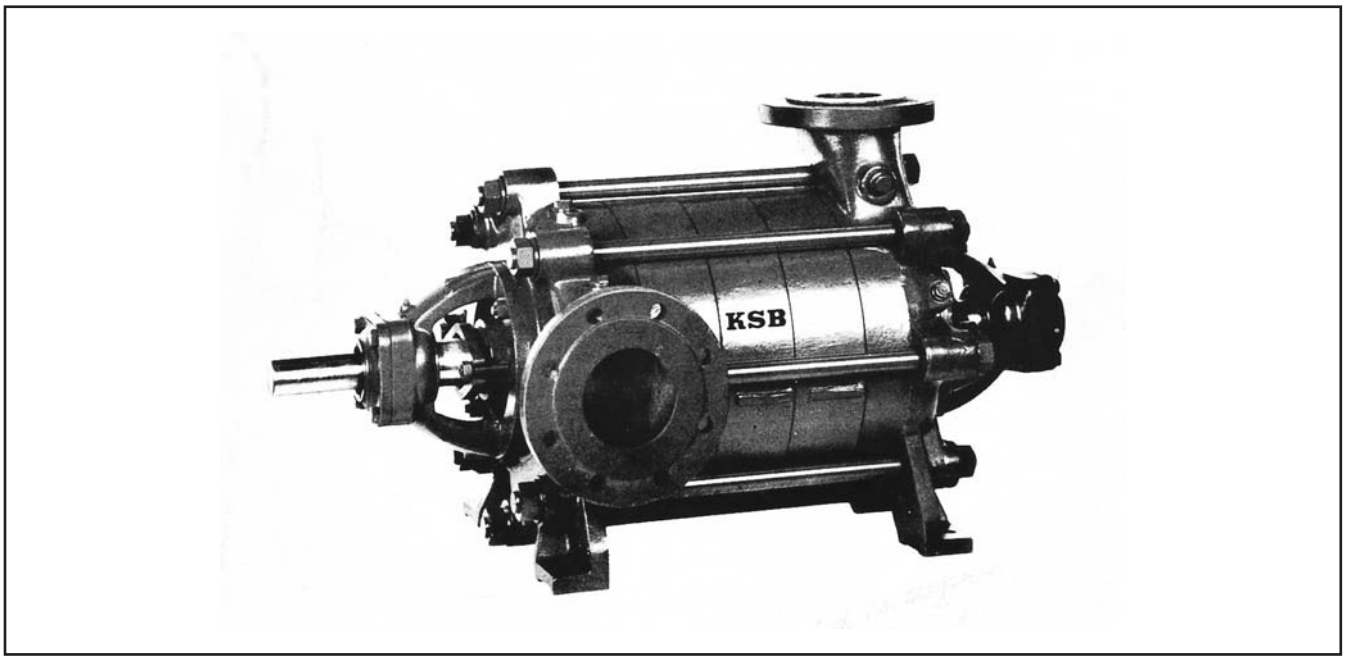


Applications

For municipal and industrial water supply in water works, pressure boosting installations, irrigation and sprinkler plants; as boiler feed pumps and condensate pumps, cooling water and hot water circulation pumps; for high pressure water in hydraulic presses, as fire pumps etc.

Construction

Horizontal high pressure centrifugal pumps in ring sectional design, single- or multistage, vertically split suction, discharge and stage casings. The individual casing parts are sealed by O-rings and are clamped together by external tie bolts.
The pump feet are cast integrally with the suction and discharge casings, and are arranged beneath the pump.

Bearings

The bearings are enclosed in two bearing housings, flanged onto each end of the pump. On the suction end of all pump sizes a cylindrical roller bearing with spacer sleeve is fitted; on the discharge side of sizes 32 and 40 a deep groove ball bearing, sizes 50 and up an angular ball bearing is fitted.
The rotating assembly is hydraulically balanced by means of back vanes or balance holes at the rear of the impeller; the residual axial thrust being absorbed by a ball bearing at the discharge side.

Shaft Seal

The shaft is fitted with renewable protective sleeves in the region of the stuffing box.
Uncooled soft-packed stuffing boxes are used for temperatures up to 110°C (230°F); for temperatures above 110°C (230°F) up to 140°C (285°F) a cooled soft-packed stuffing box is used, where the temperature on the stuffing box is kept within permissible limits with the aid of the cooling liquid. Furthermore, special stuffing boxes for connection of sealing liquid from an outside source are available.
Uncooled mechanical seal up to 110°C (230°F) maximum.

Nozzle orientation

The suction nozzle is horizontal, right-hand side when viewed from driving end, and the discharge nozzle is top, vertical.
The suction flange is machined according to DIN 2533, NP 16 or BS 4504 table 16/11. The discharge flange is machined according to DIN 2535, NP 40 or BS 4504 table 40/1.

Drive

Direct drive by electric motor through a flexible coupling.
The suction end of the pump is the driving end, direction of rotation is clockwise; the pump can be driven from the discharge side (direction of rotation is counterclockwise), or two shaft stubs can be provided, one at each end.

Materials of Construction

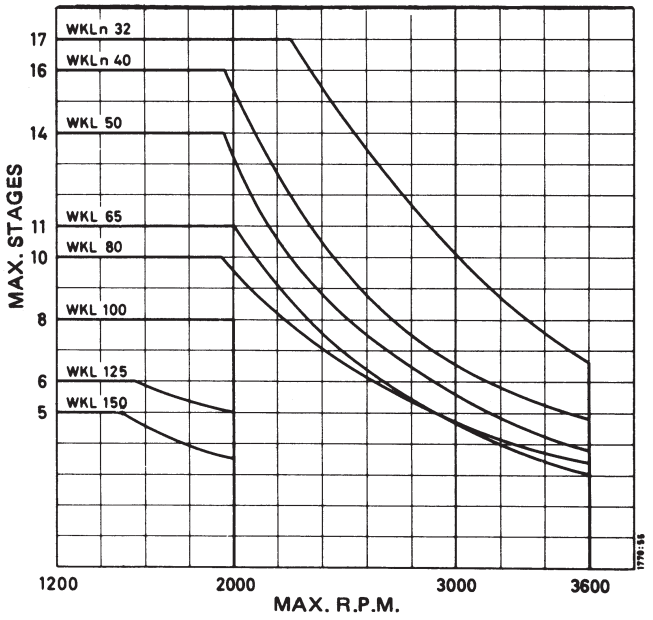
Part No.	Part Designation	Material Combinations							
		(01)	(02)	(03)	(04)	(05)	(06)	(08)	(22)
106/107	Suction-/Discharge casing	GG-25							
230	Impeller	GG-25	GCuSn10	GG-25		GCuSn10	GG-25	GCuSn10	
171.1/.2	Diffuser	GG-25							GCuSn10
210	Shaft	O8OM40Q			431S29				080M40Q
524.1/2	Shaft protection sleeve	GGZ-20	GCuSn10	316S16	GGZ-20	GCuSn10	316S16		GCuSn10
502	Casing wear ring	GG							G-CuPBSn10
	Seal	Packed gland		Mechanical	Packed gland		Mechanical		Packed gland

Direction of Rotation

Clockwise seen from the drive end.

Delivery Heads/Pressures

	32 - 65	80 - 150
Max. delivery head at shut-off	300 m	300 m
Max. suction pressure	10 bar	10 bar
Max. total discharge pressure at shut-off	30 bar	28 bar
Test Pressure Suction casing Discharge/stage casing	16 bar 45	16 bar 37.5



Layout

Selection of pump size and design according to:

Capacity	Q	m^3/h
Total head	H	m
NPSH	H_H	m
Medium handled		
Temperature	t	°C
Density	kp/dm^3	
Viscosity	mm^2/s	

Handled medium, temperature and pump discharge pressure are decisive for selection of material.

A preselection can be made by using the selection charts.

Precise determination can only be obtained from individual performance curves, for:

Head, Quantity, Efficiency, Power and NPSH req.

Safety Margin Power

up to	1,5 kW	20% approx.
up	15,0 kW	15% approx.
above	15,0 kW	10% approx. reserve power margin.

The mode of operation and the upper limit in conjunction with it will be decisive factors in the selection of an appropriate driver.

