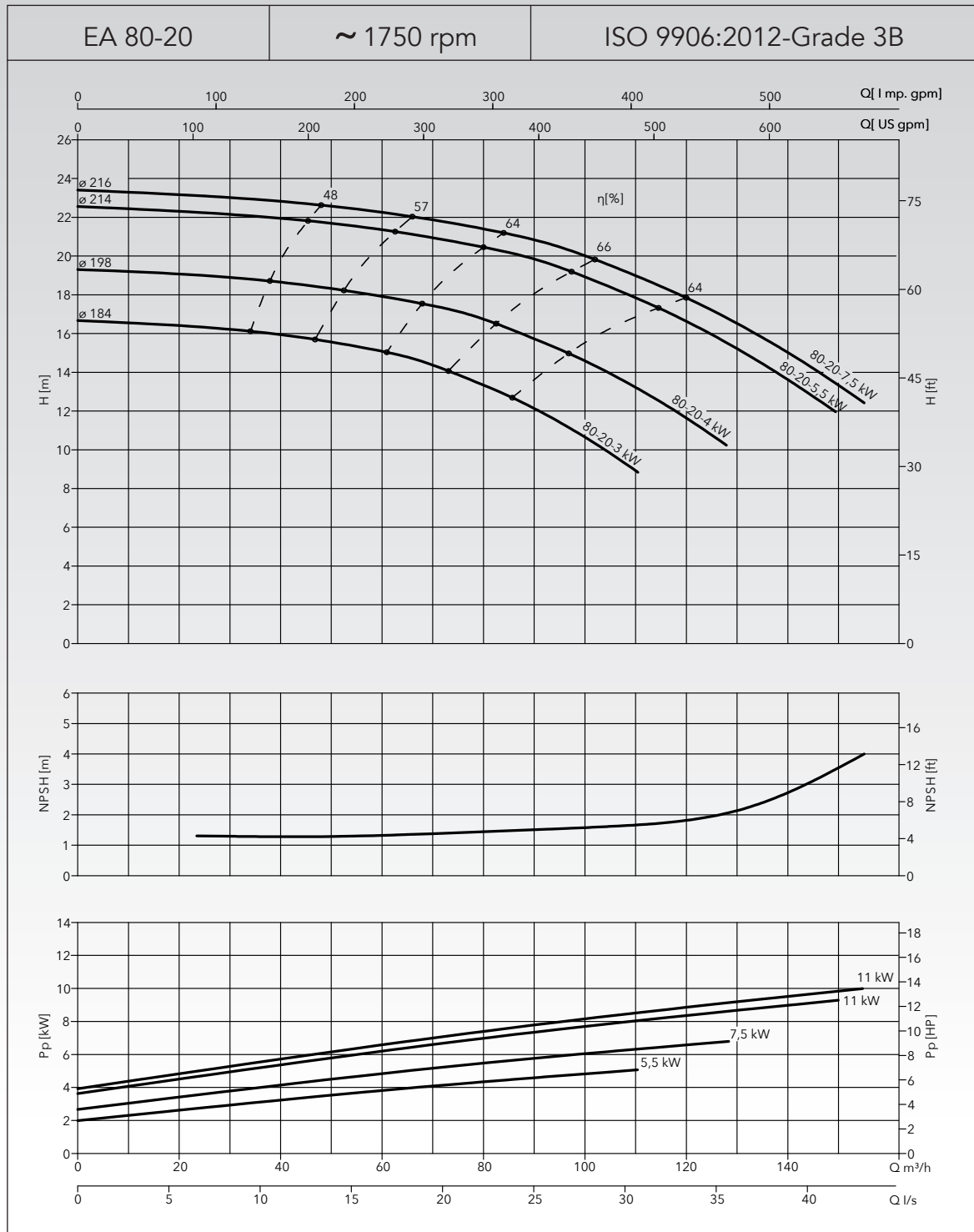
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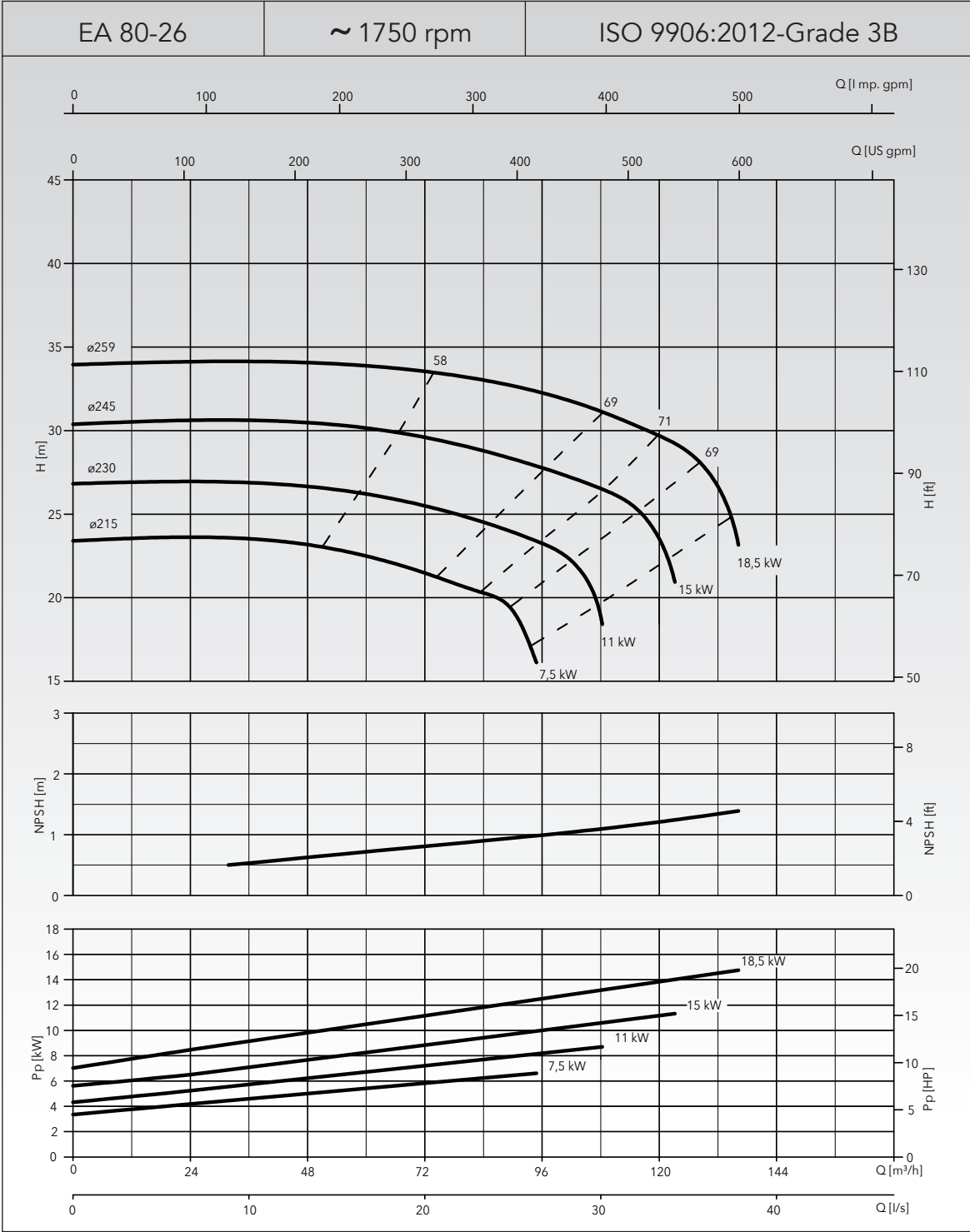
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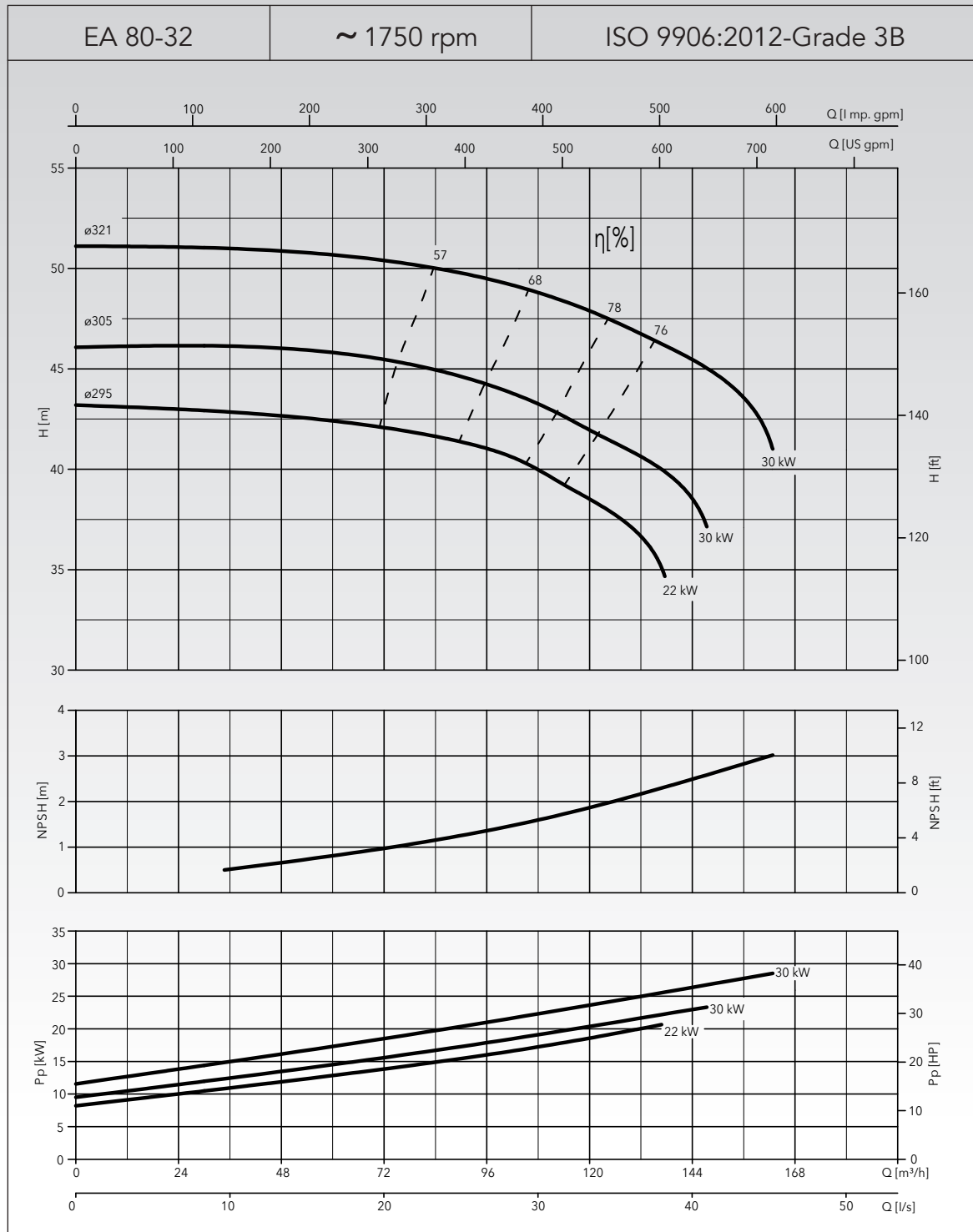
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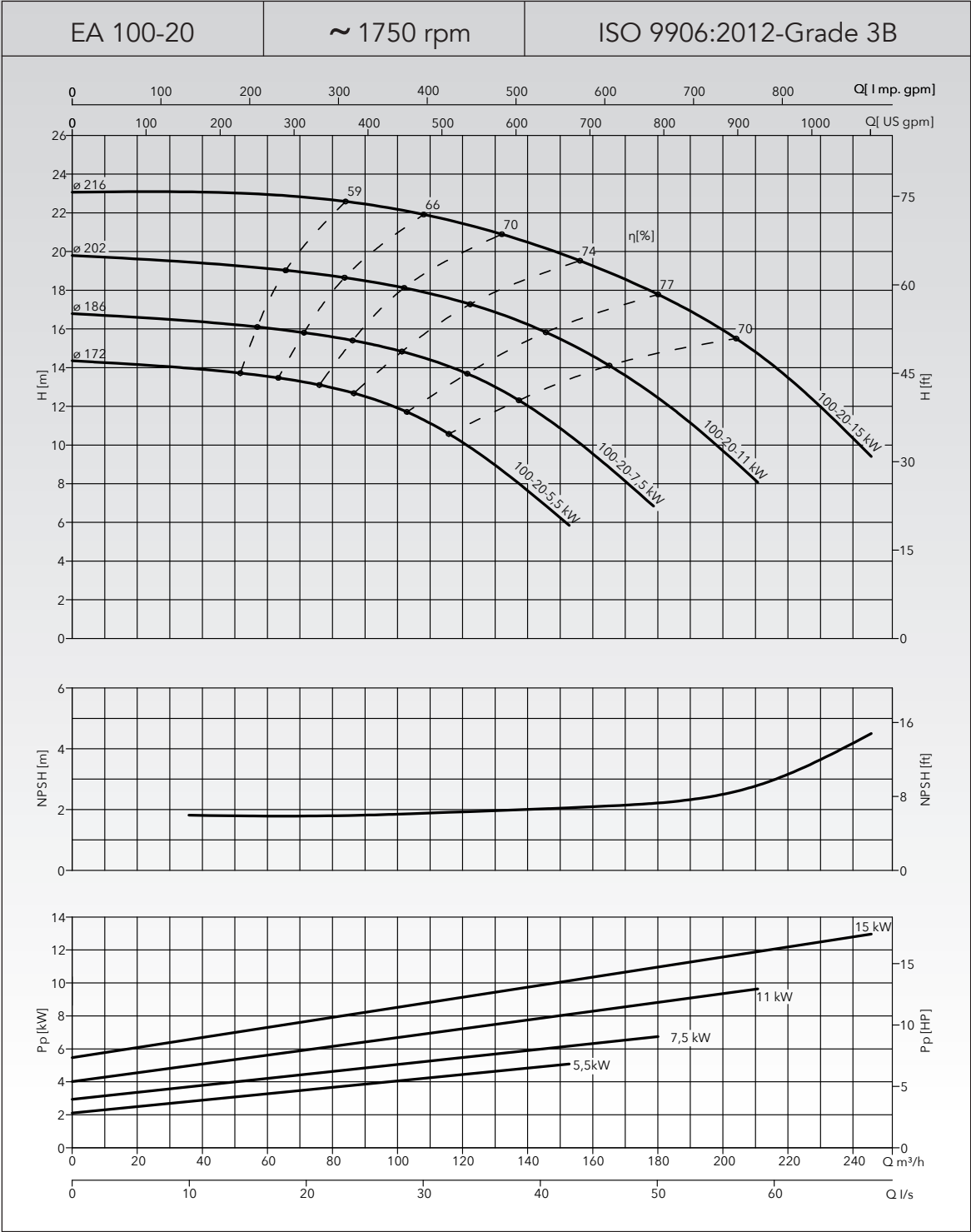
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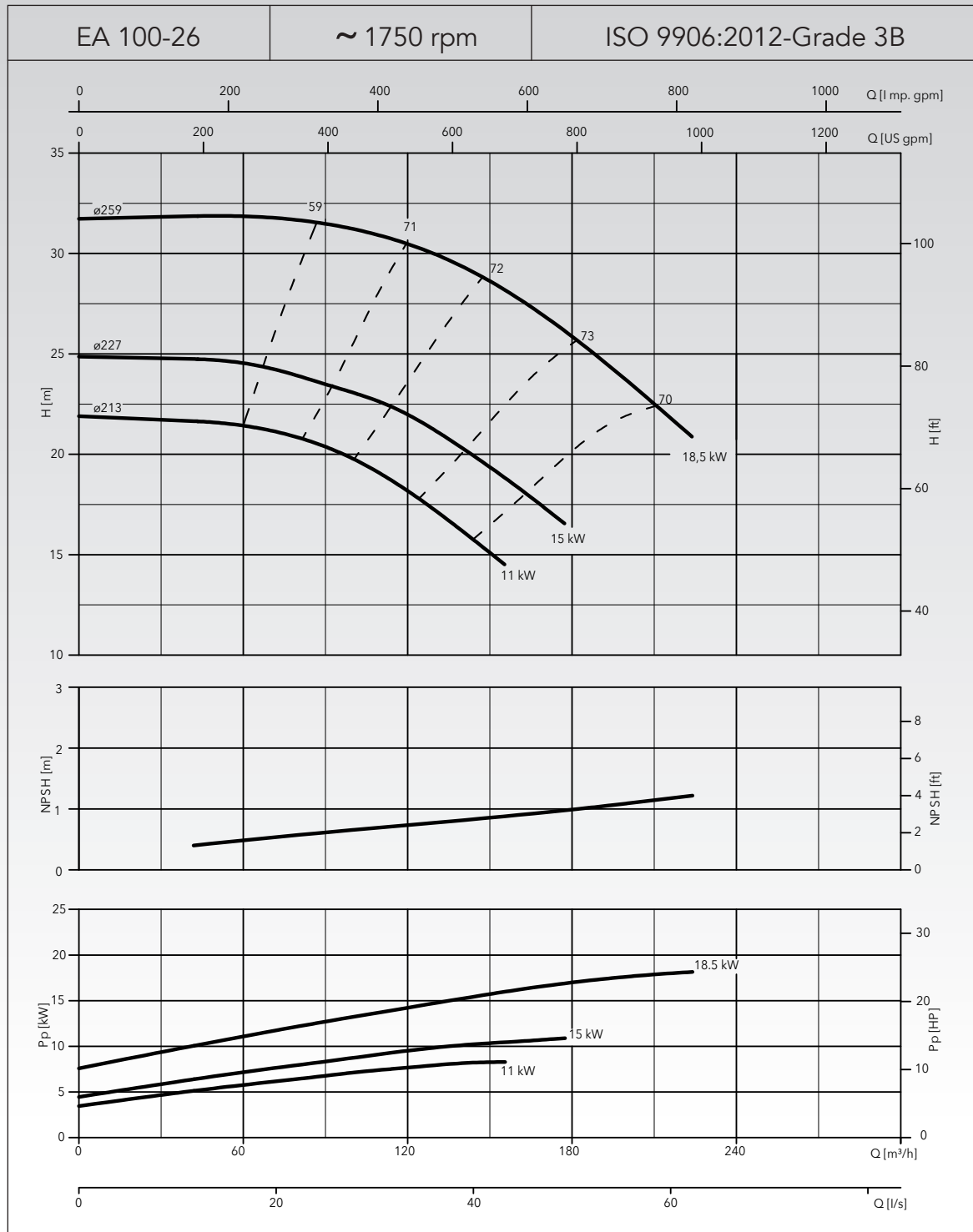
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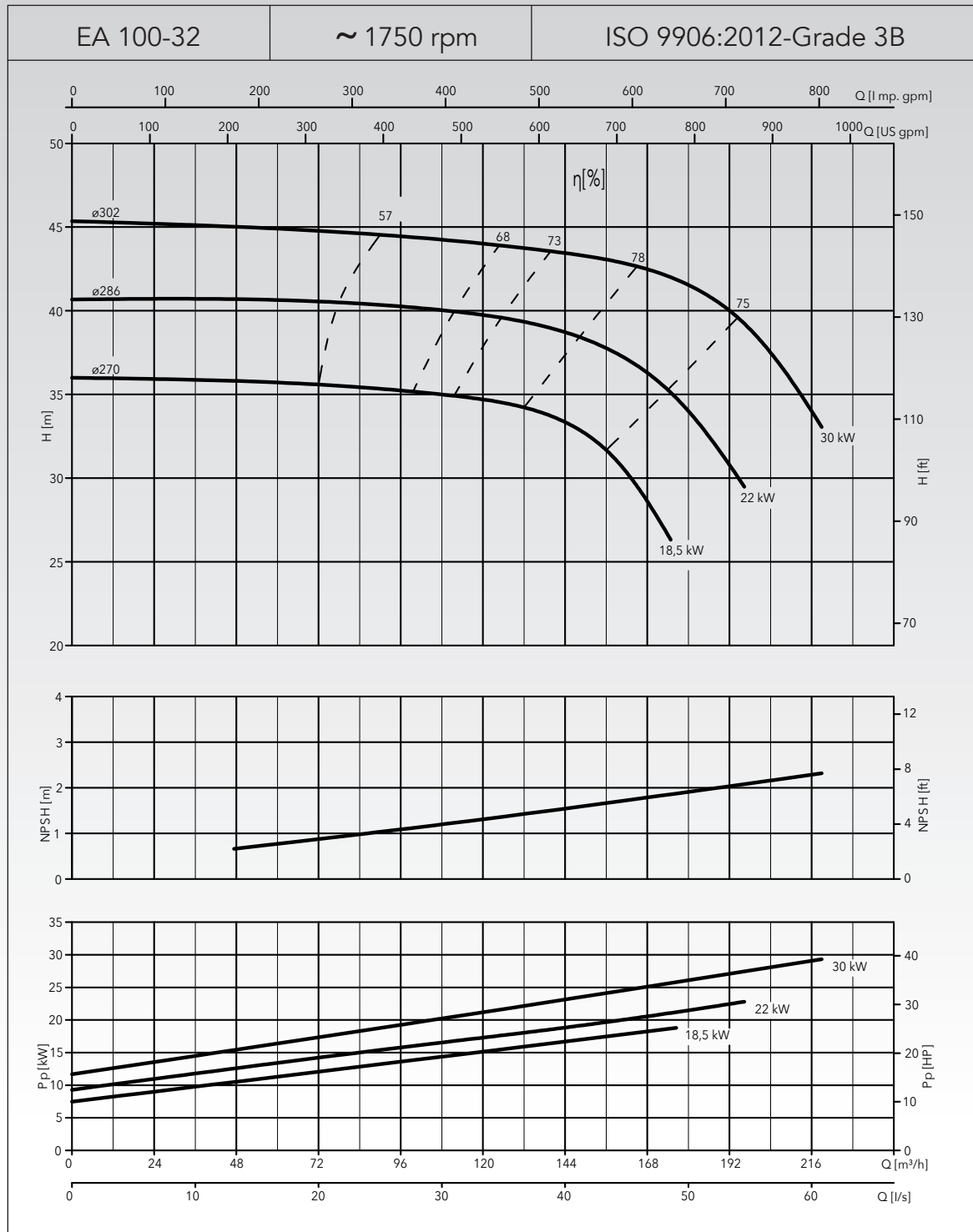
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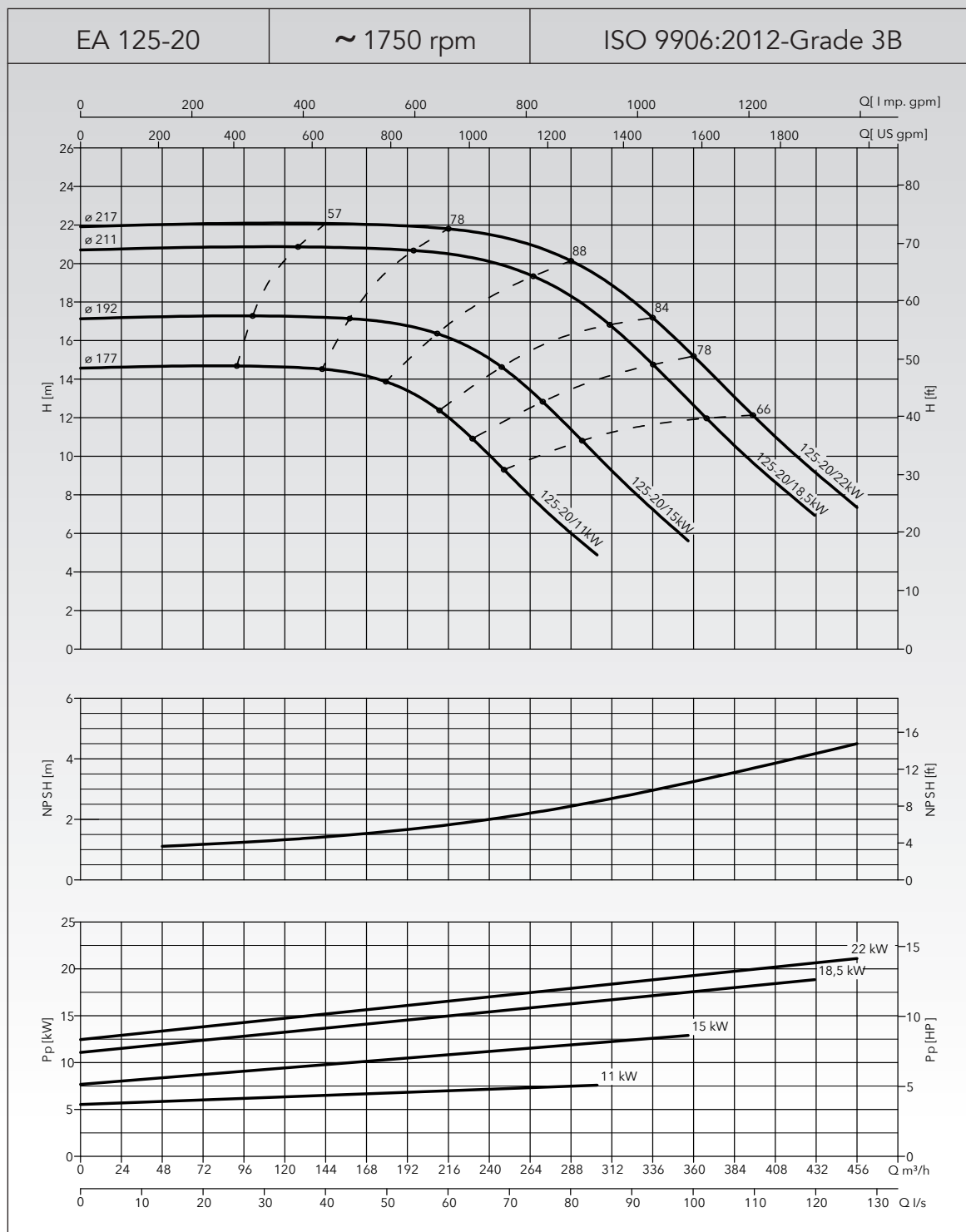
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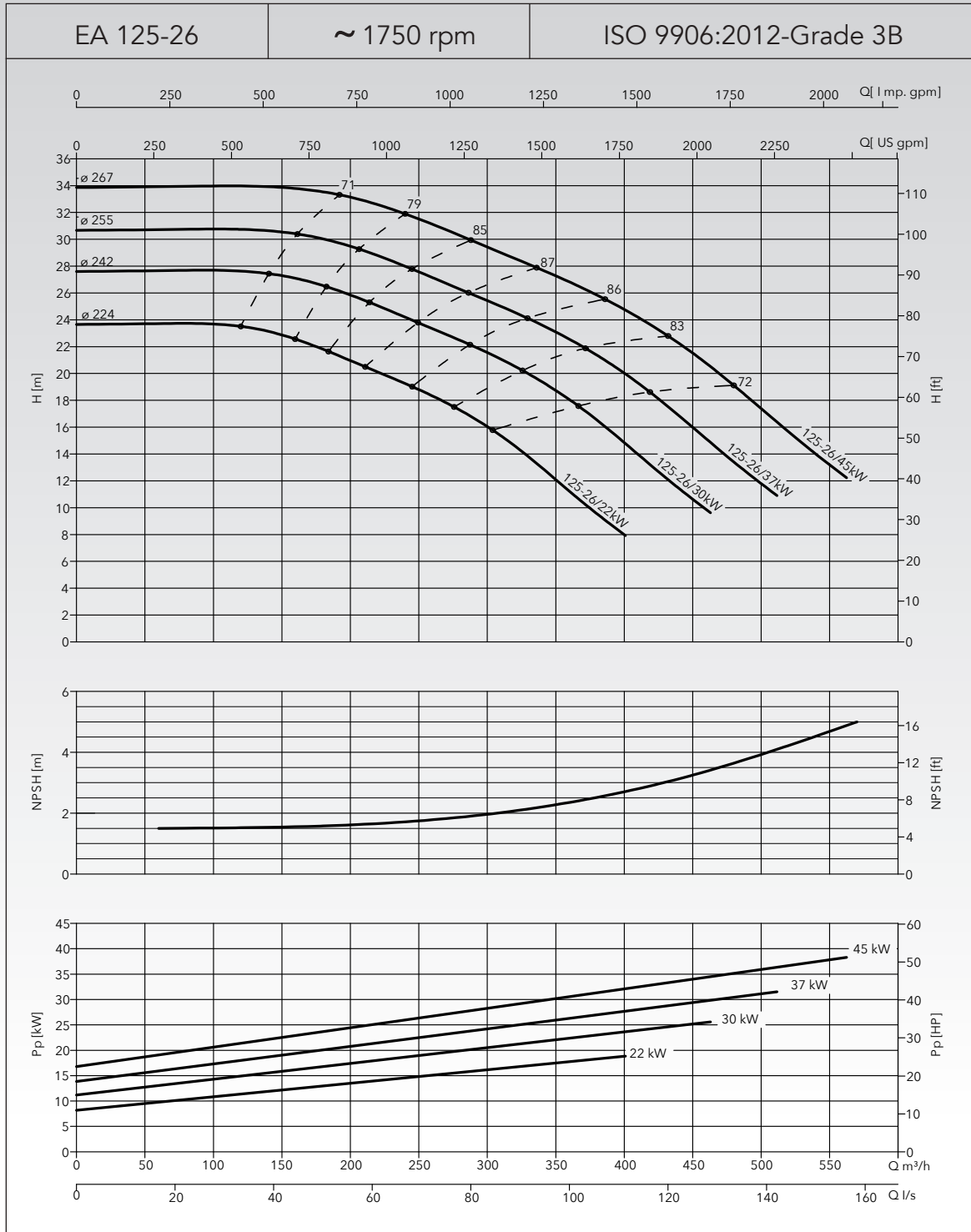
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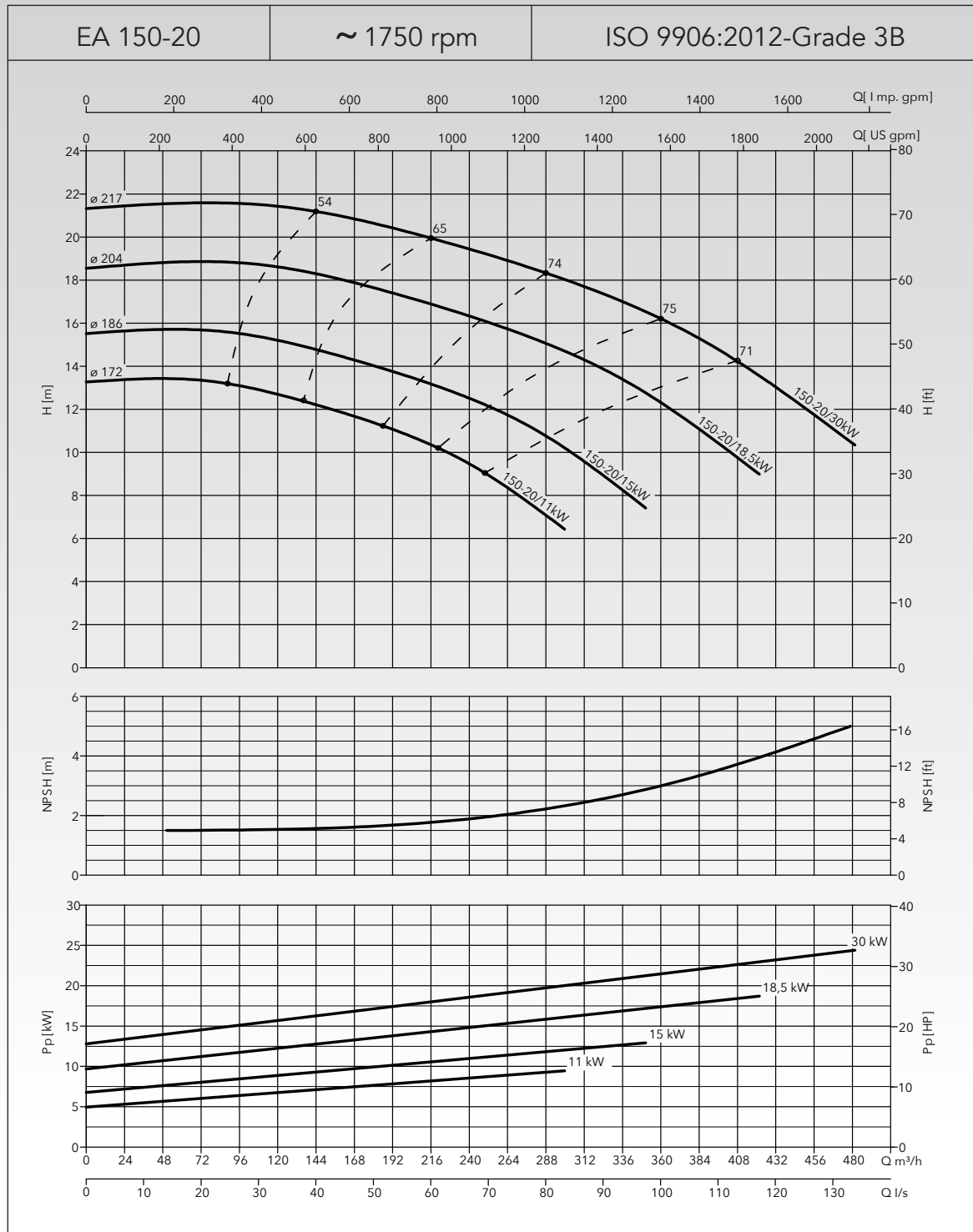
HYDRAULIC PERFORMANCE CURVES