The values of the performance curves refer in principle to liquids with a density of 1 kp/dm^3 and a viscosity of 1 mm^2/s. Liquids with a higher viscosity influence the hydraulics data. Keep within the efficiency factor 0,5.

All single curves are determined with reference to the theoretical speed of 1450 and 2900 r.p.m. Thus conversion to the respective rated speed of the-drive is necessary.

NPSH

The NPSH req values specified are certified values for all project calculations and on no account may lower values be adopted. The 10% safety margin included in these specified values, with a minimum of 0,5 metre (1.65 feet) is designed to cover tolerances of measurement and make allowances for manufacturing scatter (NPSH cannot be measured with the same degree of precision as for instance the total head H) . NPSH available must be greater than NPSH req with the exception of self-regulating condensate pumps.

Explanations of the Impeller Diameter:
Open dimension = impeller is turned off; i.e. 185Ø
Dimensions in brackets = impeller is turned out;
i.e. 185Ø (180Ø).
Open dimension and dimension in brackets = impeller is turned off and turned out; i.e. 175Ø (170Ø).

Flow

Recommended Range of Selection
Min Flow Q = 0,5 Q opt.
Max Flow Q =1,4 Q opt.

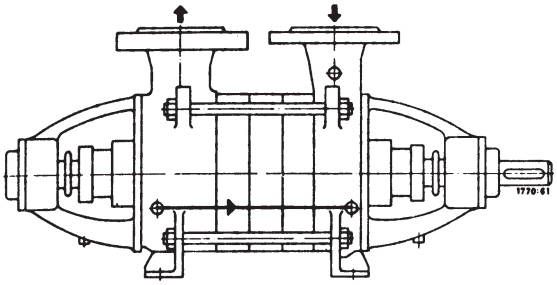
Minimum Flow

To protect the pump against damage caused when running the pump in adverse operating conditions resulting in "steaming" of the pump contents predetermined mimimum flow requirements can be as stated below.

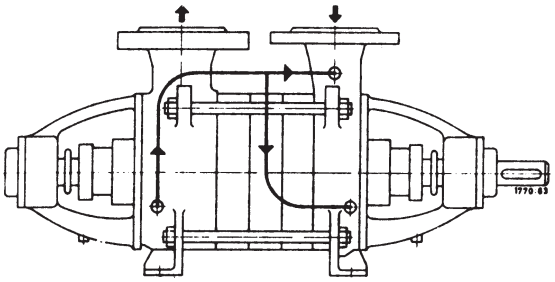
t = -10° to +100°C ≈ 15% of Q opt.
t = 100° to 140°C ≈ 20% of Q opt.

Plant requirements outside the above parameters or applications that require further investigation are to be referred back to KSB.

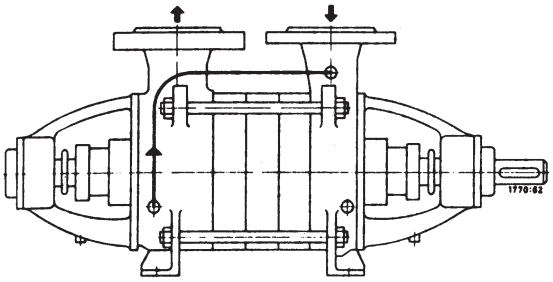
Piping Plan Layout



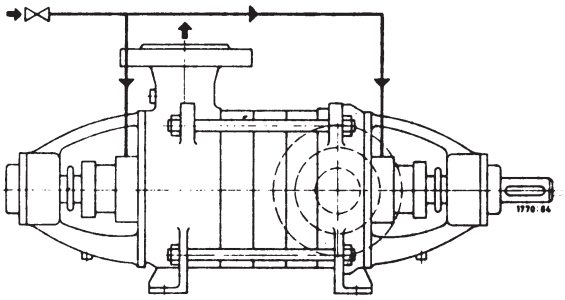
Arrangement 11



Arrangement 13



Arrangement 12

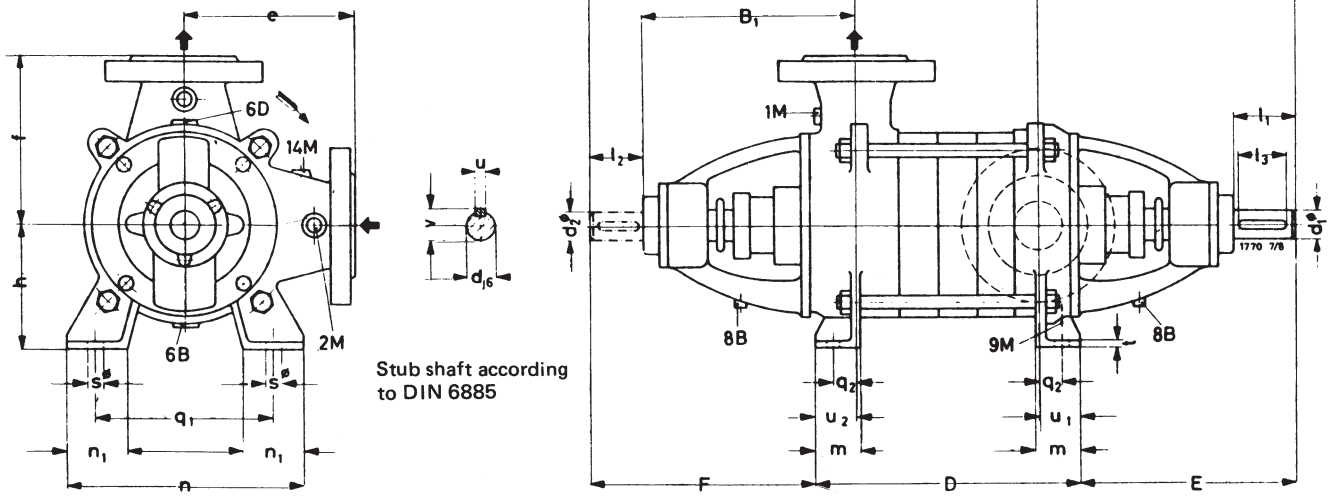


Arrangement 14

VARIATION	DISCHARGE PRESSURE	PUMP SIZE	SEAL FLUSHING DRILLING SUCTION HOUSING TO PUMP INTERNAL	SEAL FLUSHING PIPING	BALANCE LINE PIPING	SEAL FLUSHING AND BALANCE PIPING LINE	SEAL FLUSHING EXTERNAL SUPPLY CONNEC-TION
NEGATIVE SUCTION OR SUCTION PRESSURE NOT EXCEEDING 1 BAR	≤ 15 Bar	Size 32 to 65	-	arrgt. 11	-	-	
		80 from 2 stages n ≤ 2100 R/min	plugged	arrgt. 11	-	-	
		80/1 stages, n ≤ 2100 R/min	open	-	-	-	
		80 n > 2100 R/min					
		100 to 150					
		Stages 80 to 150: stage 1 with blank stages	plugged	arrgt. 11	-	-	
	> 15 Bar	32 and 40	-	arrgt. 11	-	-	
		50 and 65	-	-	-	arrgt. 13	
		80 to 150	open	-	-	arrgt. 11	
SUCTION PRESSURE EXCEEDING 1 BAR	≤ 15 Bar	32 to 65	-	-	-	-	
		80 to 150	open	-	-	-	
	> 15 Bar	32 and 40	-	-	-	-	
		50 and 65	-	-	arrgt. 12	-	
		80 to 150	open	-	arrgt. 11	arrgt. 11	
CONDENSATE VACUUM OPERATION	≤ 15 Bar	32 to 65	-	-	-	-	suction and disch. arrgt.14
		80 to 150	plugged	-	-	-	
	> 15 Bar	32 and 40	-	-	-	-	
		50 and 80	plugged (only size 80)	-	-	-	
		100 to 150	plugged	-	arrgt. 12	-	