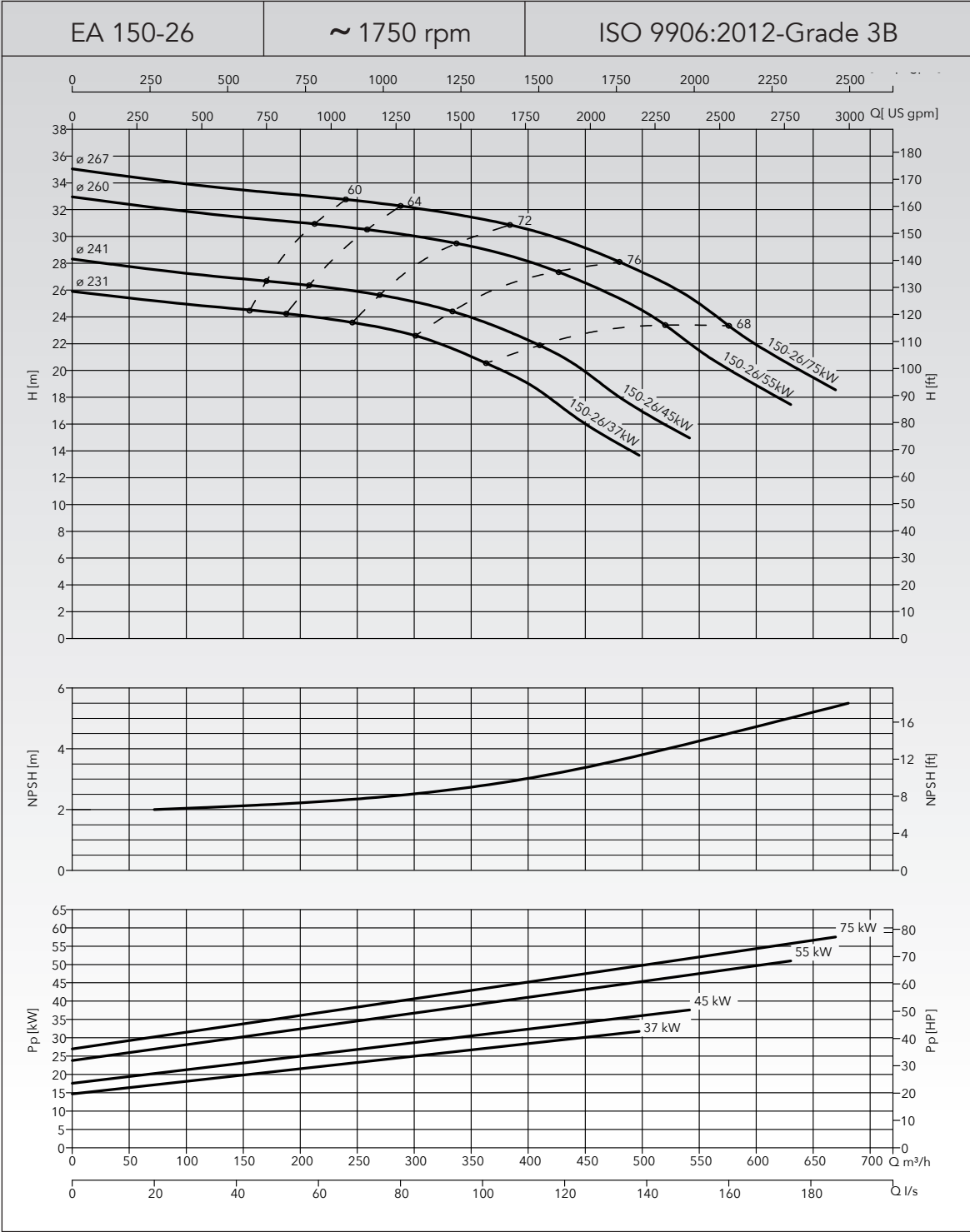
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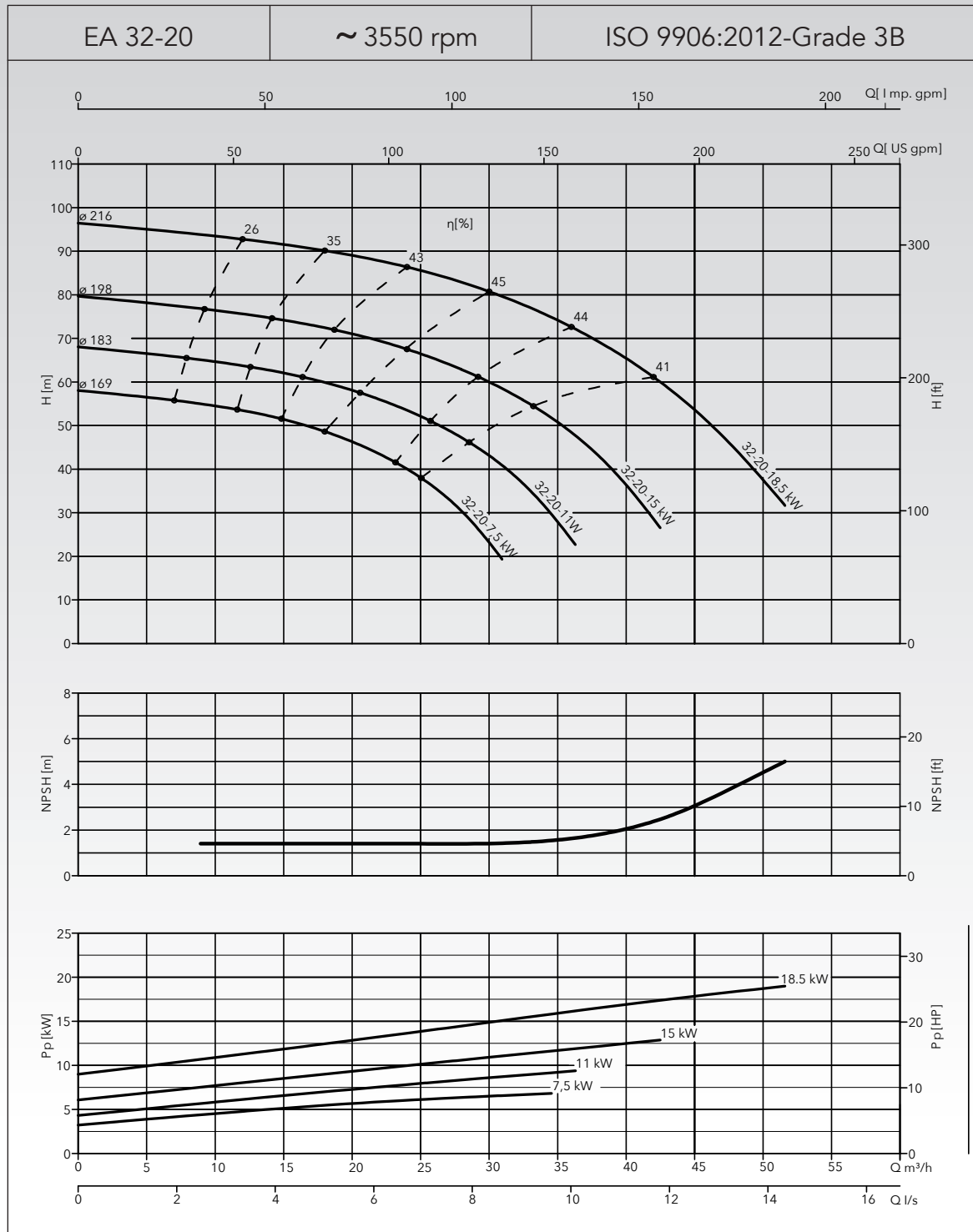
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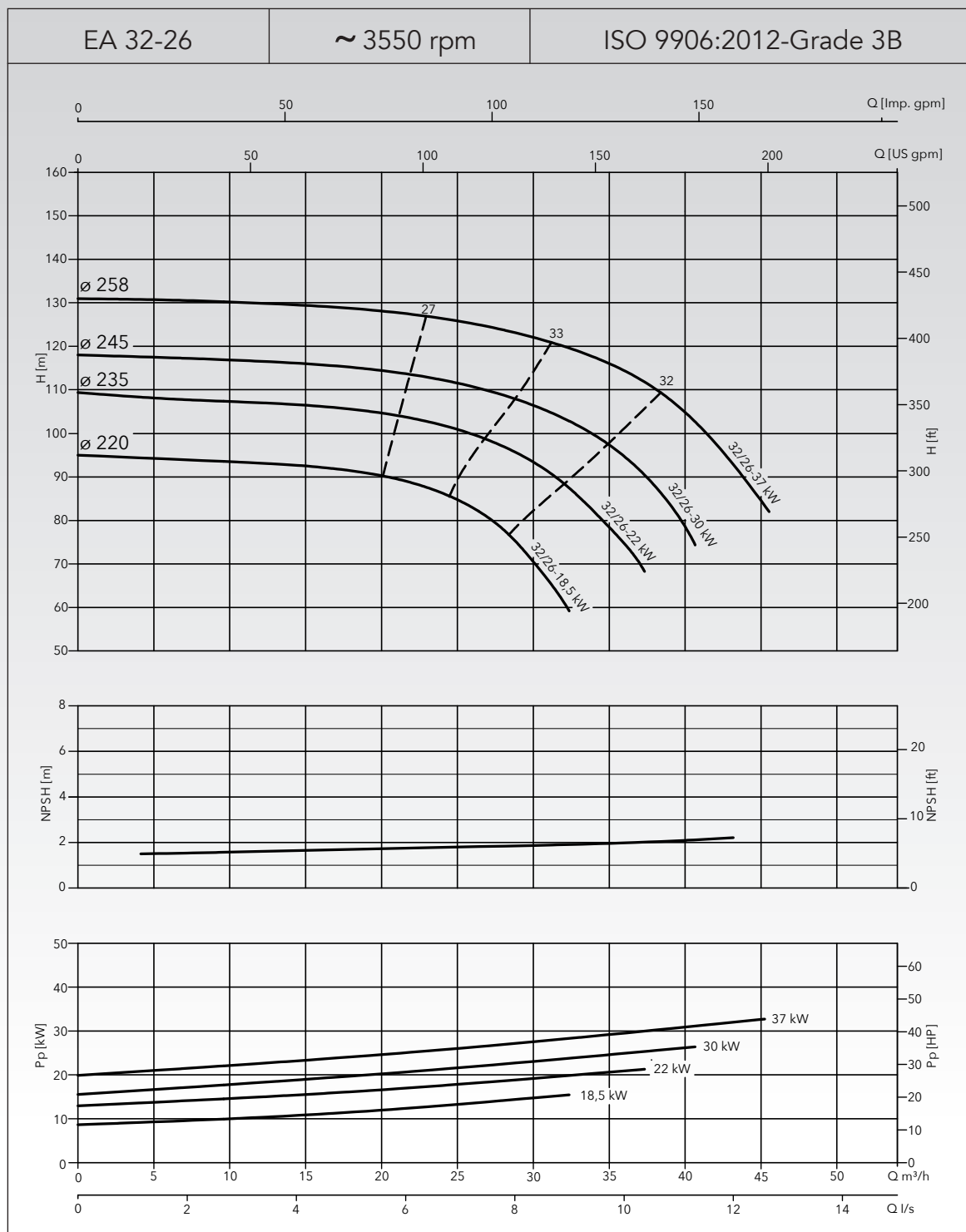
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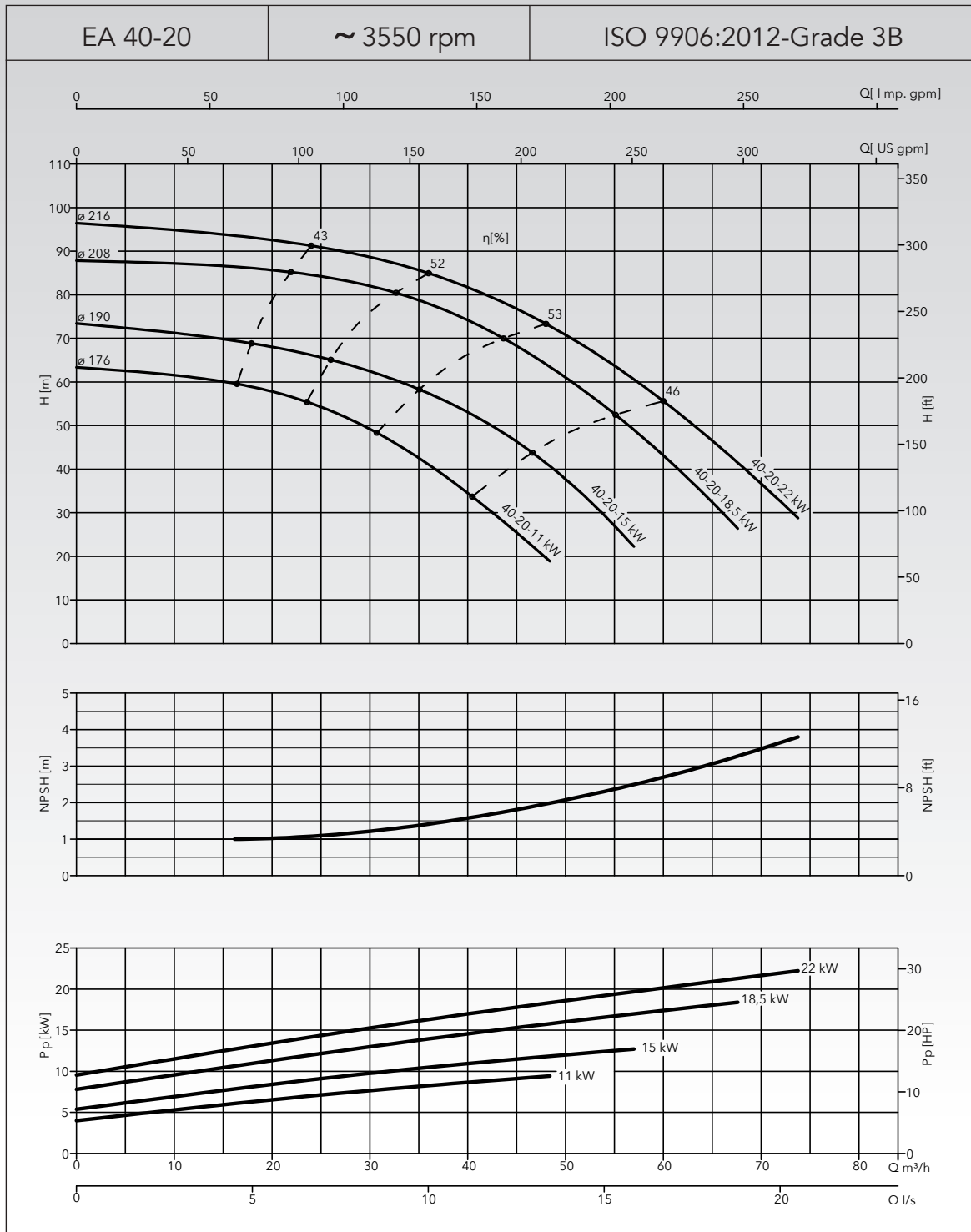
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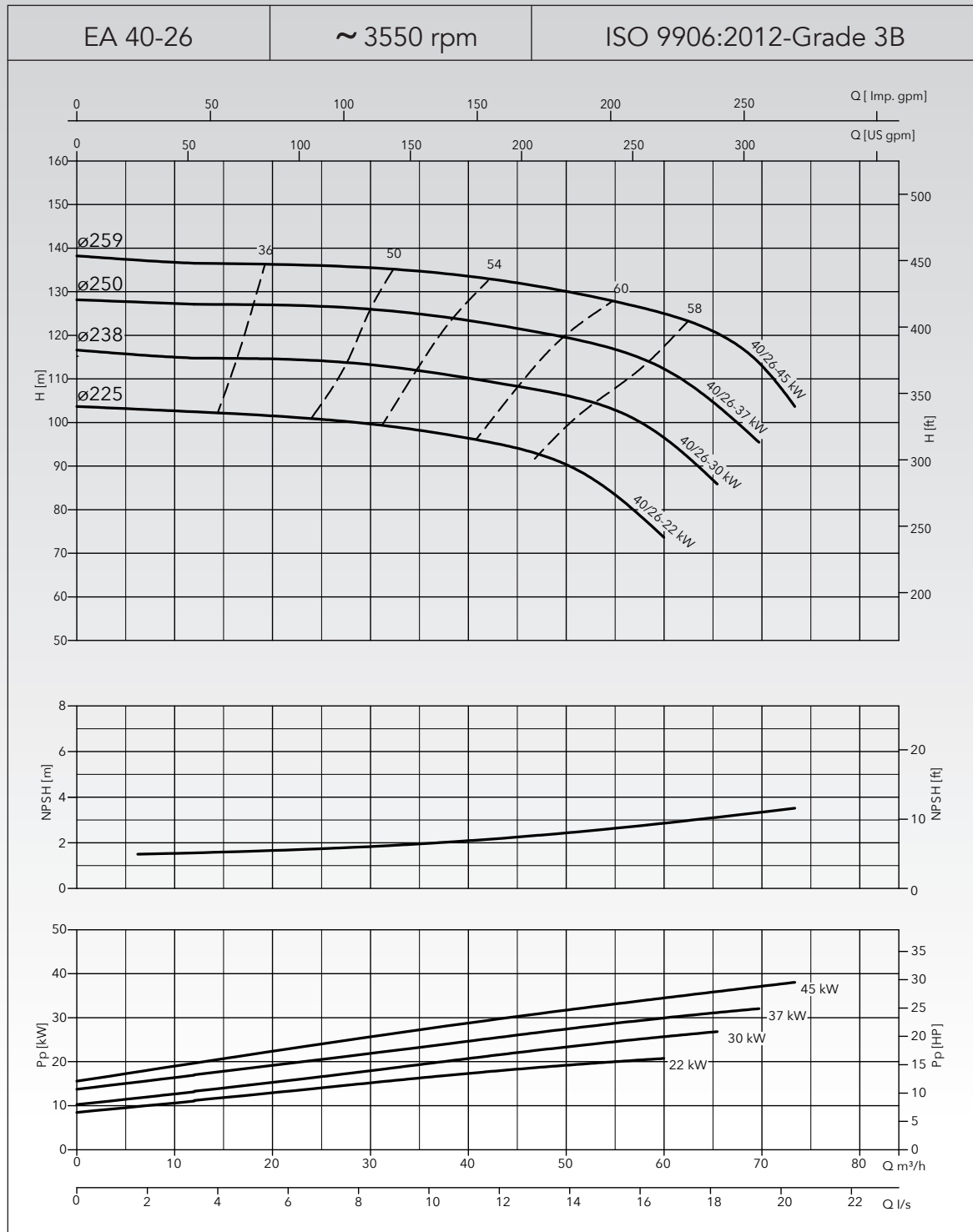