Dimension Table

High Pressure Centrifugal Pumps
WKLn 32 to 150
with uncooled stuffing box



Pump Size	Pump dimensions																			Stub shaft						
	Nominal Bore Suction	Nominal Bore Dis-charge	A	B_1	$B_{2^*)}$	D	E	F	e	f	h	m	n	n_1	q_1	q_2	s∅	t	u_1	u_2	d_1∅ j6	d_2∅ j6*)	l_1	l_2*)	l_3	v	u
32	40	32	250	183	252	C + 120	190	192	160	160	132	60	256	60	205	35	14	12	60	60	30	25	65	63	45	32,9	8
40	50	40	250	183	252	C + 120	190	192	180	180	132	60	280	60	240	35	14	12	60	60	30	25	65	63	45	32,9	8
50	65	50	285	220	295	C + 92	239	249	180	180	135	50	280	60	230	30	15	12	46	46	35	28	60	60	50	38,3	10
65	80	65	290	220	295	C + 102	239	244	200	200	155	55	300	70	250	35	15	14	51	51	35	28	60	60	50	38,3	10
80	100	80	320	250	335	C + 120	260	275	265	265	210	60	370	70	310	40	14	14	60	60	40	35	85	85	75	43,1	12
100	125	100	360	275	380	C + 140	290	310	300	300	250	75	440	80	370	45	14	14	70	70	45	40	95	95	80	48,5	14
125	150	125	420	300	440	C + 170	335	355	375	375	300	85	550	95	460	51	18	18	85	85	50	45	125	125	90	53,3	14
150	200	150	485	355	500	C + 200	385	400	425	425	350	100	650	100	550	65	23	18	100	100	60	48	140	140	90	64,2	18

Pump Size	Pump dimension C at a number of stages																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
32	82	130	178	226	274	322	370	418	466	514	562	610	658	706	754	802	850
40	82	130	178	226	274	322	370	418	466	514	562	610	658	706	754	802	
50	73	128	183	238	293	348	403	458	513	568	623	678	733	788			
65	87	147	207	267	327	387	447	507	567	627	687						
80	110	193	276	359	442	525	608	691	774	857	940	1023	1106				
100	135	235	335	435	535	635	735	835	935								
125	165	280	395	510	625	740											
150	215	360	505	650	795												

*) For pumps which can be driven from both ends

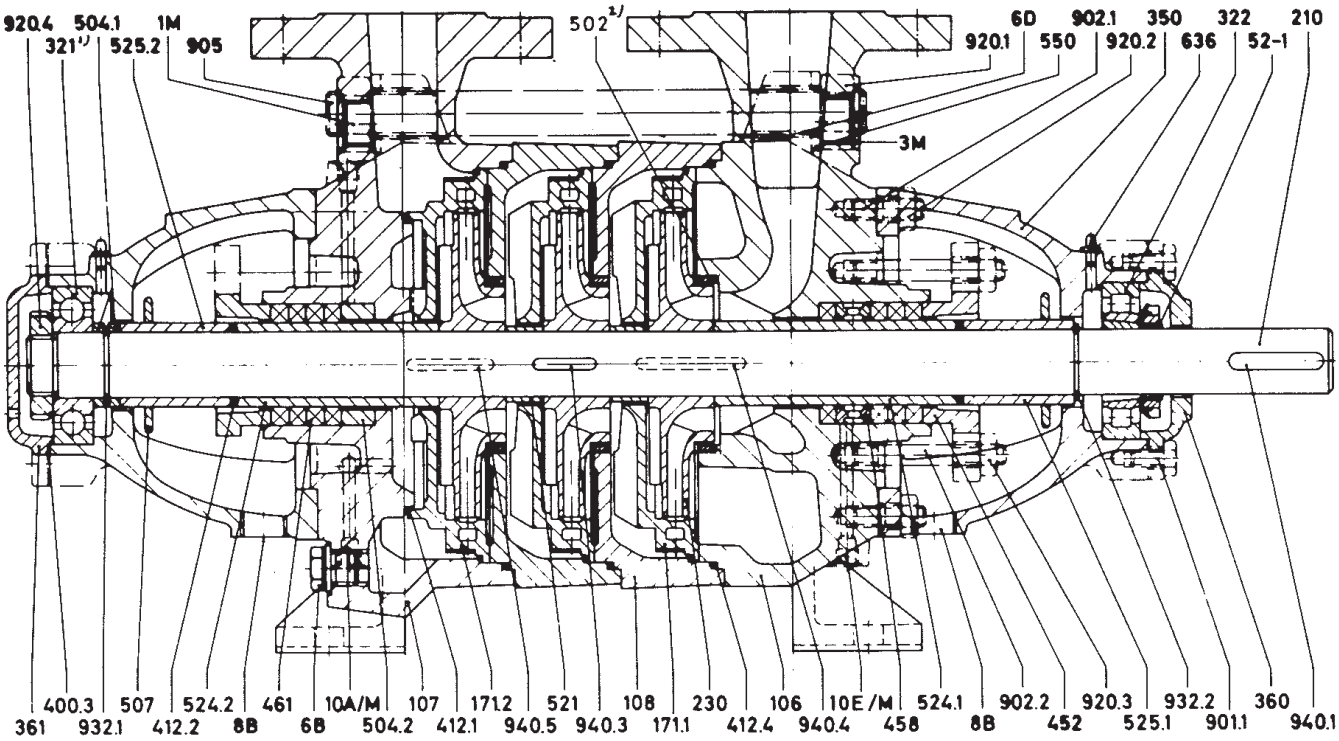
Connection sizes

	Pump Size	32	40	50	65	80	100	125	150
1 M	Pressure gauge	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”
2 M	Vacuum gauge	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”
6 D	Priming and venting	R 3/8”	R 3/8”	R 3/8”	R 3/8”	R 1/2”	R 1/2”	R 1/2”	R 1/2”
6 B	Drain	R 3/8”	R 3/8”	R 3/8”	R 3/8”	R 1/2”	R 1/2”	R 1/2”	R 1/2”
8 B	Leakage drain	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”	R 1/2”
9 M	Connection of sealing liquid	R 1/8”	R 1/8”	R 1/8”	R 1/8”	R 3/8”	R 3/8”	R 3/8”	R 3/8”
14 M	Connection of balance liquid	R 1/8”	R 1/8”	R 1/8”	R 1/8”	R 3/8”	R 3/8”	R 3/8”	R 3/8”

R = B.S.P.
All Dimentions are in millimeters

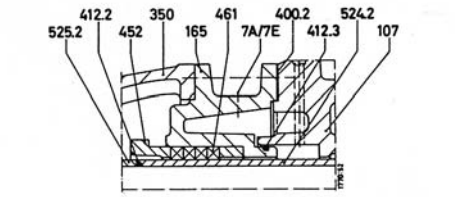
WKLn 32 up to 65

Construction with uncooled soft-packed stuffing box (N) t≤110°C (230°F)



Cross section of stuffing box

Cooled soft-packed stuffing box (HW),
t > 110°C up to 140°C
(230 up to 285° F)