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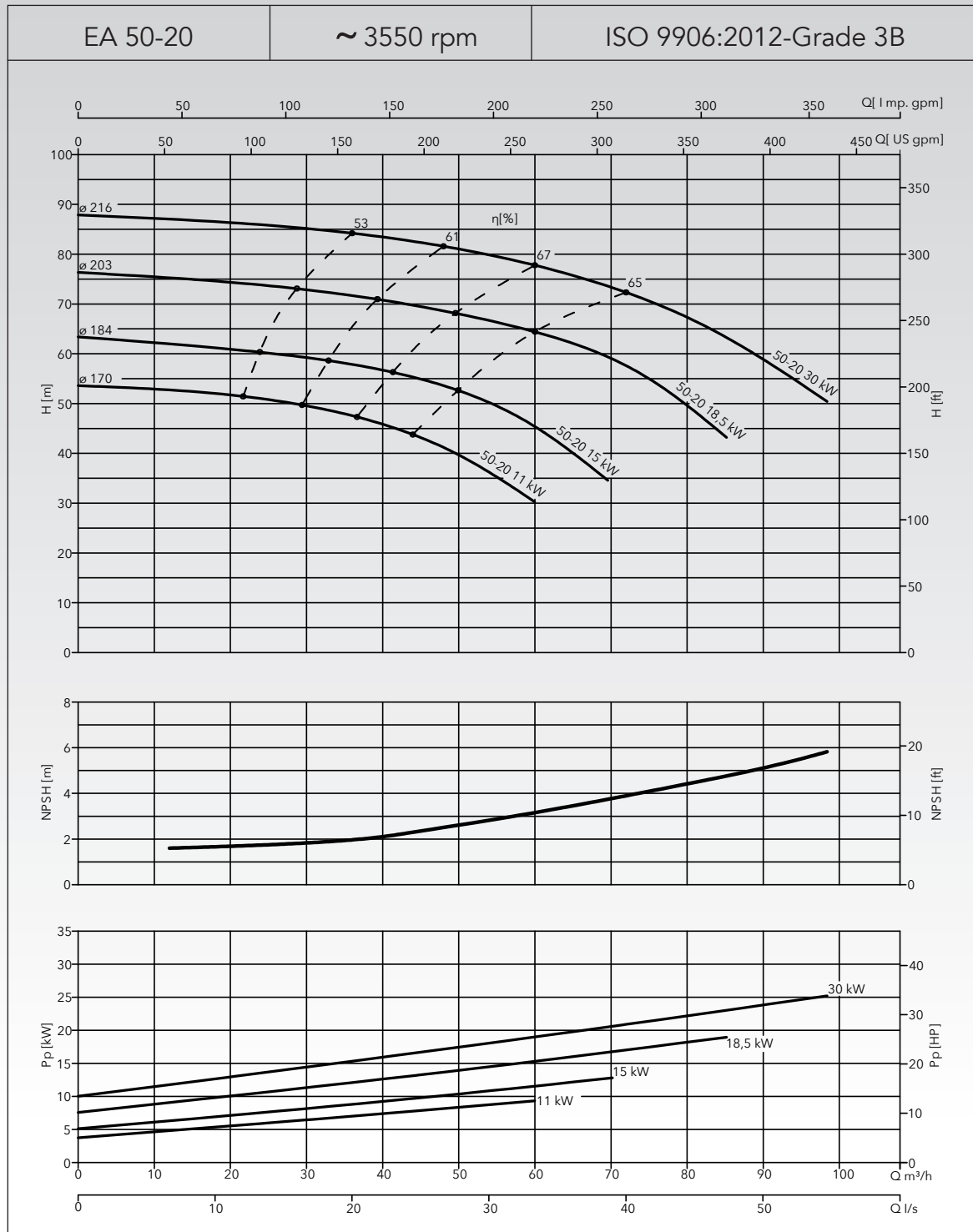
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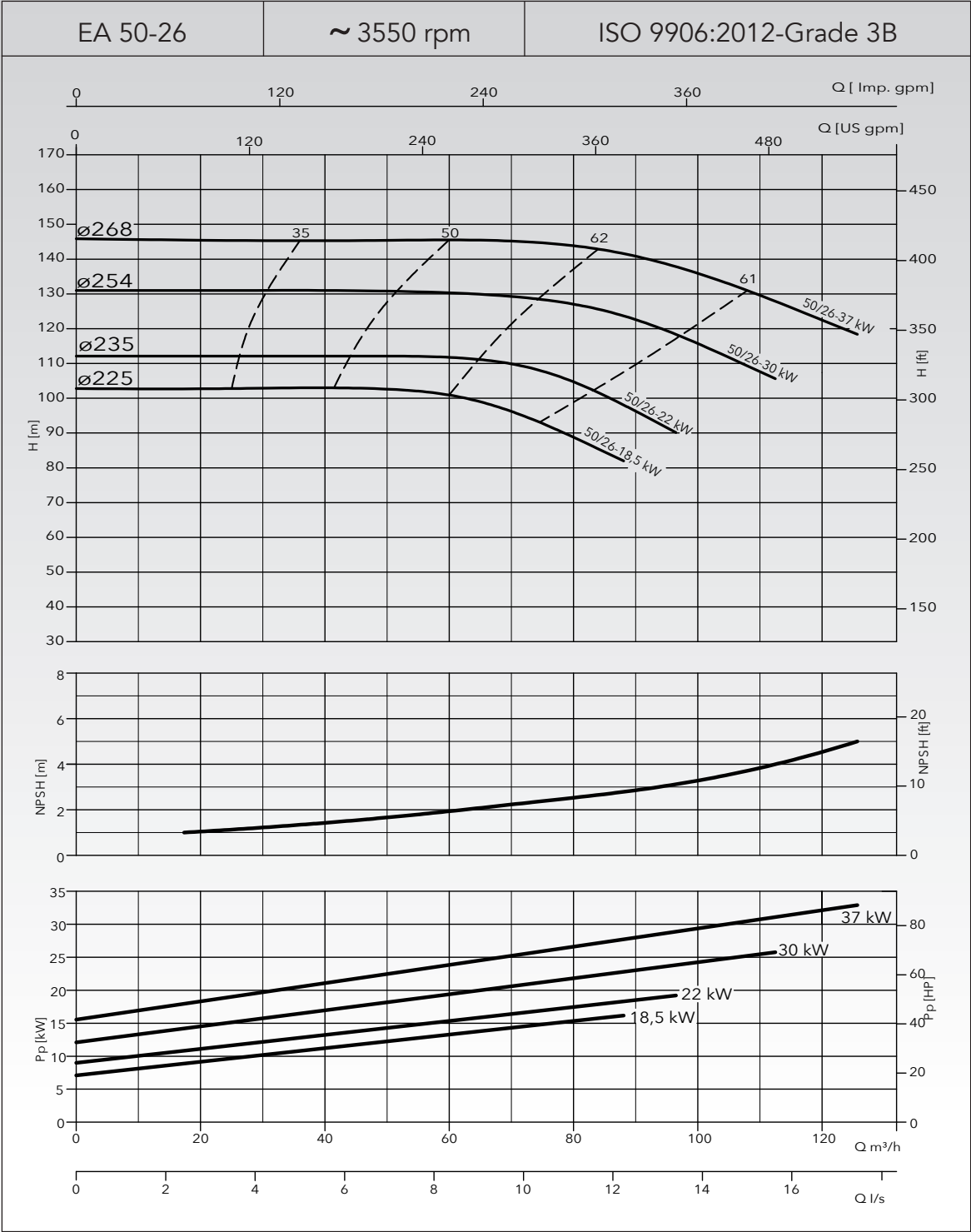
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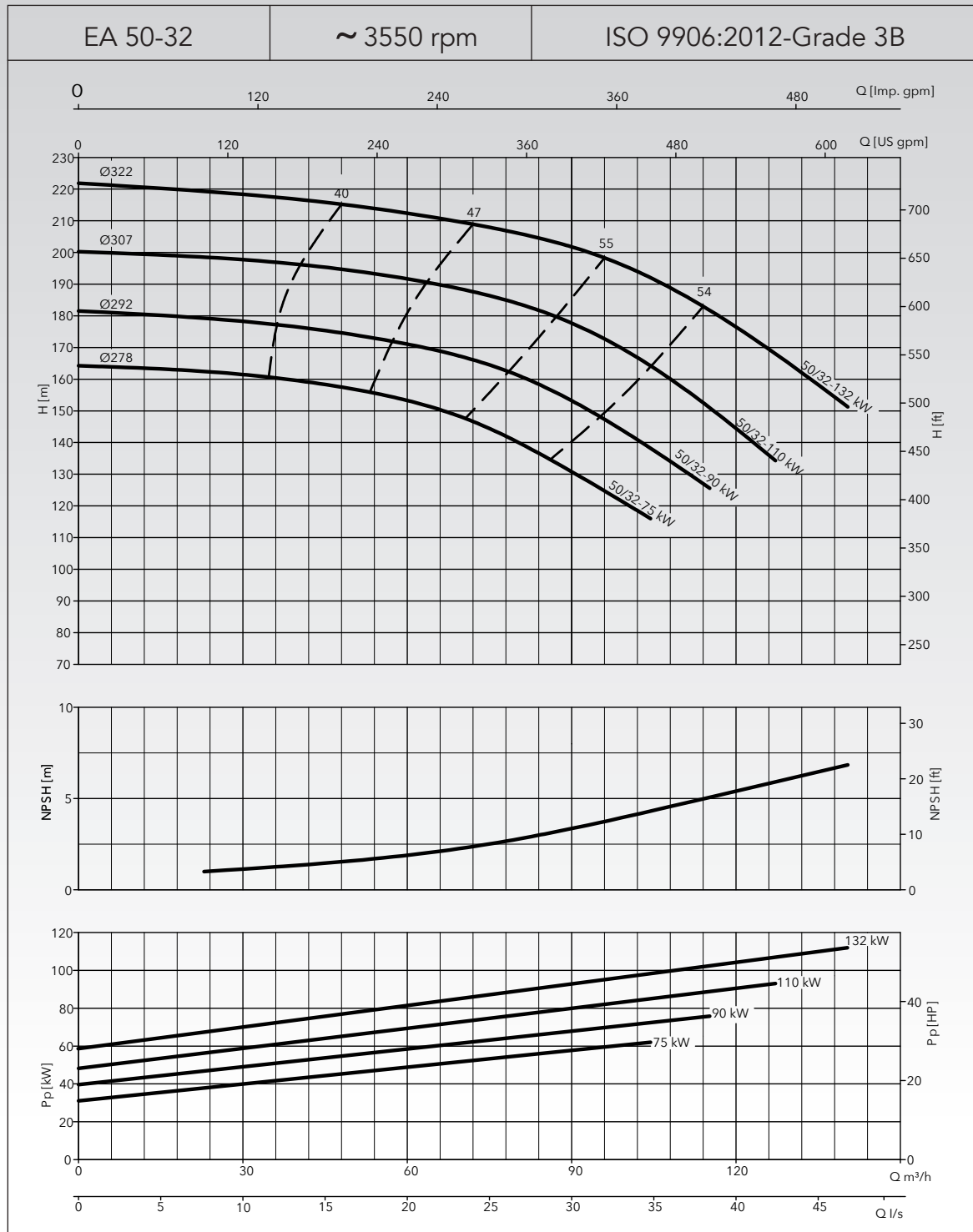
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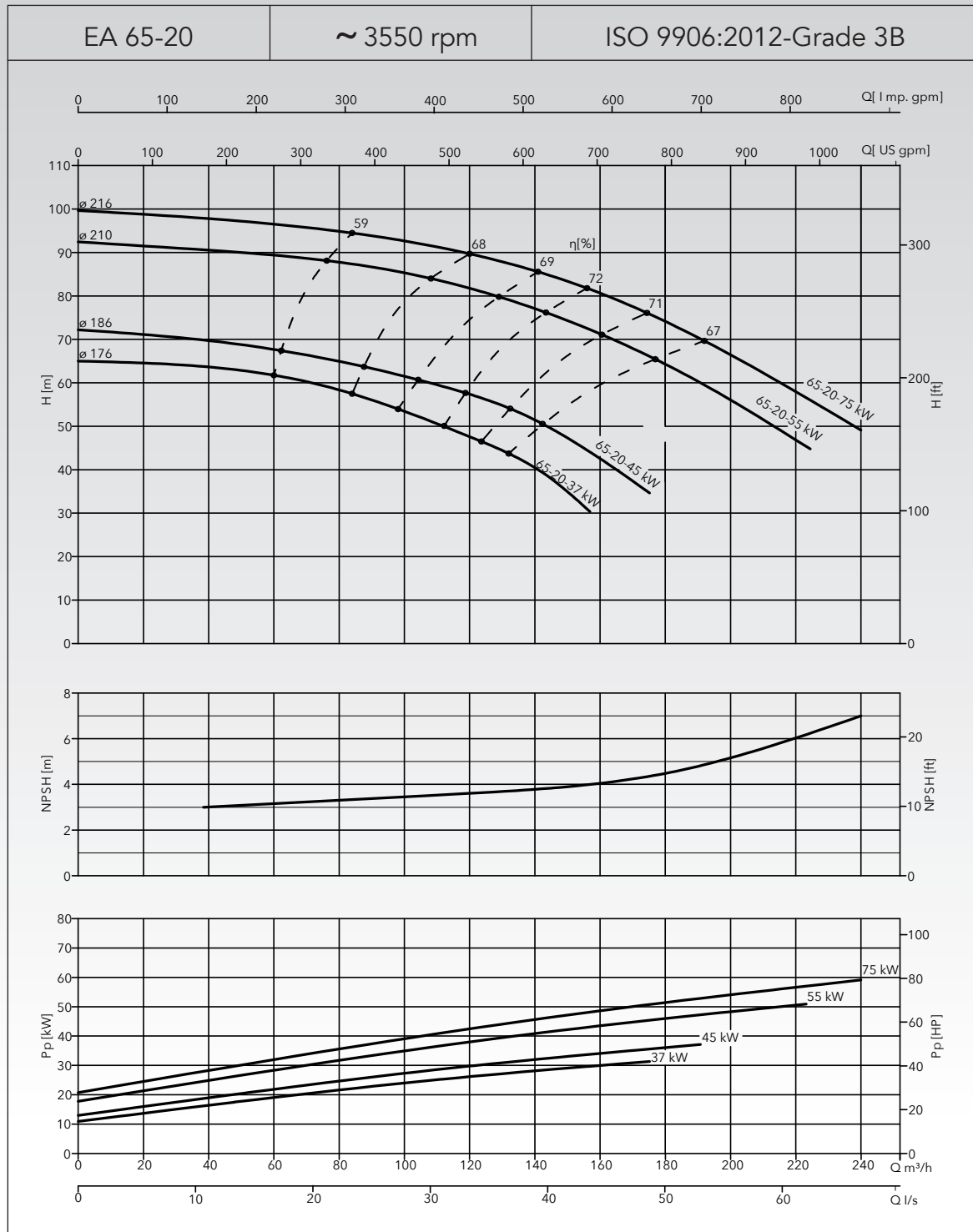
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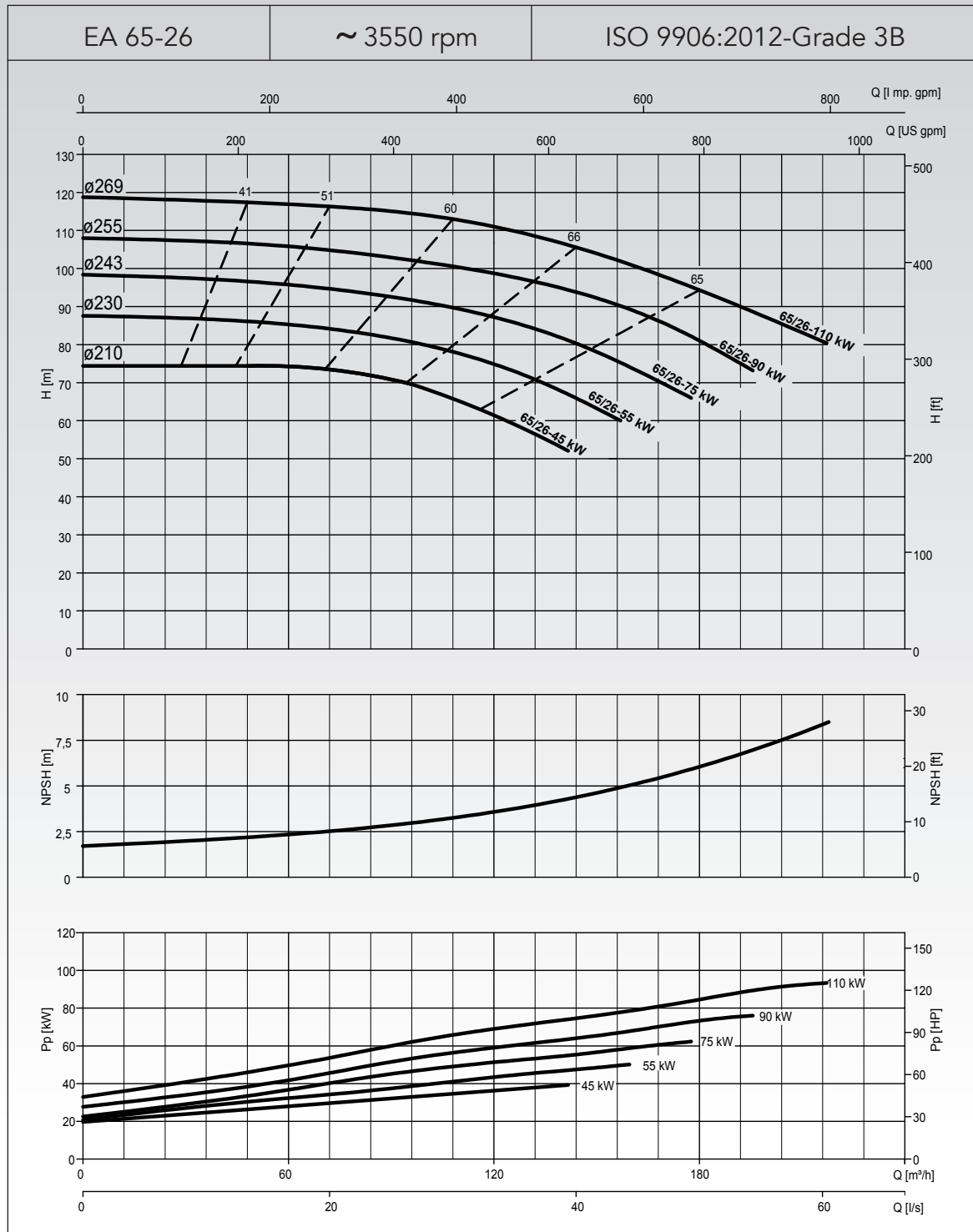
HYDRAULIC PERFORMANCE CURVES