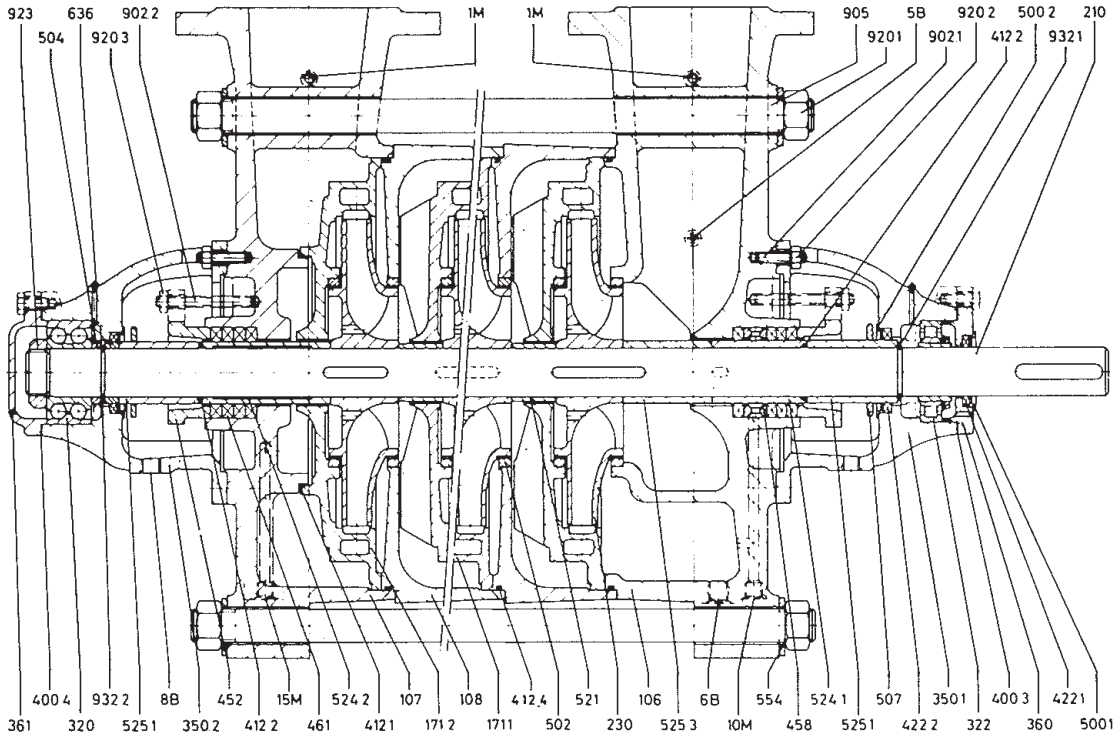


Part No.	Designation	Part No.	Designation	Part No.	Designation
106	Suction casing	461	Stuffing box packing	902.1/.2	Stud
107	Discharge casing	478[3)]	Spring-right hand (Suction side)	905	Tiebolt
108	Stage casing	479	Spring-left hand (Discharge side)	920.1/.2/.3	Hexagonal nut
165	Cooling cover	502[2)]	Casing wear ring	920.4	Grooved nut
171.1	Diffuser	504.1/.2	Spacer ring	932.1/.2	Circlip
171.2	Diffuser, last stage	507	Thrower	932.1/.3/.4	Key
210	Shaft	521	Stage sleeve	940.5/.6	Key
230	Impeller	52-1	Clamping sleeve	1M	Pressure gauge
321[3)]	Deep groove ball bearing	523.1[1)]	Shaft sleeve (Suction side)	3M	Pressure vacuum gauge
322	Cylindrical roller bearing	524.1	Shaft protecting sleeve (Suction side)	6B	Drain
350	Bearing housing			6D	Priming and venting
360	Bearing cover	524.2	Shaft protecting sleeve (Discharge side)	7A	Cooling liquid outlet
361	Bearing end cover			7E	Cooling liquid inlet
400.2/.3	Flat gasket	525.1	Spacer sleeve (Suction side)	8B	Leakage drain
412.1/.3	O-ring	525.2	Spacer sleeve (Discharge side)	10A	Sealing liquid outlet
412.4	O-ring	550	Disc	10E	Sealing liquid inlet
452	Stuffing box gland	636	Grease nipple	10M	Connection for sealing liquid from an outside source
458	Lantern ring	901.1	Hexagonal head bolt		

1) not shown in drawing
2) fitted from size 50 up
3) size 50 and 65 fitted with 320 Angular Contact Bearing

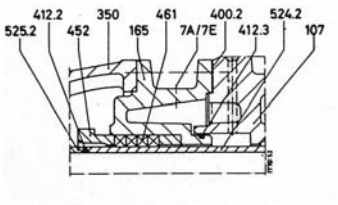
WKLn 80 up to 150

Construction with uncooled soft-packed stuffing box (N) t≤110°C (230°F)



Cross section of stuffing box

Cooled soft-packed stuffing box (HW),
t >110°C up to 140°C
(230 up to 285° F)

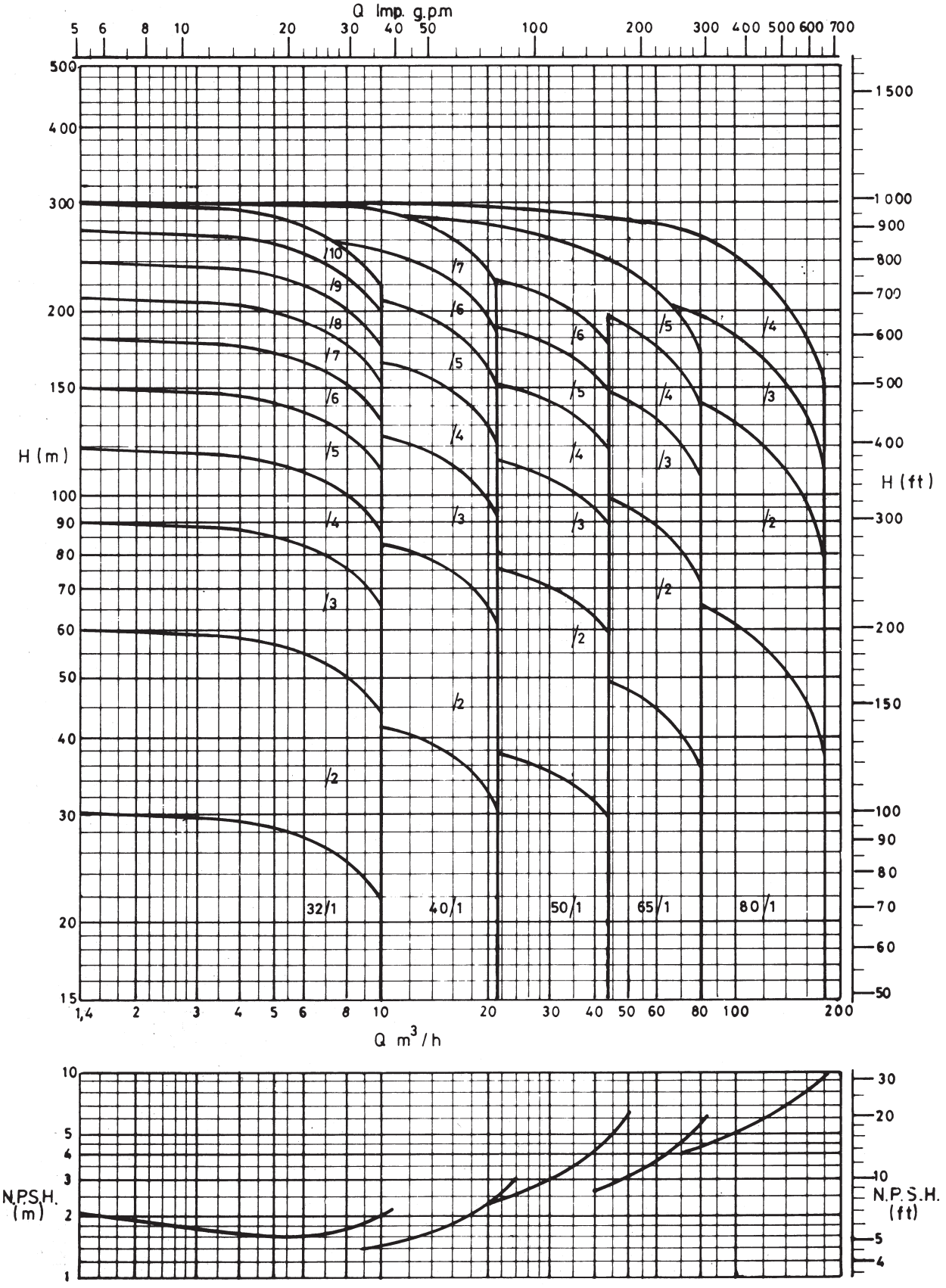


Part No.	Designation	Part No.	Designation	Part No.	Designation
106	Suction casing	502	Casing wear ring (WKLn 50 to 150)	901.1	Hexagonal head bolt
107	Discharge casing	504	Spacer ring	902.1/.2/.3[4])	Stud
108	Stagecasing	507	Thrower	905	Tiebolt
165	Cooling cover	521	Stage sleeve	920.1/.2/.3	Hexagonal nut
171.1	Diffuser	52-1	Clamping sleeve	920.4	Grooved nut (Nut with two
171.2	Diffuser, last stage	523.1[1])	Shaft sleeve (Suction side)		flats WKLn 80 up to 150)
210	Shaft	524.1	Shaft protecting sleeve	932.1/.2	Circlip
320	Angular contact ball bearing		(Suction side)	940.1/.3/.4	Key
230	Impeller	524.2	Shaft protecting sleeve	940.5/.6	Key (940.5 omitted on
321	Deep groove ball bearing		(Discharge side)		WKLn 125 and 150)
322	Cylindrical roller bearing	525.1	Spacer sleeve (Suction side)	1M	Pressure gauge
350.1/.2	Bearing housing	525.2	Spacer sleeve (Discharge side)	3M	Pressure vacuum gauge
360	Bearing cover	525.3	Spacer sleeve	6B	Drain
361	Bearing end cover		(size 150 on stuffing box	6D	Priming and venting
400.2/.3	Flat gasket		construction N;	7A	Cooling liquid outlet
412.1/.2/.3	O-ring		Sizes 100 to 150 on stuffing box	7E	Cooling liquid inlet
412.4	O-ring		construction HW)	8B	Leakage drain
422.1/.2	Felt ring(WKLn 125 and 150)	525.4[1])	Spacer sleeve	10A	Sealing liquid outlet
452	Stuffing box gland		(sizes 100 and 150 on stuffing	10E	Sealing liquid inlet
458	Lantern ring		box construction HW)	10M	Connection of sealing liquid
461	Stuffing box packing	543	Spacer bush		from an outside source
478[1])	Spring-right hand (Suction side)	550	Disc	14A	Balance liquid outlet
500.1/.2	End ring (WKLn125 and 150)	636	Grease nipple	14E	Balance liquid inlet

1) Not shown in drawing
2) Stud 902.3 from WKLn 100 onwards

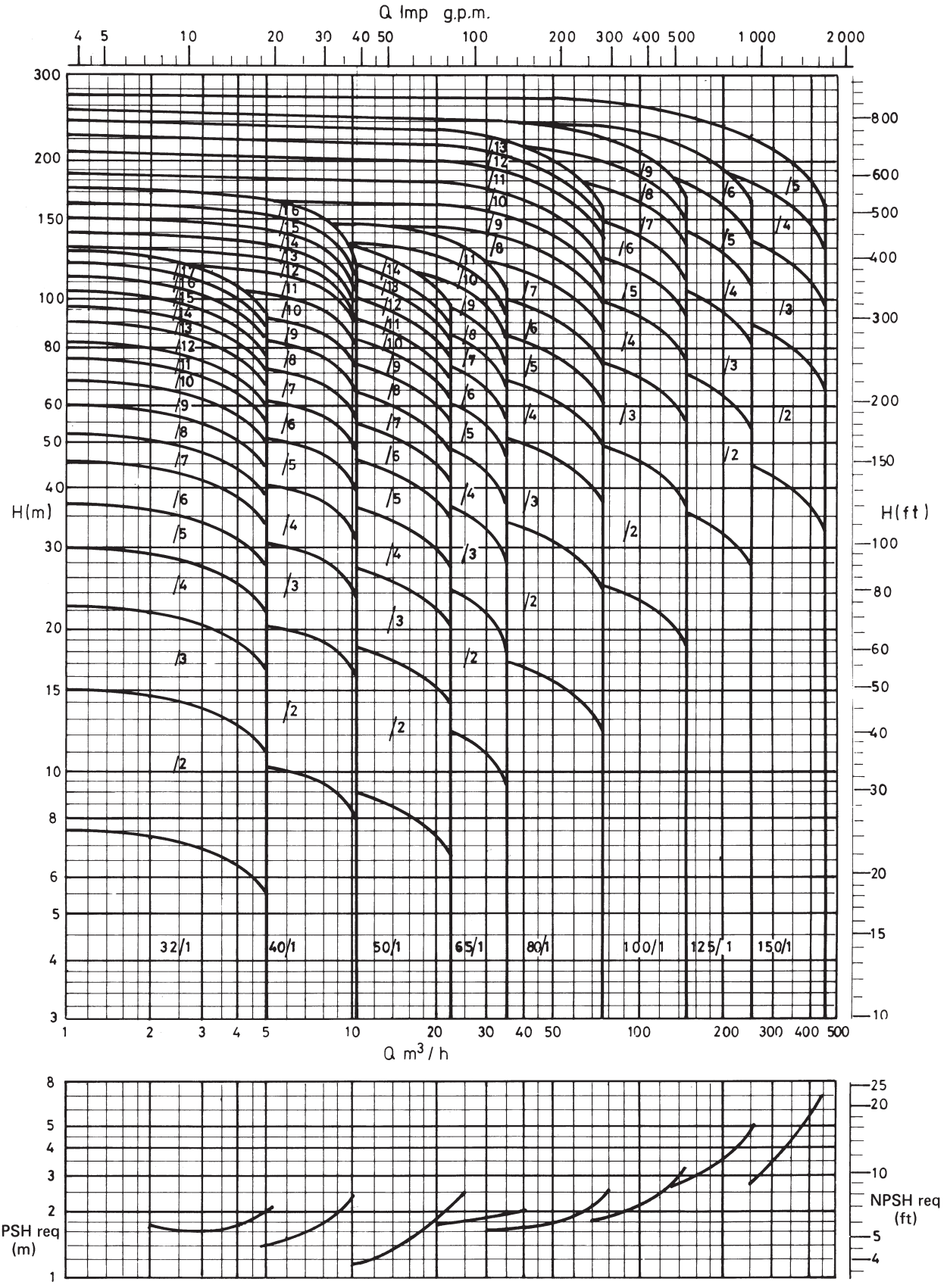
Selection chart

Performance Characteristics
Selection chart 2900 1/min
Number of stages for uncooled and
cooled stuffing box constructions

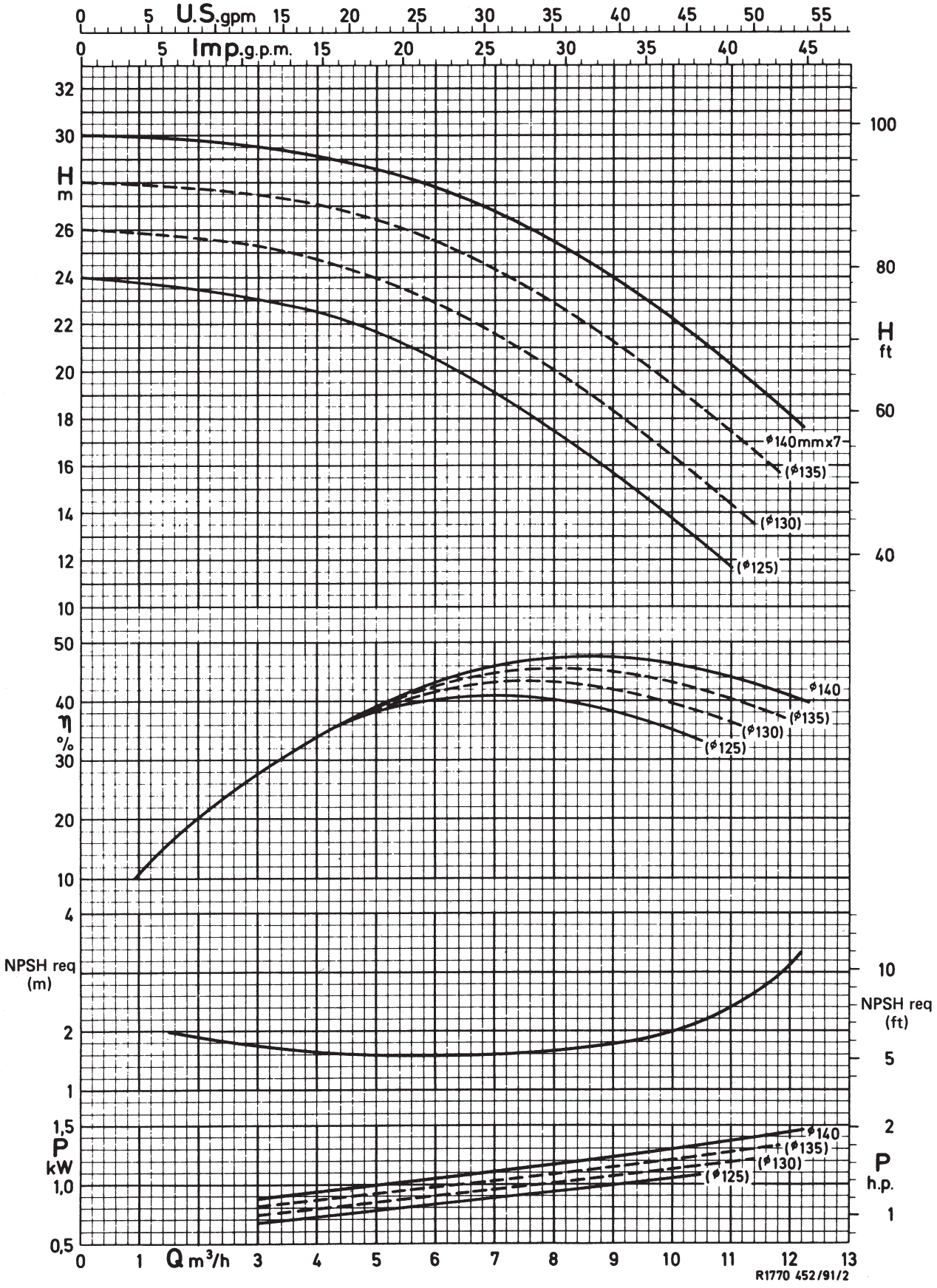


Selection chart

Selection chart 1450 1/min
Number of stages for construction with uncooled stuffing box.
For construction with cooled stuffing box reduction of number of stages for size 32 to 65 = 2, sizes 80 to 150 =1