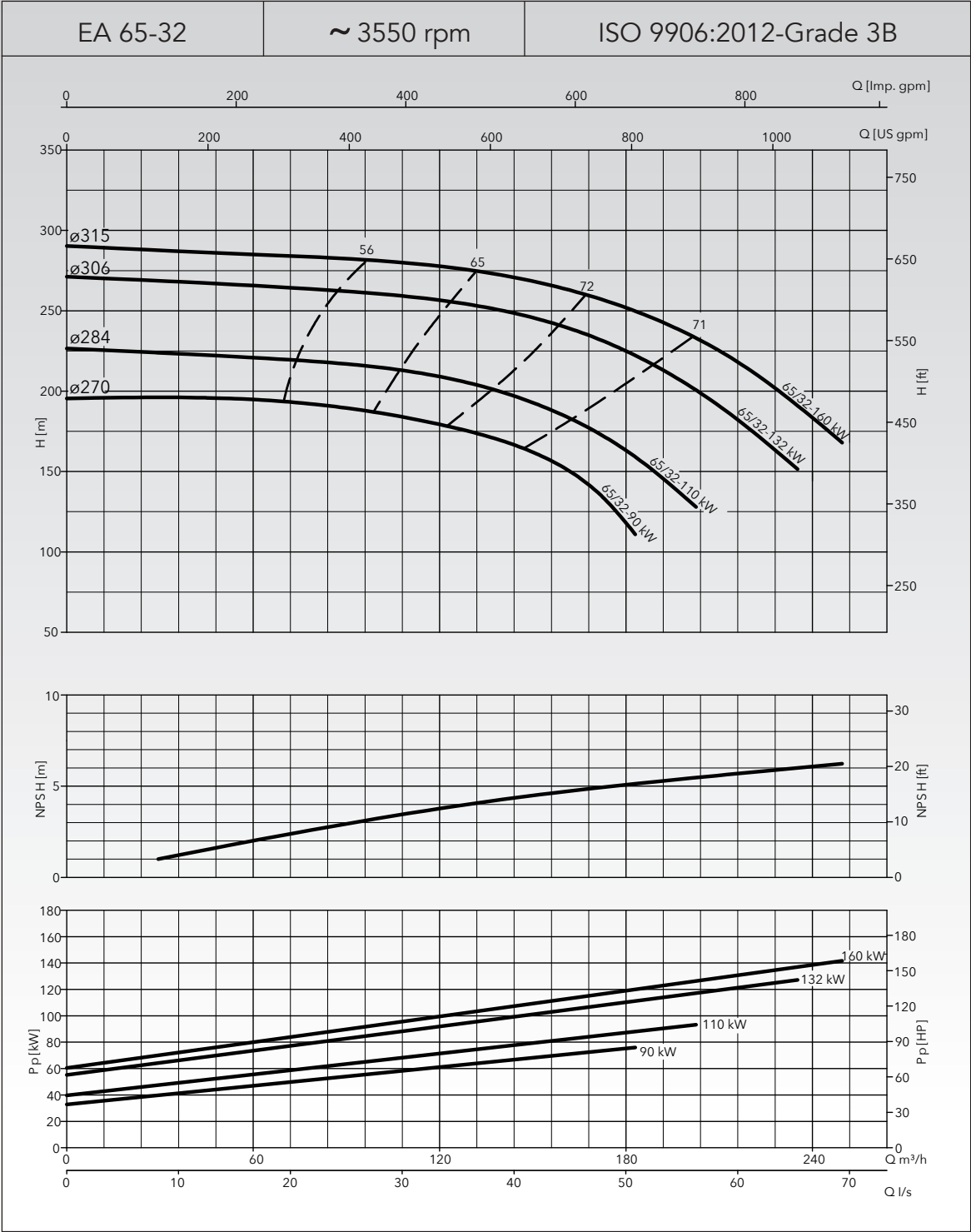
HYDRAULIC PERFORMANCE CURVES



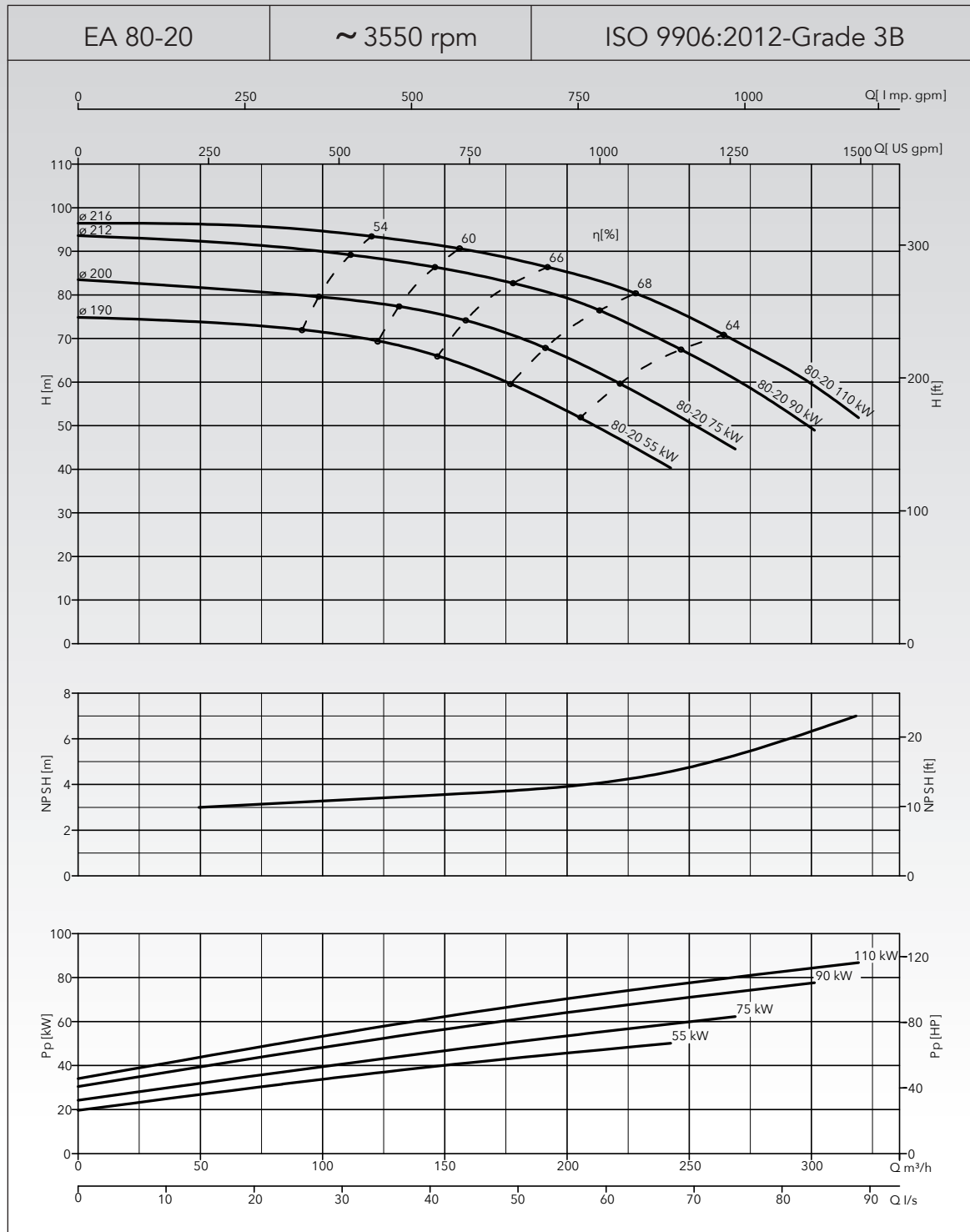
HYDRAULIC PERFORMANCE CURVES



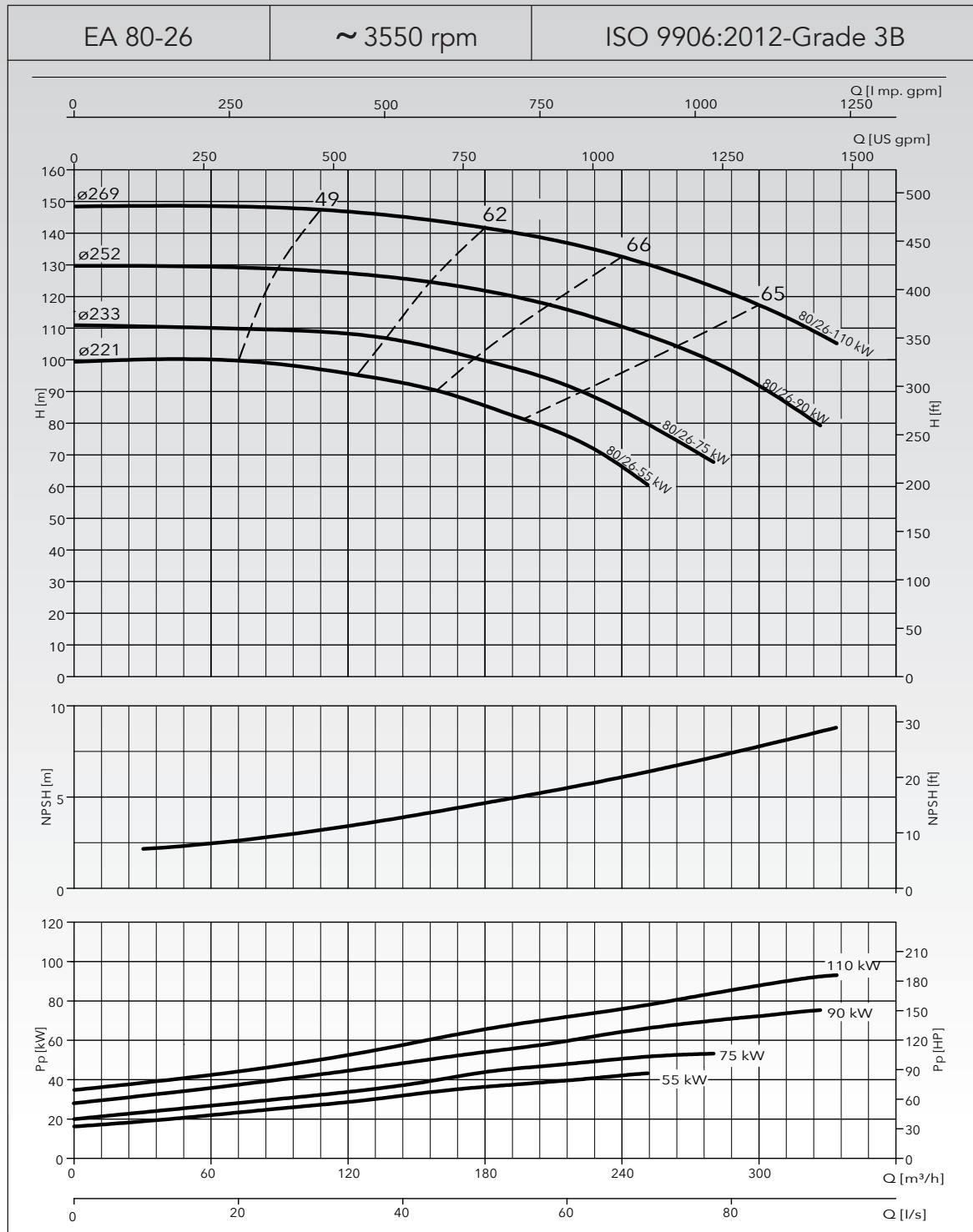
HYDRAULIC PERFORMANCE CURVES



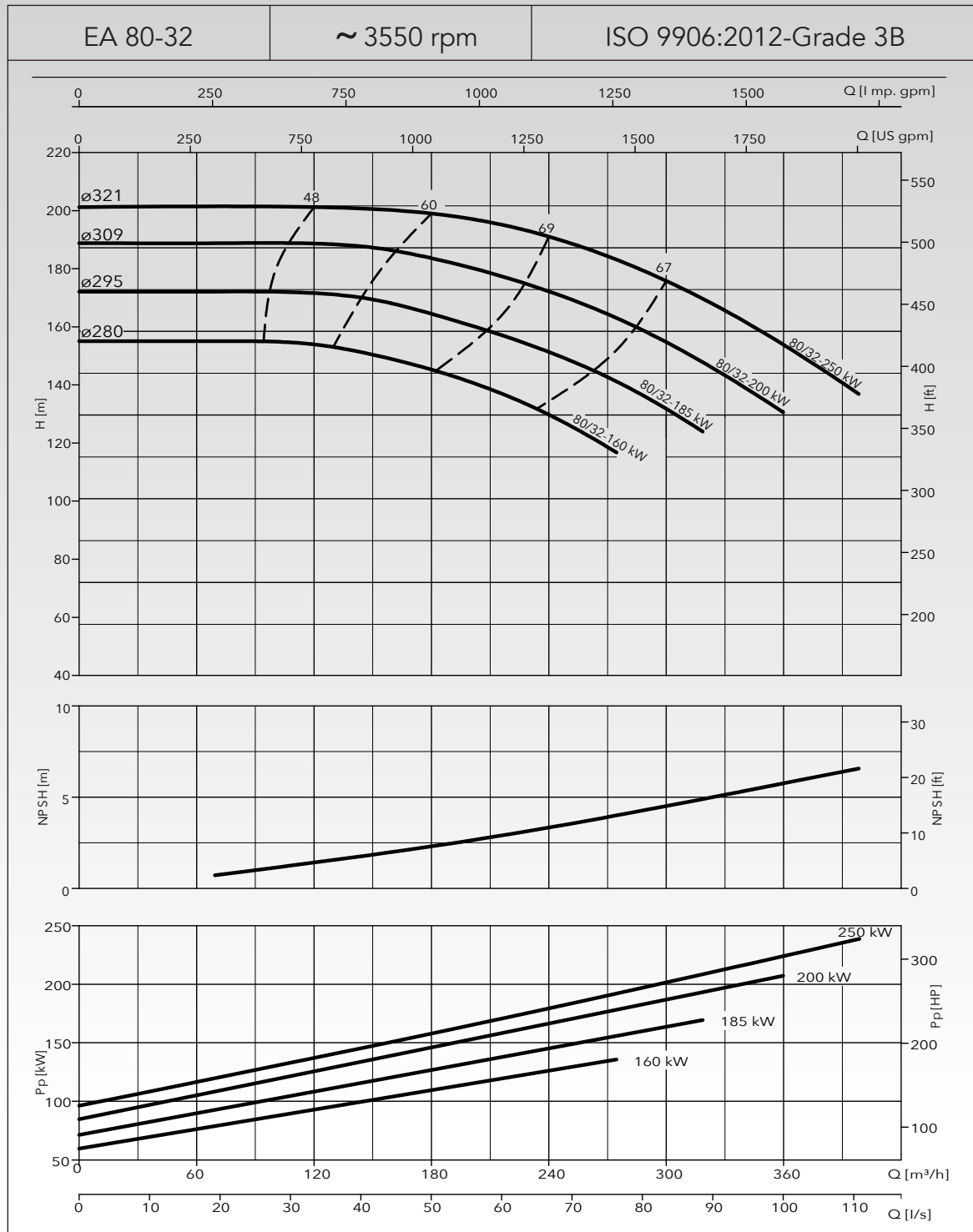
HYDRAULIC PERFORMANCE CURVES



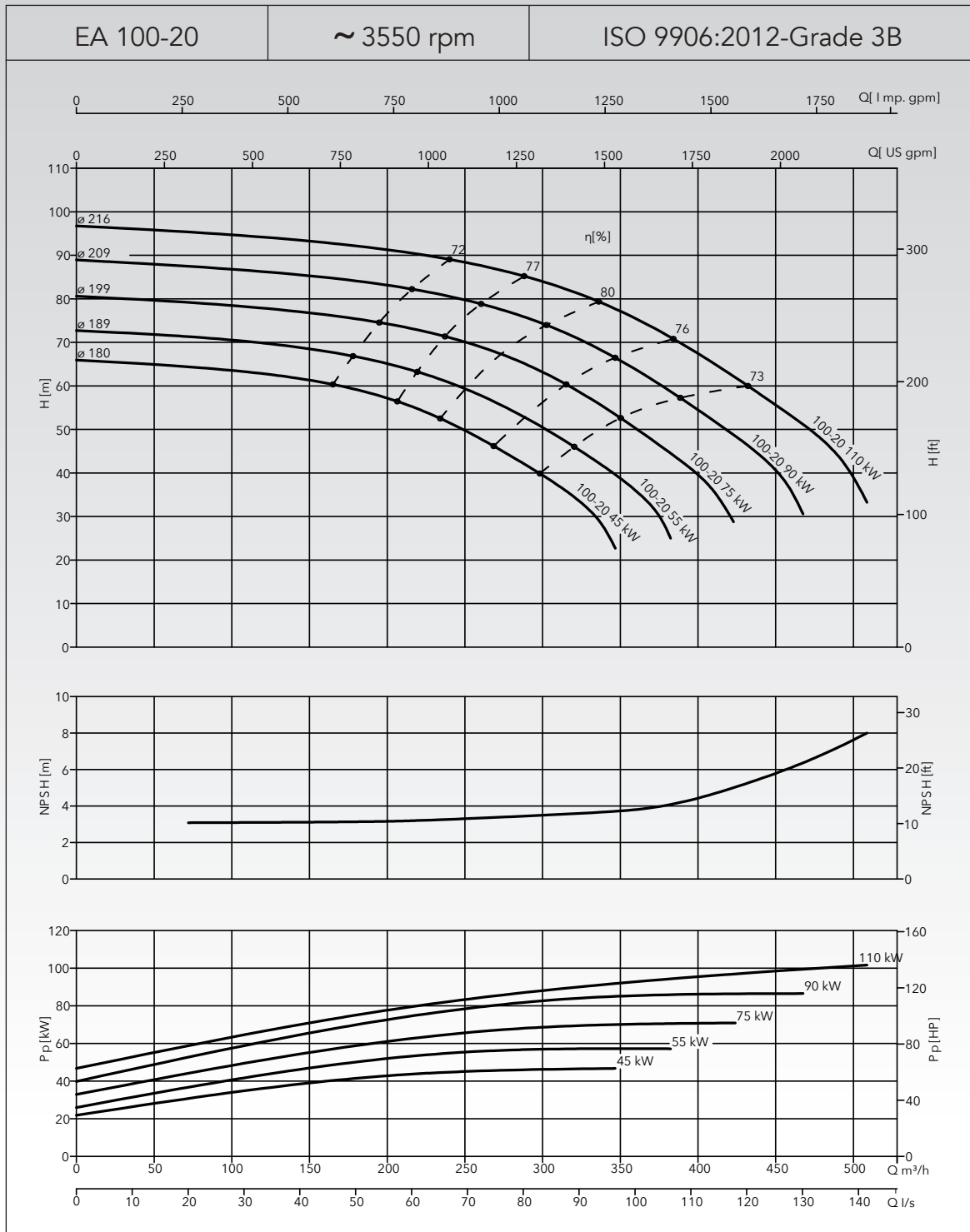
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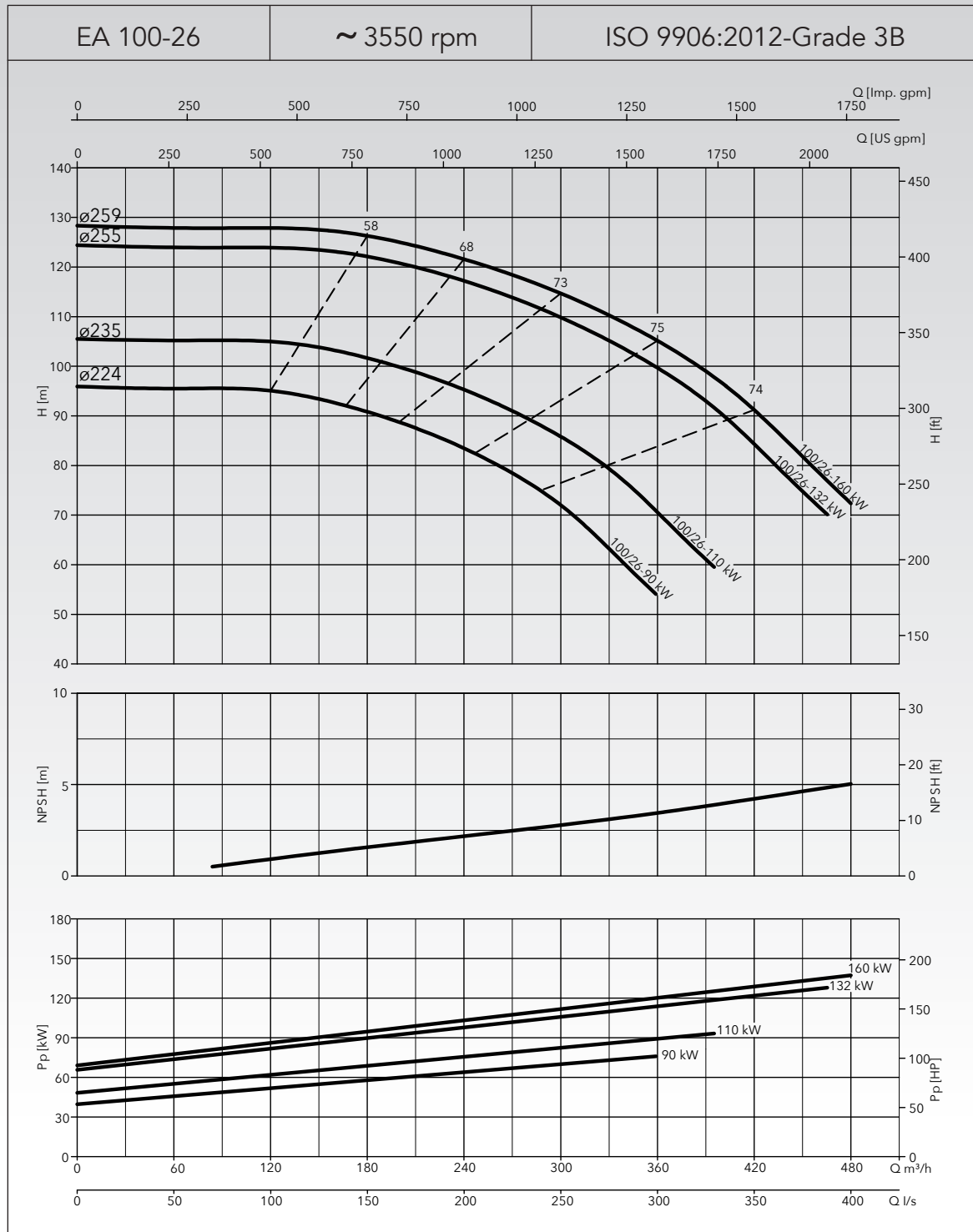
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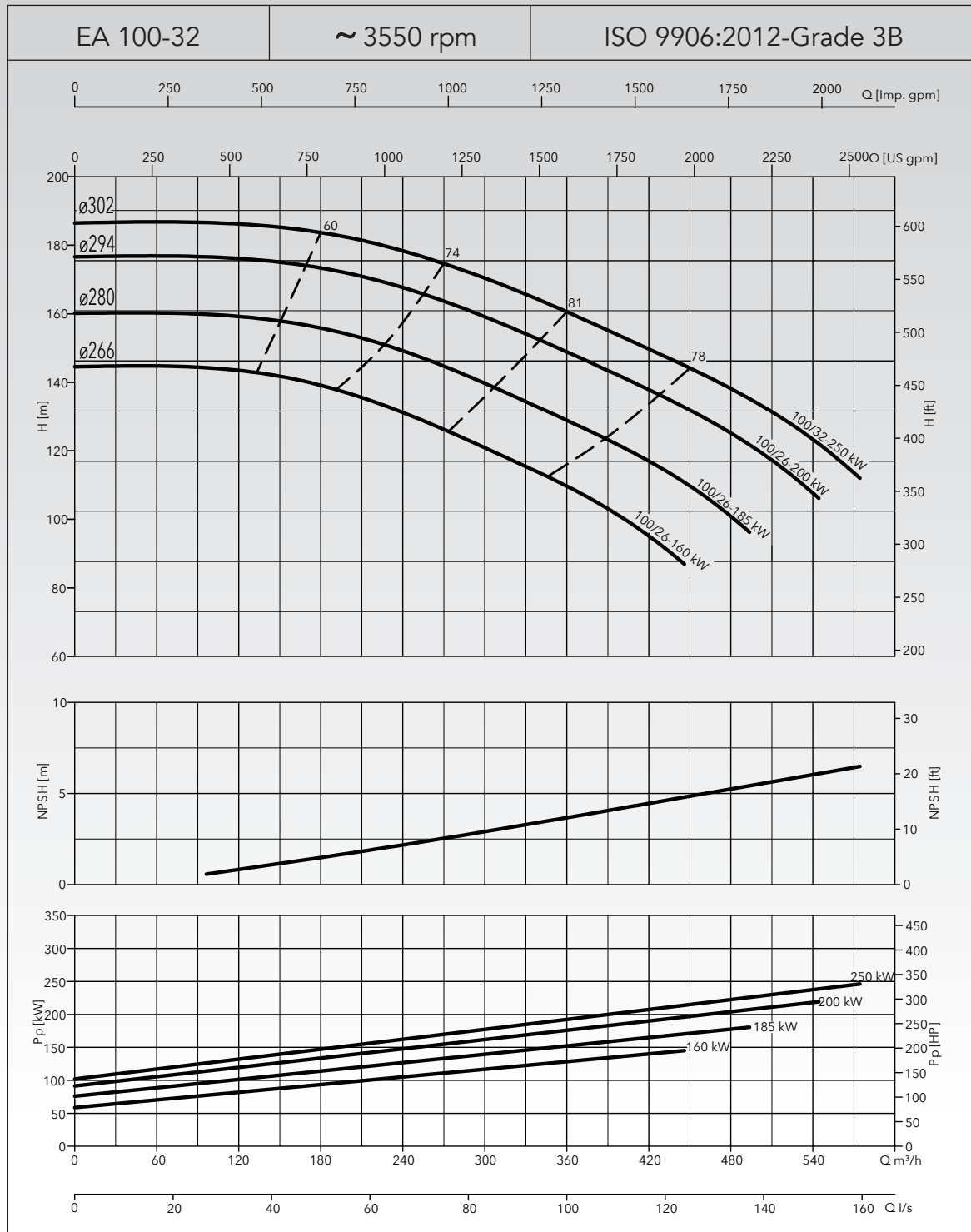