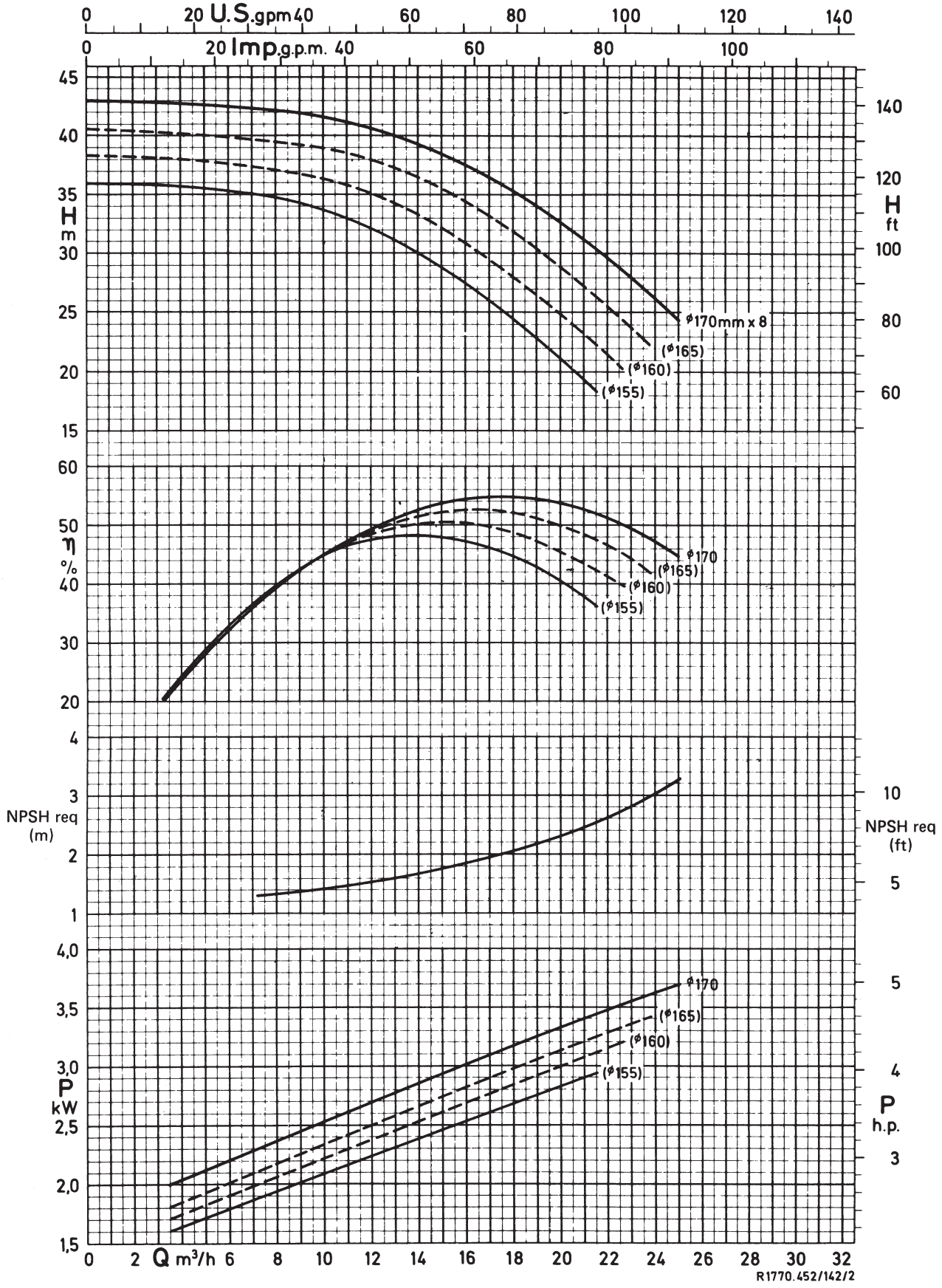


WKLn 32



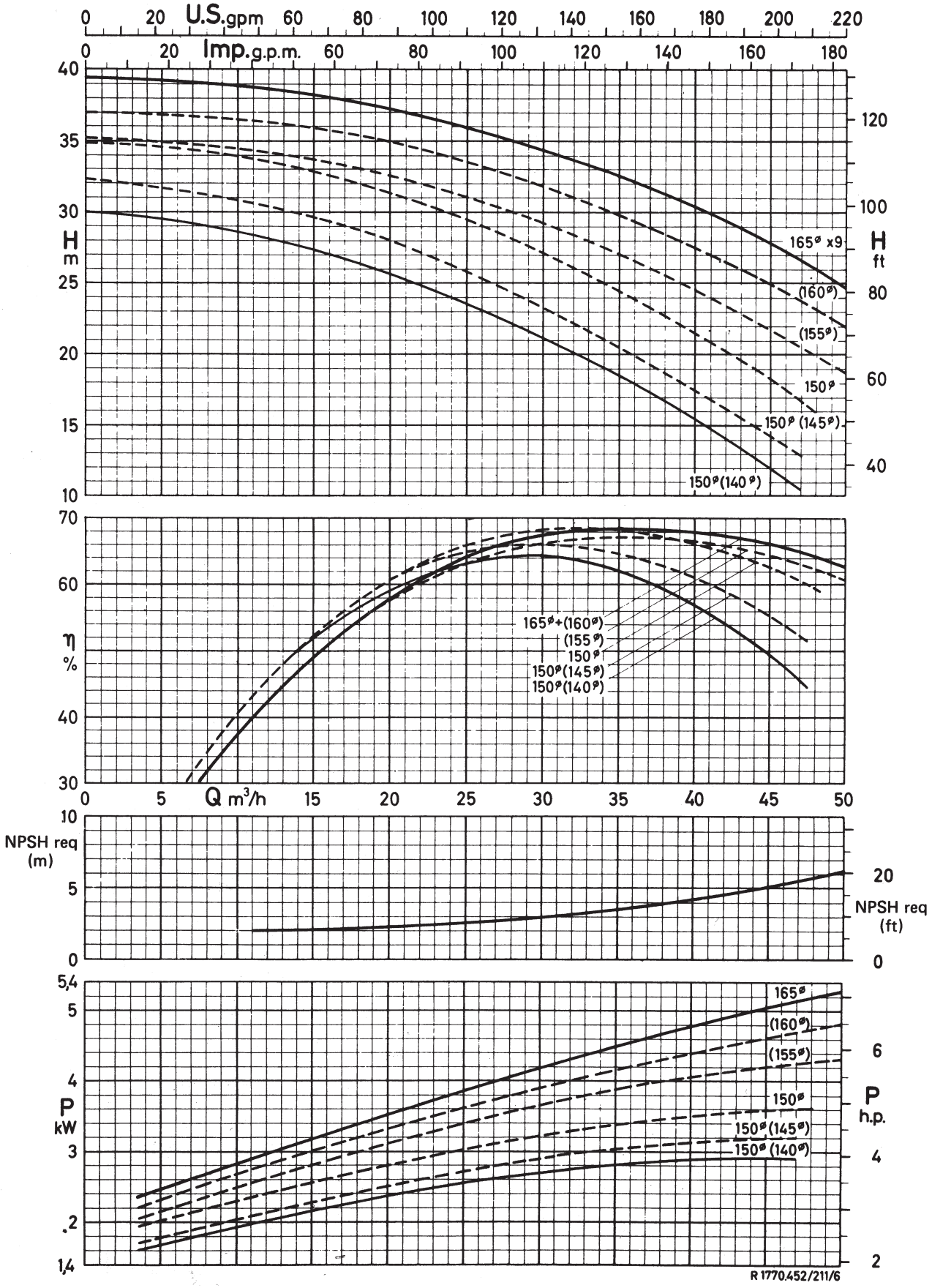
Impeller 140-125 mm Ø Impeller outlet width 7 mm **2900 R.P.M.**