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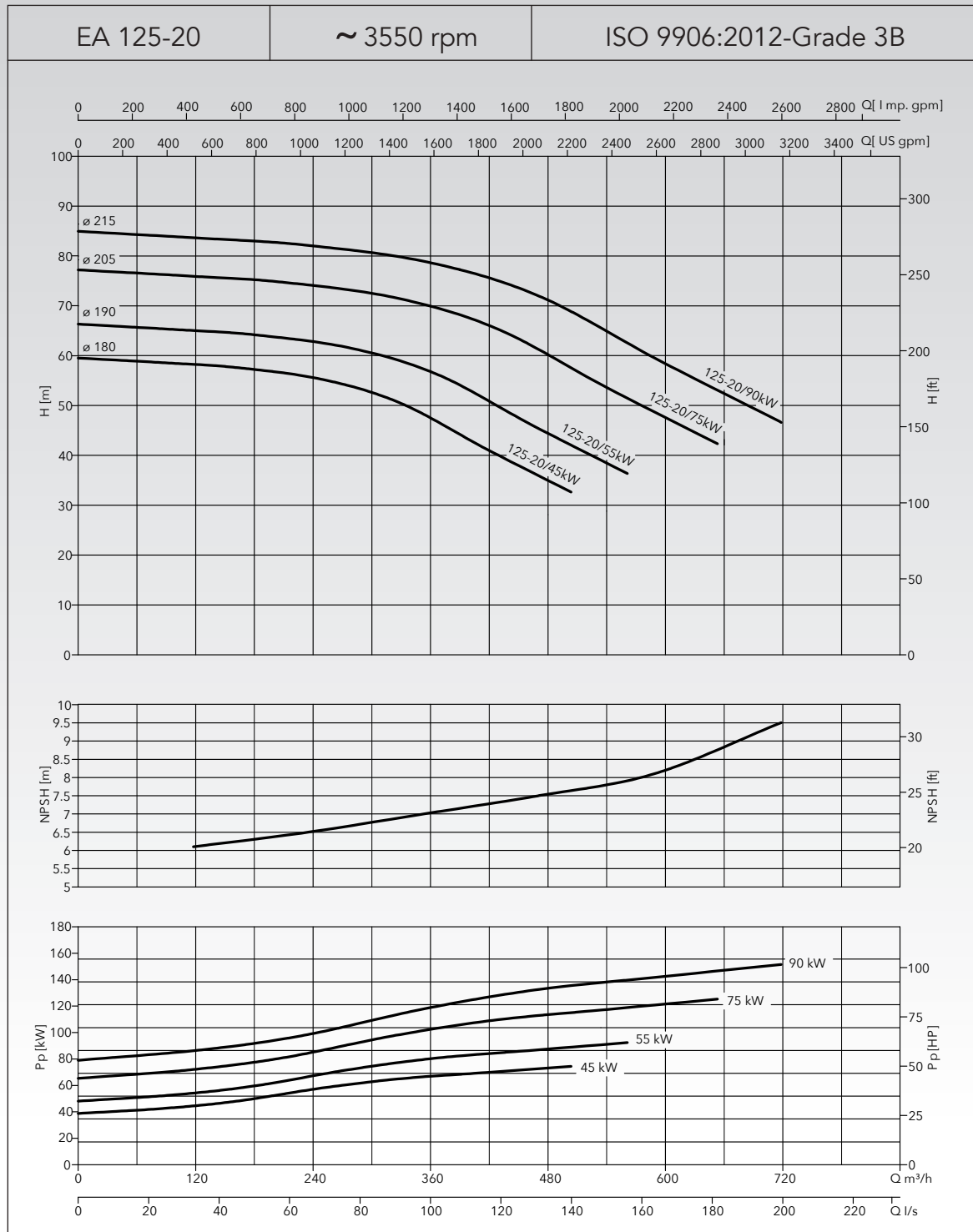
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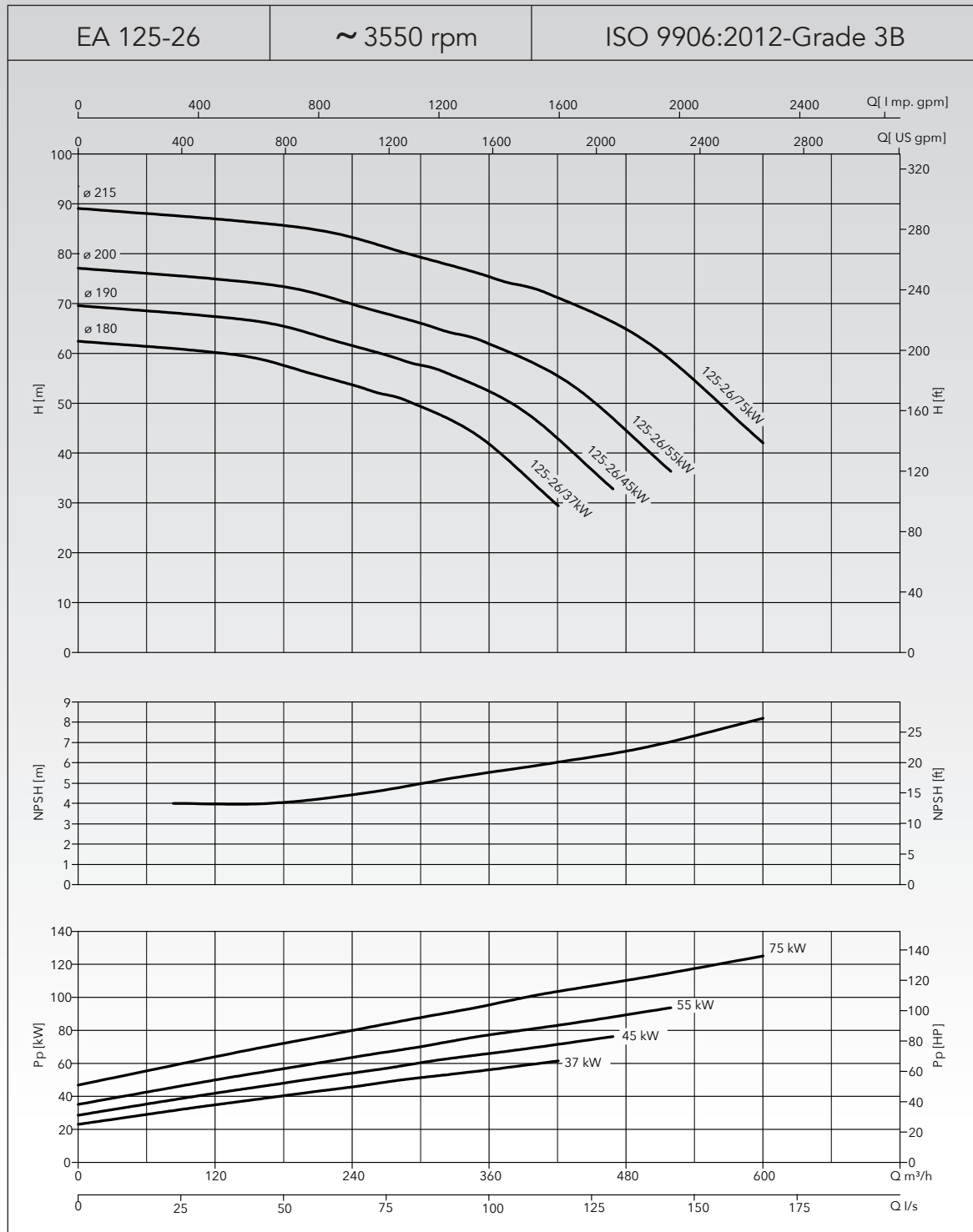
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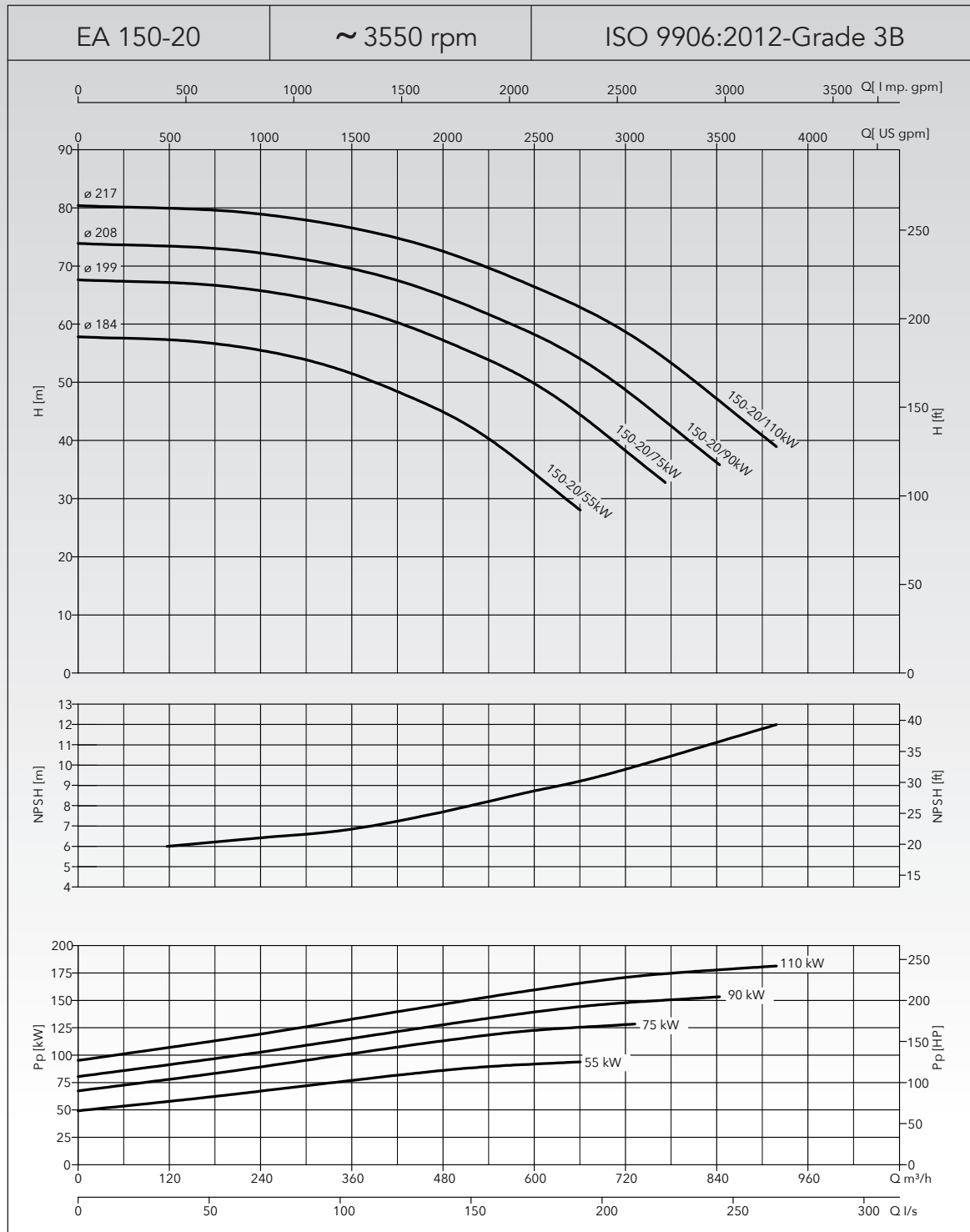
HYDRAULIC PERFORMANCE CURVES



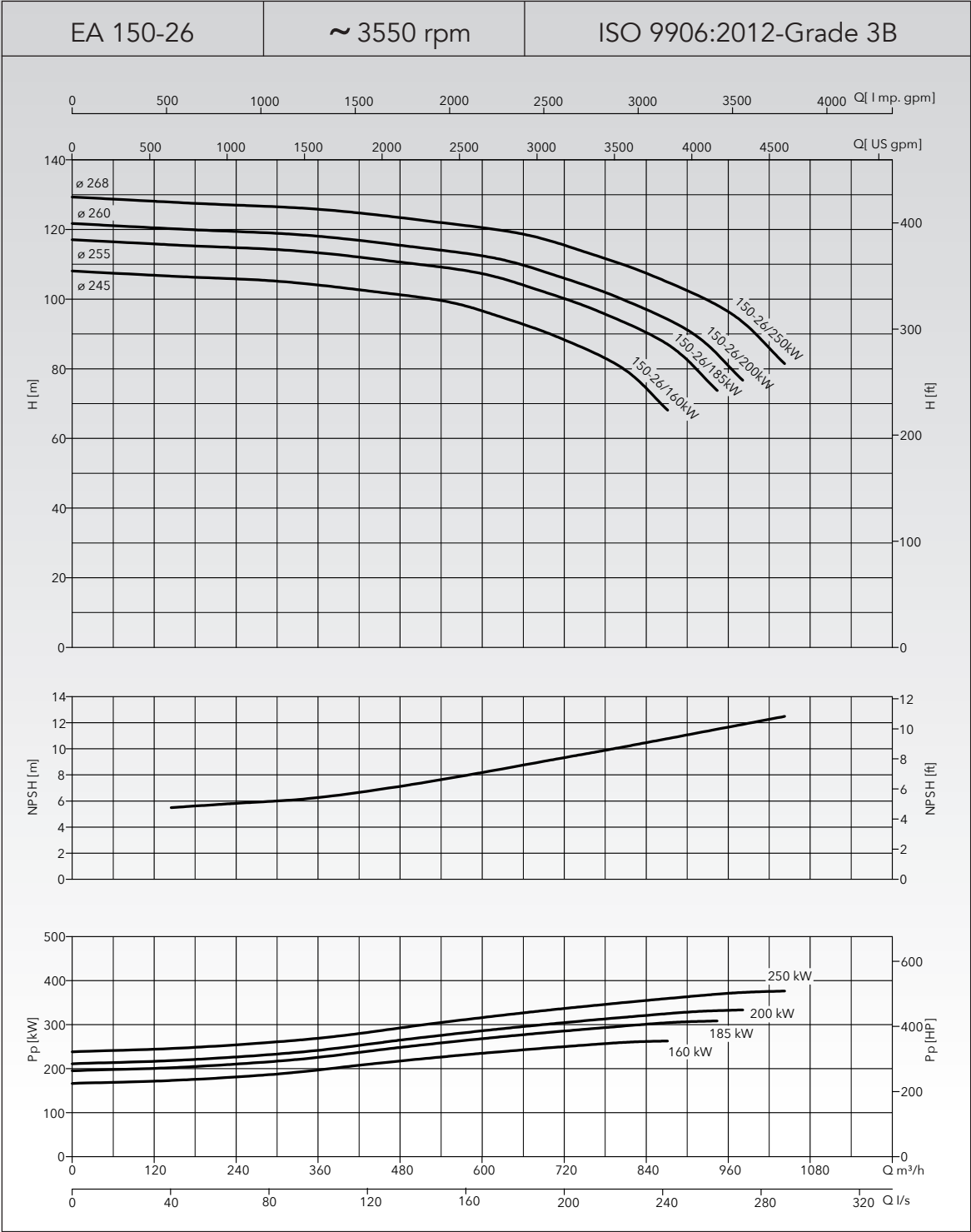
HYDRAULIC PERFORMANCE CURVES



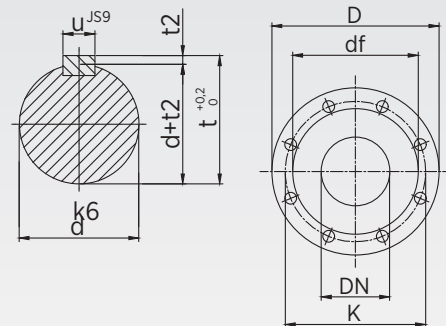
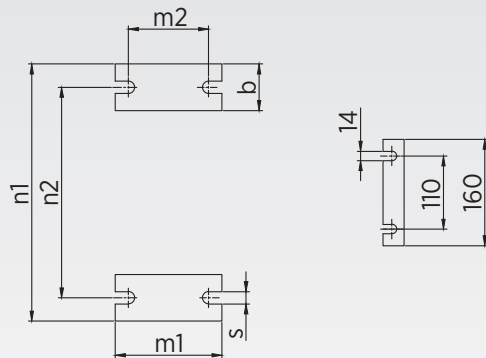
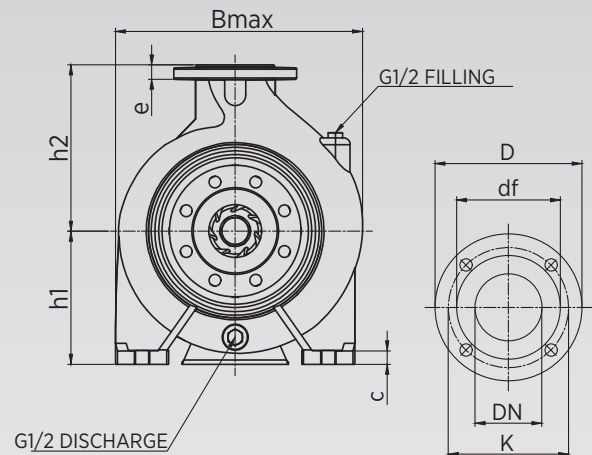
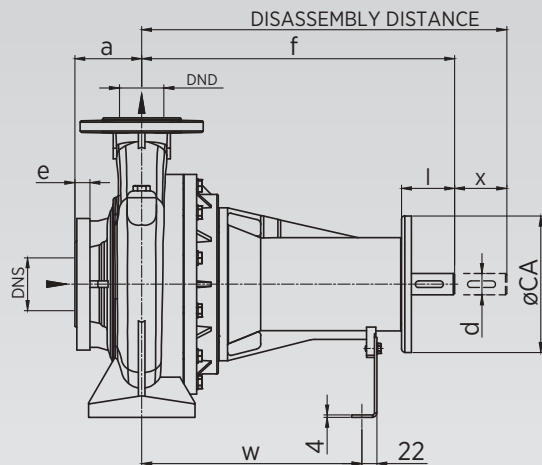
HYDRAULIC PERFORMANCE CURVES



HYDRAULIC PERFORMANCE CURVES



EA SERIES PUMP DIMENSIONS AND WEIGHTS



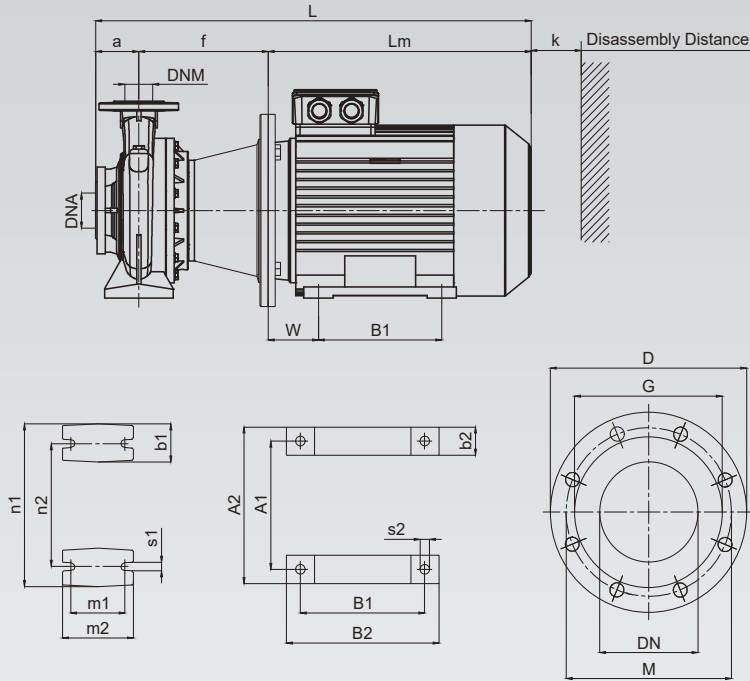
EN1092-2, PN 16 *						ASME B16.5 Class 150 RF *					
DN	D	K	e	df	L	DN	D	K	e	df	L
32	140	100	18	76	4x19	1 1/4	140	89	18	63,5	4x19
40	150	110	18	84	4x19	1 1/2	150	98,5	18	73	4x19
50	165	125	20	99	4x19	2	165	120,5	20	92	4x19
65	185	145	20	118	4x19	2 1/2	185	139,5	20	105	4x19
80	200	160	20	138	8x19	3	200	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
		+0,018
ø32	k6	+0,018
		+0,002
		+0,018
ø42	k6	+0,018
		+0,002
		+0,018
8-10	JS9	+0,018
		-0,018
		+0,0215
10-12	JS9	+0,0215
		-0,0215

EA SERIES PUMP DIMENSIONS AND WEIGHTS

PUMP MODEL	DIMENSIONS (mm)																											
	PUMP							FOOT								SHAFT				B	X	Weight (kg)						
	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			100		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	360	180	225	205	65	14	125	95	320	255	14	234	24	40	27	8	340	100	58						
EA 40/32					200	250		80				345	280							360		67						
EA 50/20	50	65			160	200		50		100	70	265	215		260	24	50	27	8	280	100	48						
EA 50/26								180	225					65						16		125	95	320	250	340	60	
EA 50/32			125	470	225	280		345	280	340	32	80	35		10	360	112	68										
EA 65/20	65	80	100	360	180	225	205	80	16	125	95	320	250	14	260	24	50	27	8	340	140	51						
EA 65/26					125	200						250	400							315		370	73,4					
EA 65/32			225			280						400	315							434		95						
EA 80/20	80	100	125	470	180	250		65	16	125	95	345	280	14	340	32	80	35	10	360	140	63						
EA 80/26					200	280		80												160		120	400	315	434	86		
EA 80/32					250	315		360								280		42	45,7				12	370	111			
EA 100/20	100	125	140	470	200	280	205	80	18	160	120	360	280	18	340	32	80	35	10	370	140	87						
EA 100/26					225	280						400	315							434		94						
EA 100/32					150							250	315			400		315	42	45		12	434	116	117			
EA 125/20	125	150			355	100		180	150	500	400			24	32		35									10	140	150
EA 125/26																												
EA 150/20	150	200			160	280		375	100	200	150	500	400	24	32	35	10	540										
EA 150/26																												

EAR SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 4 POLES (1750 rpm)



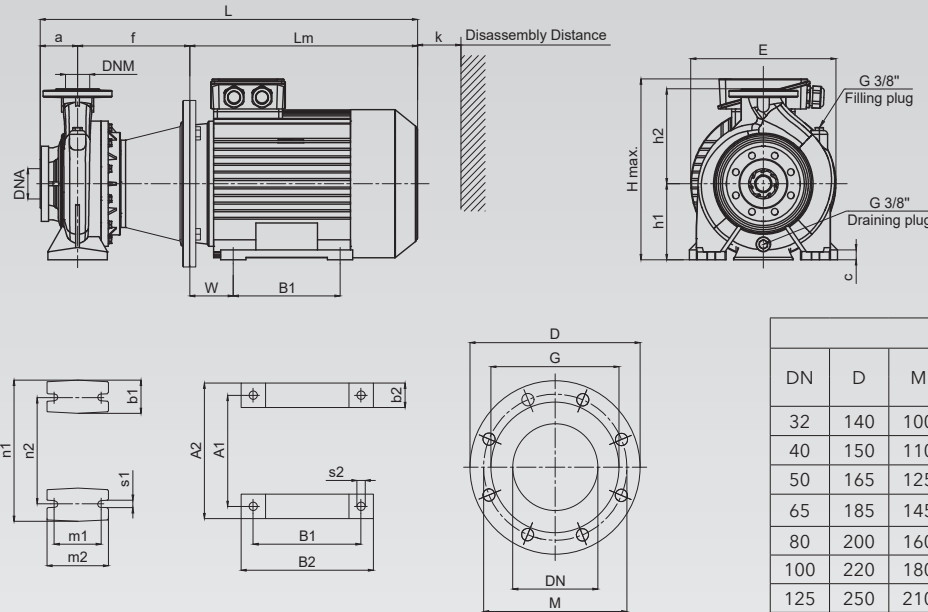
PUMP FLANGES						
DN	D	M	G	HOLE		MAX. Thickness
				N	ϕ	
32	140	100	76	4	18	18
40	150	110	84	4	18	18
50	165	125	99	4	18	20
65	185	145	118	4	18	20
80	200	160	138	8	18	22
100	220	180	158	8	18	22
125	250	210	188	8	18	22
150	285	240	211	8	22	29
200	340	295	264	12	22	31

PUMP TYPE	ENGINE		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	1,1	90S	50	32	80	165	55	160	180	50	15	70	190	240	190	14	15	140	180	100	130	45	260	285	340	505	150	56																																				
EAR 32/20	1,5					175	160																					180	20	95	125	320	260	18	160	200	140	175	50	315	330	405	580	59																				
EAR 32/20	2,2																																												70	180	225	20	95	125	320	260	18	160	200	140	175	50	315	330	405	580	63	
EAR 32/20	3																																																															165
EAR 32/26	2,2	55			160			200	15	60	100	265	212	18	160		200	140	175	50	315	330	405	580	84																																							
EAR 32/26	3					175	160																			200		15	60	100	265	212	18	160	200	140	175	50	315	330	405	580	78																					
EAR 32/26	4																																											70	180	225	20	95	125	320	260	18	160	200	140	175	50	315	330	405	580	87		
EAR 32/26	5,5*																																																														165	180
EAR 40/20	1,1	90S	65	40	100			175	160	180	15	60	100	265	212	18	160	200	140	175	50	315	280	340	525		116																																					
EAR 40/20	1,5					70	180																			225		65	95	125	244	260	18	160	200	140	175	50	315	405	580	590	107																					
EAR 40/20	2,2																																											165	180	225	65	95	125	244	260	18	160	200	140	175	50	315	405	580	110			
EAR 40/20	3																																																													55	160	180
EAR 40/26	3	100L						165	180	225	65	95	125	244	260	18	160	200	140	175	50	315	405	580	59																																							
EAR 40/26	4					70	180																			225		65	95	125	244	260	18	160	200	140	175	50	315	405	580	63																						
EAR 40/26	5,5*																																										175	160	200	15	60	100	265	212	18	160	200	140	175	50	315	405	580	74				
EAR 50/20	1,5																																																												90L	65	50	125
EAR 50/20	2,2	175	160	200	70			180	225	25	320	250	18	216	260	178	220	50	415	415	505	750	190																																									
EAR 50/20	3					70	180																	225	25	320	250	18	216	260	178	220	50	415	415	505	750	174																										
EAR 50/20	4																																						165	180	225	25	320	250	18	216	260	178	220	50	415	415	505	750	190									
EAR 50/26	4																																																							100L	165	180	225	25	320			
EAR 50/26	5,5*	195	180	225	25			320	250	18	216	260	178	220	50	415	415	505	750	190																																												
EAR 50/26	7,5					90	225														280	70	15	345	280	18	216	260	178	220	50	415	415	505	750	190																												
EAR 50/26	11*																																				125	210	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505	750	190									
EAR 50/32	7,5																																																							132M	125	210	225	280	70	15	345	280
EAR 50/32	11*	15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
EAR 50/32	15					15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225	280	70	15	345
		15	160L	250	110			225	280	70	15	345	280	18	216	260	178	220	50	415																																												
						15	160L														250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415																												
																																					15	160L	250	110	225	280	70	15	345	280	18	216	260	178	220	50	415	415	505									
																																																								15	160L	250	110	225				

EAR SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 4 POLES (1750 rpm)

PUMP TYPE	ENGINE		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 65/20	3	100L	80	65	100	175	70	160	225	75	25	120	160	320	260	14	18	160	200	140	175	50	315	330	405	590	81				
EAR 65/20	4																														
EAR 65/20	5,5*																														
EAR 65/20	7,5	132M				200	90	200	250	360				280	19	18	216	260	178	220	50	415	375	450	725						
EAR 65/26	7,5																														
EAR 65/26	11*	160L			125	250	110	225	280	400				315	15	254	315	210	305	60	490	440	505	750	840						
EAR 65/26	15																														
EAR 65/32	11	132M																													
EAR 65/32	15	160L			180M	250	120	225	280	400				315	19	18	216	260	178	220	50	415	440	505	750	840					
EAR 65/32	18,5																														
EAR 65/32	18,5																														
EAR 80/20	3	100L	100	80	125	175	70	180	250	95	125	345	280	400	315	19	18	160	200	140	175	50	315	360	430	615	97				
EAR 80/20	4	112M																													
EAR 80/20	5,5	132S																													
EAR 80/20	7,5	132M				200	90	200	280	400	315	18	216	260	178	220	50	415	400	480	750										
EAR 80-26	7,5																														
EAR 80-26	11*																														
EAR 80-26	15	160L				250	110	200	280	400	315	15	254	315	210	305	60	490	475	565	1015										
EAR 80-26	18,5	180M																													
EAR 80-32	22	180L																													
EAR 80-32	30	200L				250	135	250	315	400	315	19	18	216	260	140	180	50	375	385	480	740									
EAR 100-20	5,5	132S																													
EAR 100-20	7,5	132M																													
EAR 100-20	11*		200	100	200	280	360	280	18	216	260	178	220	50	415	385	480	740													
EAR 100-20	15	160L																													
EAR 100-20	15	160L																													
EAR 100-26	11	160M	245	110	225	280	400	315	15	254	315	210	305	60	490	430	505	880													
EAR 100-26	15	160L																													
EAR 100-26	18,5	180M																													
EAR 100-26	18,5	180M	250	120	250	315	400	315	19	279	355	241	280	70	550	485	940														
EAR 100-32	18,5																														
EAR 100-32	22	180L																													
EAR 100-32	30*		250	135	355	315	400	315	23	15	254	315	210	305	60	490	560	635													
EAR 125-20	11	160M																													
EAR 125-20	15	160L																													
EAR 125-20	18,5	180M	245	110	250	315	400	315	15	254	315	210	305	60	490	560	635														
EAR 125-20	22	180L																													
EAR 125-26	22																														
EAR 125-26	30	180M	250	135	375	315	400	315	19	279	355	241	280	70	640	540	655														
EAR 125-26	37*	200L																													
EAR 125-26	45*																														
EAR 150-20	11	160M	200	150	160	245	110	280	100	30	150	200	500	400	19	318	400	305	355	80	760	540	655	1045	2090	697					
EAR 150-20	15	160L																													
EAR 150-20	18,5	180M																													
EAR 150-20	30	180L	270	150	170	280	375	400	500	400	19	356	440	286	365	80	655	540	655												
EAR 150-26	37*	200L																													
EAR 150-26	45*																														
EAR 150-26	55	225S	270	150	170	280	375	400	500	400	19	356	440	286	365	80	655	540	655												
EAR 150-26	75	250M																													

EAR SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 2 POLES (3550 rpm)

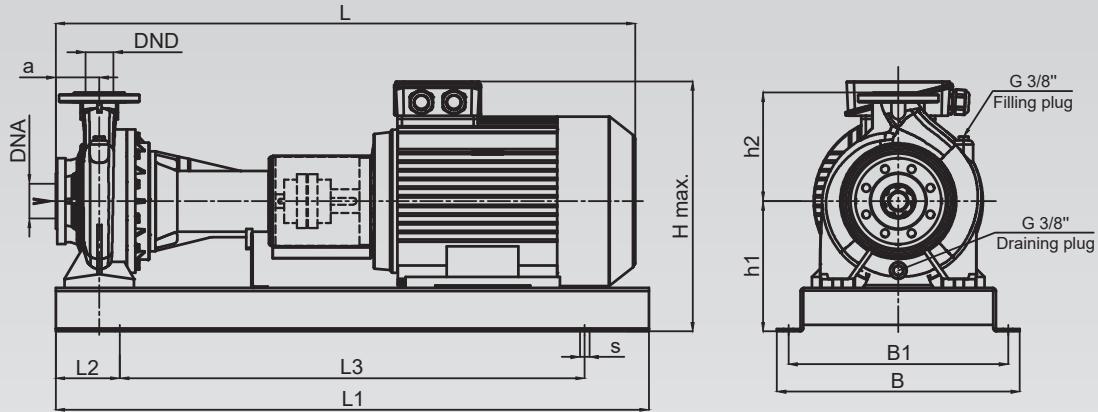


PUMP FLANGES						
DN	D	M	G	HOLE		MAX. Thickness
				N	ø	
32	140	100	76	4	18	18
40	150	110	84	4	18	18
50	165	125	99	4	18	20
65	185	145	118	4	18	20
80	200	160	138	8	18	22
100	220	180	158	8	18	22
125	250	210	188	8	18	22

PUMP TYPE	ENGINE		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	7,5	132S	50	32	80	200	90	160	180	50	15	70	190	240	190	14	18	216	260	140	180	50	375			655	150	76																																																																
EAR 32/20	11*	132M																	340	695	81																																																																							
EAR 32/20	11	160M															160	180	50	15	70	190	240	190	15	254		315	210	305	60	490		385	815	87																																																								
EAR 32/20	15					245																																																	96																																					
EAR 32/20	18,5	160L					110																					860	108																																																															
EAR 32/26	18,5																																																154																																											
EAR 32/26	22*	180M																												870	165																																																													
EAR 32/26	22																														235	120	180	225	20	95	125	320	260	19		279	355	241	280	70	550		420	885	182																																									
EAR 32/26	30*																																																		318	400	305	355	80	640		480	975	195																																
EAR 32/26	30				200L																																																																			208																				
EAR 32/26	37																														224																																																													
EAR 40/20	11*	132M	65	40	100	200	90	160	180	65	15	60	100	265	212	14	18	216	260	178	220	50	415			340	715	97																																																																
EAR 40/20	11	245				110	160										180											15	254	315	210	305	60	490		385	880	128																																																						
EAR 40/20	15																																					160L	160M																							135																														
EAR 40/20	18,5																																																																																					148						
EAR 40/20	22*																																																																																						164					
EAR 40/20	22																																																													180M																									181					
EAR 40/26	22*																																																													160L																									186					
EAR 40/26	22																																																													180M																									204					
EAR 40/26	30*																																																																																							218				
EAR 40/26	30																																																														200L																									237				
EAR 40/26	37																																																																																								246			
EAR 40/26	45*																																																																										267																	
EAR 40/26	45	225M				260	150	20																			283																																																																	
EAR 50/20	11*	132M			200	90	70																				100																			123																																														
EAR 50/20	11	160M																																																																129																										
EAR 50/20	15																																																																																										138	
EAR 50/20	18,5																																																																	160L																									145	
EAR 50/20	22*																																																																																											
EAR 50/20	22																																																																	180M					120										19	279	355	241	280	70	550			425	895	183

PUMP TYPE	ENGINE		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 50/26	18,5	160L	65	50	100	235	110	180	225	65	25	95	125	320	250	14	18	254	315	254	305	60	535		405	870	150	166																				
EAR 50/26	22*																																								178							
EAR 50/26	22	180M																														279	355	241	280	70	550		420	885	189							
EAR 50/26	30*																																								192							
EAR 50/26	30	200L																															318	400	305	355	80	640		480	975	226						
EAR 50/26	37																																								245							
EAR 50/32	75*	250M			125	275	170	225	280	70	15			345	280		24	406	485	349	410	80	760		575	1160		408																				
EAR 65/20	30*	180M	80	65	100	240	120	160	225	75			120	160	320	260	14	19	279	355	241	280	70	550		420	890		219																			
EAR 65/20	37*																																								235							
EAR 65/20	37	200L																															318	400	305	355	80	640		480	980	242						
EAR 65/20	45*																																								267							
EAR 65/20	45	225M																																							304							
EAR 65/20	55*																																	356	440	311	370	85	680		510	1020	322					
EAR 65/20	55	250M																												348																		
EAR 65/20	75*																														427																	
EAR 65/26	45*	200L								250	135	200	250				360	280	19		318	400	305	355	80	640		480	990		299																	
EAR 65/26	45	225M																																				347										
EAR 65/26	55*																											356	440	311	370	85	680		510	1055	369											
EAR 65/26	55	250M																																	384													
EAR 65/26	75*																																		436													
EAR 80/20	55*	225M	100	80	125		150	180	250	25											95	125	345	280	19	19	216	260	178	220	50	415		510	810		306											
EAR 80/20	55	250M																																						362								
EAR 80/20	75*																																							394								
EAR 80-26	55*	225M												150	200	250	25									400	315	19		19	356	440	311	370	85	680		510	180		328							
EAR 80-26	55	250M																																														374
EAR 80-26	75*																																															417
EAR 100-20	45*	200L	125	100	125	245	135	200	280	80				360						280	19		318	400	305				355	80	640		480	1010		197												
EAR 100-20	45	225M																																													239	
EAR 100-20	55*																																														264	
EAR 100-20	55	250M																																					287									
EAR 100-20	75																																						327									
EAR 125-20	45*	200L				150	125								140	245	135	250	315						120	160	400	315	23		318	400	305	355	80	640			1025		308							
EAR 125-20	45	225M																																						342								
EAR 125-20	55*																																							367								
EAR 125-20	55	250M																																						411								
EAR 125-20	75*																																							430								
EAR 125-26	37	200L						250	135	250	355						400			315	23											318	400	305	355	80	640			1030		449						
EAR 125-26	45*																																						467									
EAR 125-26	45	225M																																					481									
EAR 125-26	55*																																						497									
EAR 125-26	55	250M																																					531									
EAR 125-26	75*																																			568												
EAR 150-20	55*	225M	200	150	160	270	150	280		100	30	150	200	550	450		19	356	440	311	370	85	680			635	1110		601																			
EAR 150-20	55	250M																																						641								
EAR 150-20	75*																																							667								

EAS SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 4 POLES (1750 rpm)