WKLn 40



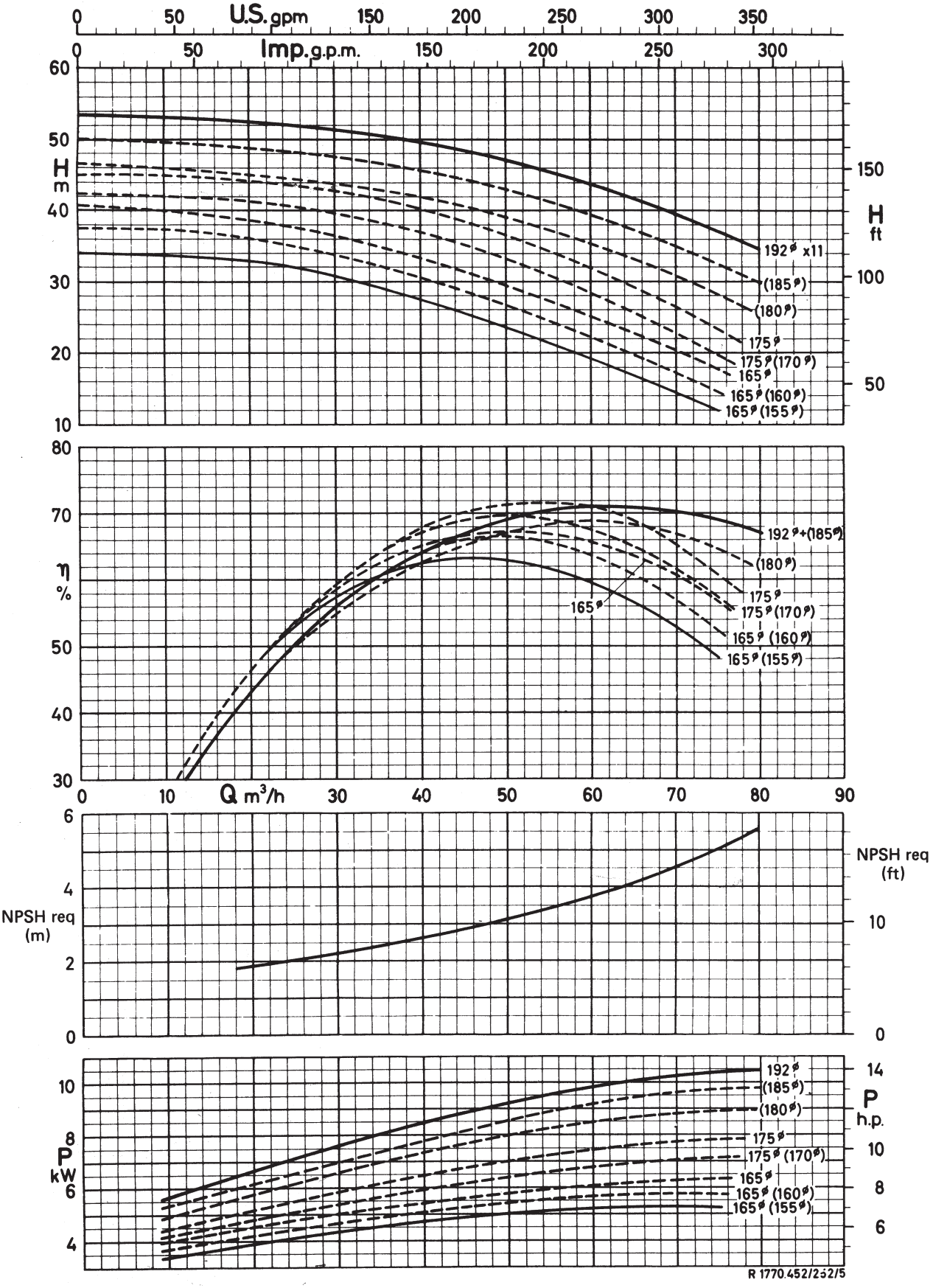
Impeller 170-155 mm ∅ Impeller outlet width 8 mm **2900 R.P.M.**

WKLn 50



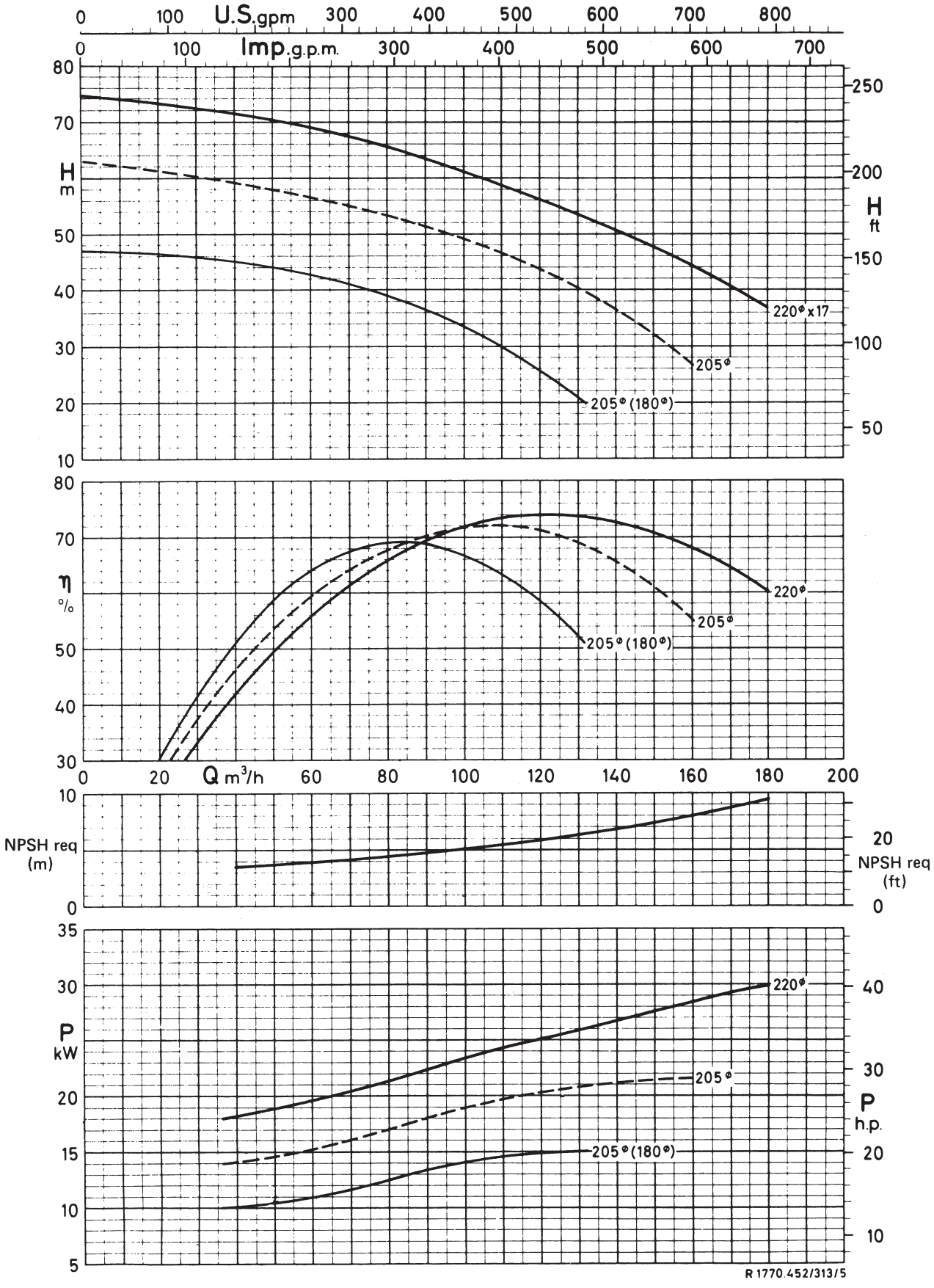
Impeller 165-140 mm Ø Impeller outlet width 9 mm **2900 R.P.M.**