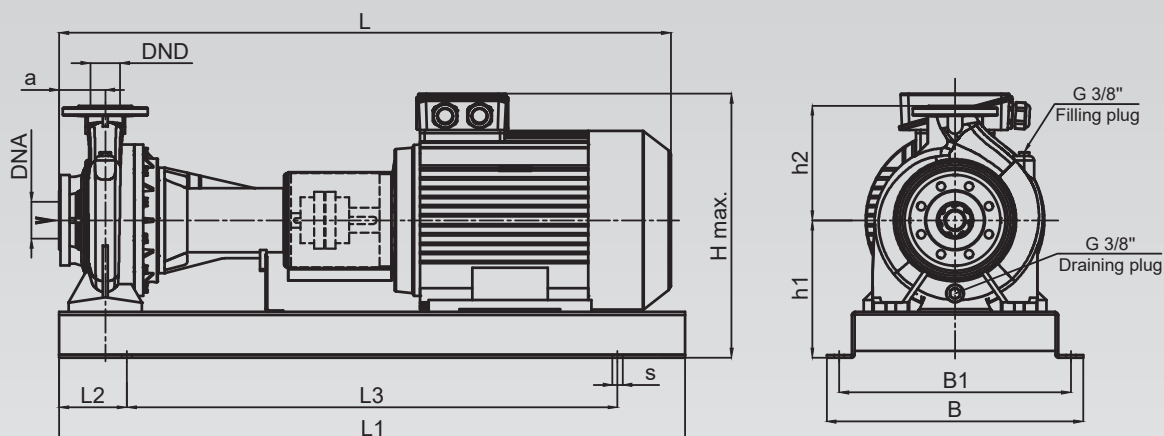


PUMP TYPE	DIMENSIONS																				
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	Hmax								
EAS 32-20 / 1,1	32	50	80	210	180	380	340	740	740	50	640	22	390								
EAS 32-20 / 1,5						440	400	770													
EAS 32-20 / 2,2								800													
EAS 32-20 / 3								840													
EAS 32-26 / 2,2			100	230	225	440	400	815	785		685		455								
EAS 32-26 / 3								860													
EAS 32-26 / 4								880													
EAS 32-26 / 5,5								945	840		740										
EAS 40-20 / 1,1	40	65	100	210	180	380	340	760	740		640	22	390								
EAS 40-20 / 1,5						440	400	790													
EAS 40-20 / 2,2								815													
EAS 40-20 / 3								860	785		685			455							
EAS 40-26 / 3				230	225			880													
EAS 40-26 / 4								945					840		740						
EAS 40-26 / 5,5								880	785		685										
EAS 40-32 / 4								945	840		740										
EAS 40-32 / 7,5	50	65	100	250	250	440	400	1150	990		890	500									
EAS 40-32 / 11								210	200		790	760		660							
EAS 50-20 / 1,5											815										
EAS 50-20 / 2,2											860										
EAS 50-20 / 3				125	230						225	440	400		880	785	685	455			
EAS 50-20 / 4								890													
EAS 50-26 / 4								945	840					740							
EAS 50-26 / 5,5								1140	1120					1120							
EAS 50-26 / 7,5	80	100	275	280	440	400	1080	940			840			555							
EAS 50-26 / 11							1225				1120				1020						
EAS 50-32 / 7,5							65	80	100		230				225	440	400	1225	1120	1020	455
EAS 50-32 / 11																		860	785		
EAS 50-32 / 15	880																				
EAS 65-20 / 3		945	940	840																	
EAS 65-20 / 4	65	80	100	230	225	440	400	860	785		685										
EAS 65-20 / 5,5								880													
EAS 65-20 / 7,5								945					940	840							

EAS SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 4 POLES (1750 rpm)

PUMP TYPE	DIMENSIONS																						
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	Hmax										
EAS 65-26 / 7,5	65	80	100	250	250	480	440	1055	965	50	865	22	500										
EAS 65-26 / 11						560	520	1200	1180		1080												
EAS 65-26 / 15			125	275	280	520	480	1225	1120		1020		555										
EAS 65-32 / 11											840		480										
EAS 65-32 / 15																							
EAS 65-32 / 18,5	80	100	125	230	250	440	400	995	940	50	840	22	480										
EAS 80-20 / 3								1015															
EAS 80-20 / 4								1080															
EAS 80-20 / 5,5								1080	1120														
EAS 80-20 / 7,5																							
EAS 80-26 / 7,5				250	280	520	480	1225	1120		1020		530										
EAS 80-26 / 11																							
EAS 80-26 / 15				300	315	560	520	1285	1180		1080		615										
EAS 80-26 / 18,5								1380	1230		1130												
EAS 80-32 / 22				100	125	250	280	480	440		1080		965	865	50	1020	22	530					
EAS 100-20 / 5,5	520	480	1225					1120	1130	615													
EAS 100-20 / 7,5											1240	1230											
EAS 100-20 / 11	560	520	1300					1230	1130	615													
EAS 100-20 / 15	300	315	520			480	1245	1120	1020		685												
EAS 100-26 / 11							560	520	1300	1180		1080											
EAS 100-26 / 15							580	540	1390	1330		1230											
EAS 100-26 / 18,5							125	150	140	300		315	520	480		1240		1120	50	1020	22	615	
EAS 100-32 / 18,5	355	700	660			1410					1350												1450
EAS 100-32 / 22																							
EAS 100-32 / 30				1390	1230										1250								
EAS 125-20 / 11							375	700	660	1410		1350	1450										
EAS 125-20 / 15	1260	1170	1155																				
EAS 125-20 / 18,5				1390	1230	1250																	
EAS 125-20 / 22		1260	1170								1155												
EAS 125-26 / 22				1390	1230	1250																	
EAS 125-26 / 30	1390						1230	1250															
EAS 125-26 / 37									1390	1230		1250											
EAS 125-26 / 45		1390	1230								1250												
EAS 150-20 / 11				1390	1230	1250																	
EAS 150-20 / 15	1390						1230	1250															
EAS 150-20 / 18,5									1390	1230		1250											
EAS 150-20 / 30		1390	1230								1250												
EAS 150-26 / 37				1390	1230	1250																	
EAS 150-26 / 45	1390						1230	1250															
EAS 150-26 / 55									1390	1230		1250											
EAS 150-26 / 75		1390	1230								1250												

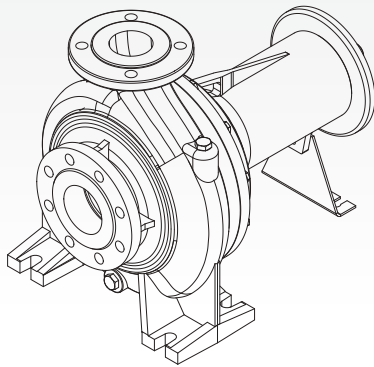
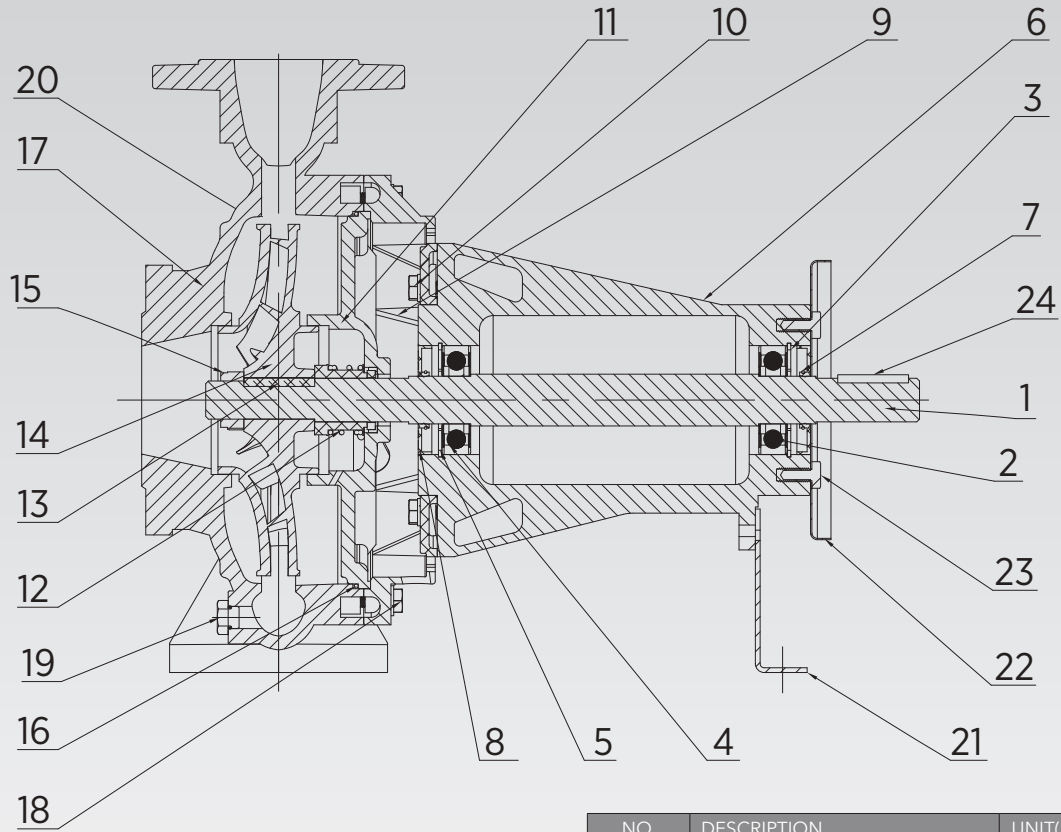
EAS SERIES PUMP DIMENSIONS AND WEIGHTS 60 Hz, 2 POLES (3550 rpm)



PUMP TYPE	DIMENSIONS															
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	Hmax			
EAS 32-20 / 7,5	32	50	80	210	180	440	400	925	870	50	740	22	390			
EAS 32-20 / 11								1070	990		890		435			
EAS 32-20 / 15																
EAS 32-20 / 18,5								1090	1040					940		
EAS 32-26 / 18,5																
EAS 32-26 / 22			500	460	1150	1000	455									
EAS 32-26 / 30			580	540	1245	1100		530								
EAS 32-26 / 37																
EAS 40-20 / 11	40	100	210	180	440	400			1100	990	890	435				
EAS 40-20 / 15							1150		1120	1020	475					
EAS 40-20 / 18,5							1245	1100	1000	530						
EAS 40-20 / 22							1290	1330	1290	560						
EAS 40-26 / 22			230	225	500	460	1150	1040	940	475						
EAS 40-26 / 30			250	580	540	1245	1100	1000	530							
EAS 40-26 / 37			275													
EAS 40-26 / 45																
EAS 50-20 / 11	50	65	210	200	440	400	1090	990	50	890	22	435				
EAS 50-20 / 15										500		460	1150	1040	940	475
EAS 50-20 / 18,5															440	400
EAS 50-20 / 22										500		460	1150	1040		
EAS 50-26 / 18,5			580	540	1245	1100	1000	530								
EAS 50-26 / 22							580	540		1245		1100	1000	530		
EAS 50-26 / 30			580	540	1245	1100							1000	530		
EAS 50-26 / 37							580	540		1245		1100	1000	530		
EAS 50-32 / 75	125	330	280	680	640	1600			1475		1375		680			
EAS 50-32 / 90							555	850		750	1900	2000	350	1300	25	1065
EAS 50-32 / 110																
EAS 50-32 / 132																
EAS 65-20 / 37	65	80	100	250	225	580	540	1245	1100	50	1000	22	530			
EAS 65-20 / 45				275				1290	1220		1120		560			
EAS 65-20 / 55				300				620	580		1400		1350	625		
EAS 65-20 / 75				330				670	630		1470			680		
EAS 65-26 / 45				275	250	580	540	1400	1330		1230		560			

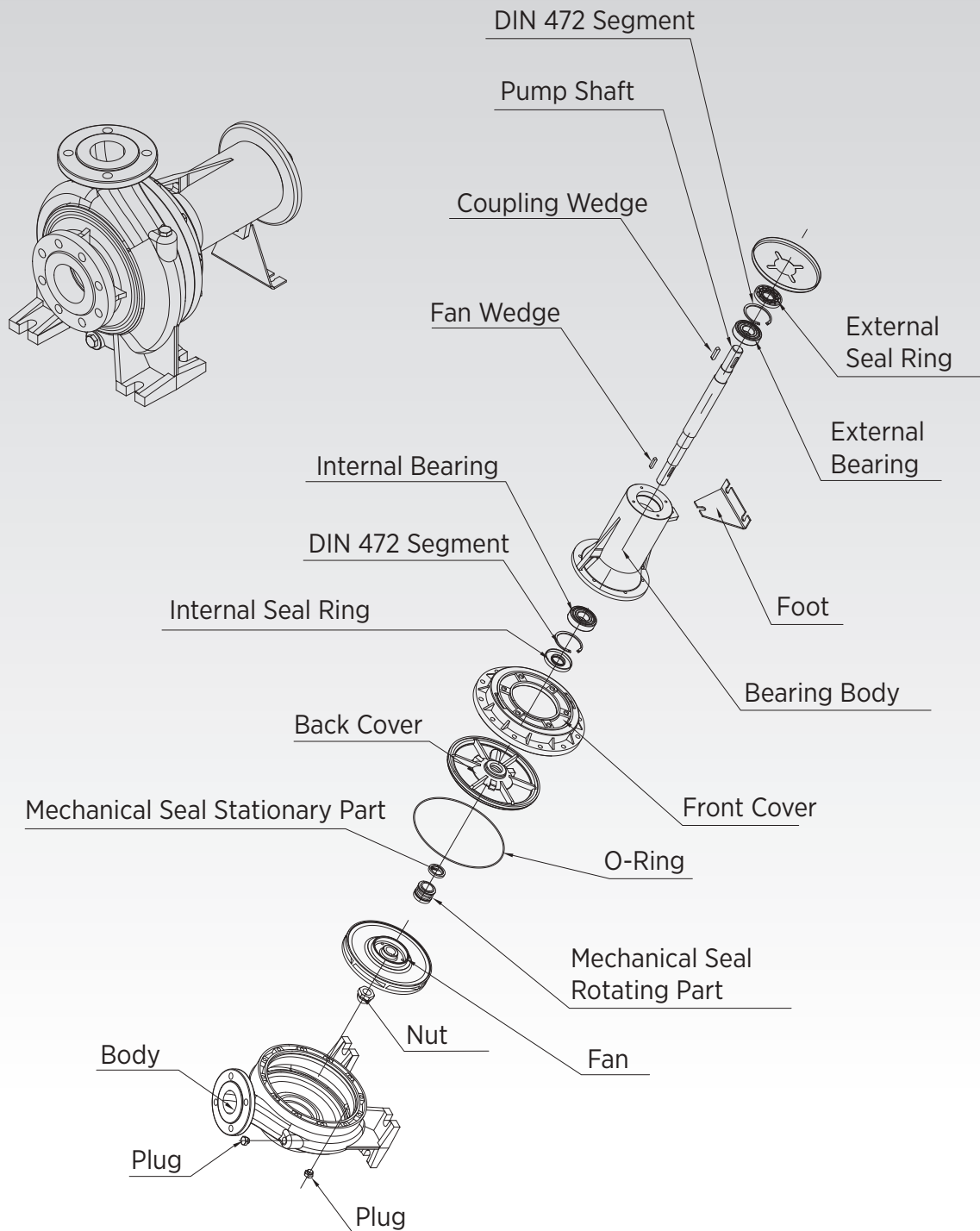
PUMP TYPE	DIMENSIONS												
	DND	DNA	a	h1	h2	B	B1	L	L1	L2	L3	Øs	Hmax
EAS 65-26 / 55	65	80	100	300	250	620	580	1500	1450	50	1350	22	625
EAS 65-26 / 75				330		680	640	1580	1475		1675		680
EAS 65-26 / 90				555		850	750	1900	2000		1300	25	1065
EAS 65-26 / 110			125	330	280	680	640	1600	1475	50	1375	22	680
EAS 65-32 / 90				555		850	750	1900	2000	350	1300	25	1065
EAS 65-32 / 110													
EAS 65-32 / 132													
EAS 65-32 / 160													
EAS 80-20 / 55	80	100	125	300	250	620	580	1530	1450	50	1350	22	625
EAS 80-20 / 75				330		680	640	1600	1475		1375		680
EAS 80-20 / 90				555		850	750	1900	2000	350	1300	25	1065
EAS 80-20 / 110				300	280	620	580	1530	1450	50	1350	22	625
EAS 80-26 / 55				330		680	640	1600	1475		1375		680
EAS 80-26 / 75				555		850	750	1925	2000	350	1300		1065
EAS 80-26 / 90					315			1970					
EAS 80-26 / 110								2000					
EAS 80-32 / 160								2080	2150		1350		
EAS 80-32 / 185													
EAS 80-32 / 200													
EAS 80-32 / 250													
EAS 100-20 / 45	100	125	140	275	280	580	540	1425	1330	50	1230	22	560
EAS 100-20 / 55				300		620	580	1530	1450		1350		625
EAS 100-20 / 75				330		660	580	1600	1475		1375		680
EAS 100-20 / 90				555	315	850	750	1800	1900	350	1200	25	1065
EAS 100-20 / 110				330		680	640	1615	1475	50	1375	22	680
EAS 100-26 / 90				555		850	750	1920	2000	350	1300	25	1065
EAS 100-26 / 110					315								1065
EAS 100-26 / 132													
EAS 100-26 / 160													
EAS 100-32 / 160				555	315	850	750	2000	2000	350	1300	25	1065
EAS 100-32 / 185													1065
EAS 100-32 / 200													
EAS 100-32 / 250								2080	2150		1350		
EAS 125-20 / 45	125	150	140	300	315	580	540	1440	1330	50	1230	22	615
EAS 125-20 / 55						620	580	1545	1450		1350		625
EAS 125-20 / 75				330		680	640	1615	1475		1375		680
EAS 125-20 / 90					355	560	520	1390	1230	50	1130	22	655
EAS 125-26 / 37				300		580	540	1440	1330		1230		
EAS 125-26 / 45						620	580	1545	1450		1350		
EAS 125-26 / 55						680	640	1615	1475		1375		
EAS 125-26 / 75				330	355	700	660	1570	1550	350	1450	25	1065
EAS 150-20 / 55								1640					
EAS 150-20 / 75													
EAS 150-20 / 90	150	200	160		375					350		25	1065
EAS 150-20 / 110													
EAS 150-26 / 160													
EAS 150-26 / 185													
EAS 150-26 / 200													
EAS 150-26 / 250								2120	2150		1350		

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:

$$h_p + h_z \geq h_z (\text{NPSHr} + 0.5) + h_f + h_{pv}$$

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
 $1.013 \times 10.2 = 10.33$ m

h_{pv} = 15 °C $P_v = 0.01704$ bar (from evaporation pressure table) $0.01704 \text{ bar} \times 10.2 \text{ m}$

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

h_z = 3.5 m suction head

h_f = (suction pipe $\varnothing 65$ 3.5 m pipe + 90° wide elbow + check valve) flow resistances

From flat pipe flow resistance and armature loss table:

For 50 m³ / h $\varnothing 65$ 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 $10/6 = 1.66 \times 2$ 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

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

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

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

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

FRICITION 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																					
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			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.																		
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										

FRICITION 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 P_v and γ SPECIFIC WEIGHT OF WATER

t	T	P_v	γ
°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	P_v	γ
°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	P_v	γ
°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

NOTE

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NOTE

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