WKLn 65



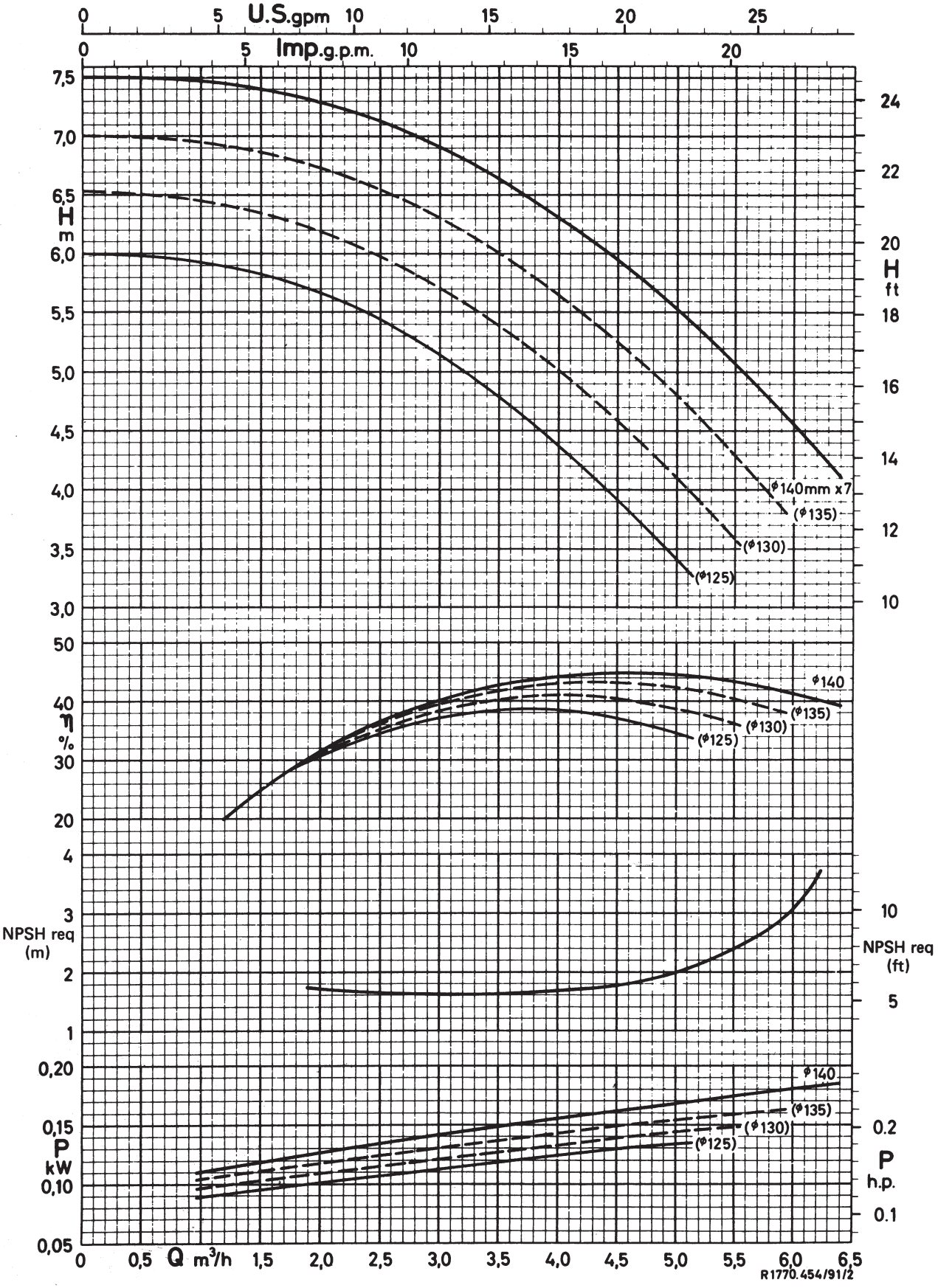
Impeller 192-155 mm Ø Impeller outlet width 11 mm **2900 R.P.M.**

WKLn 80



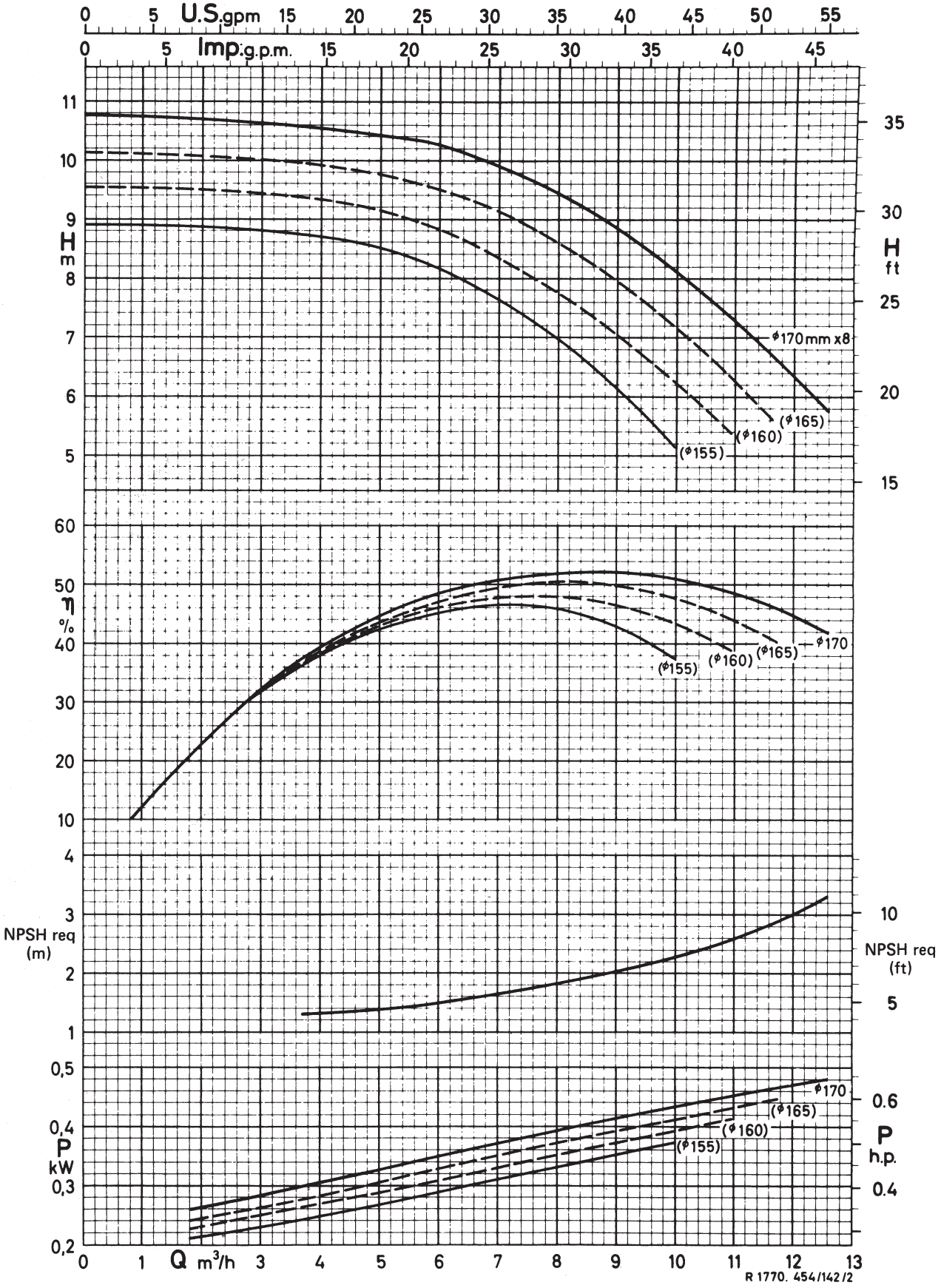
Impeller 220-180 mm Ø Impeller outlet width 17 mm **2900 R.P.M.**

WKLn 32



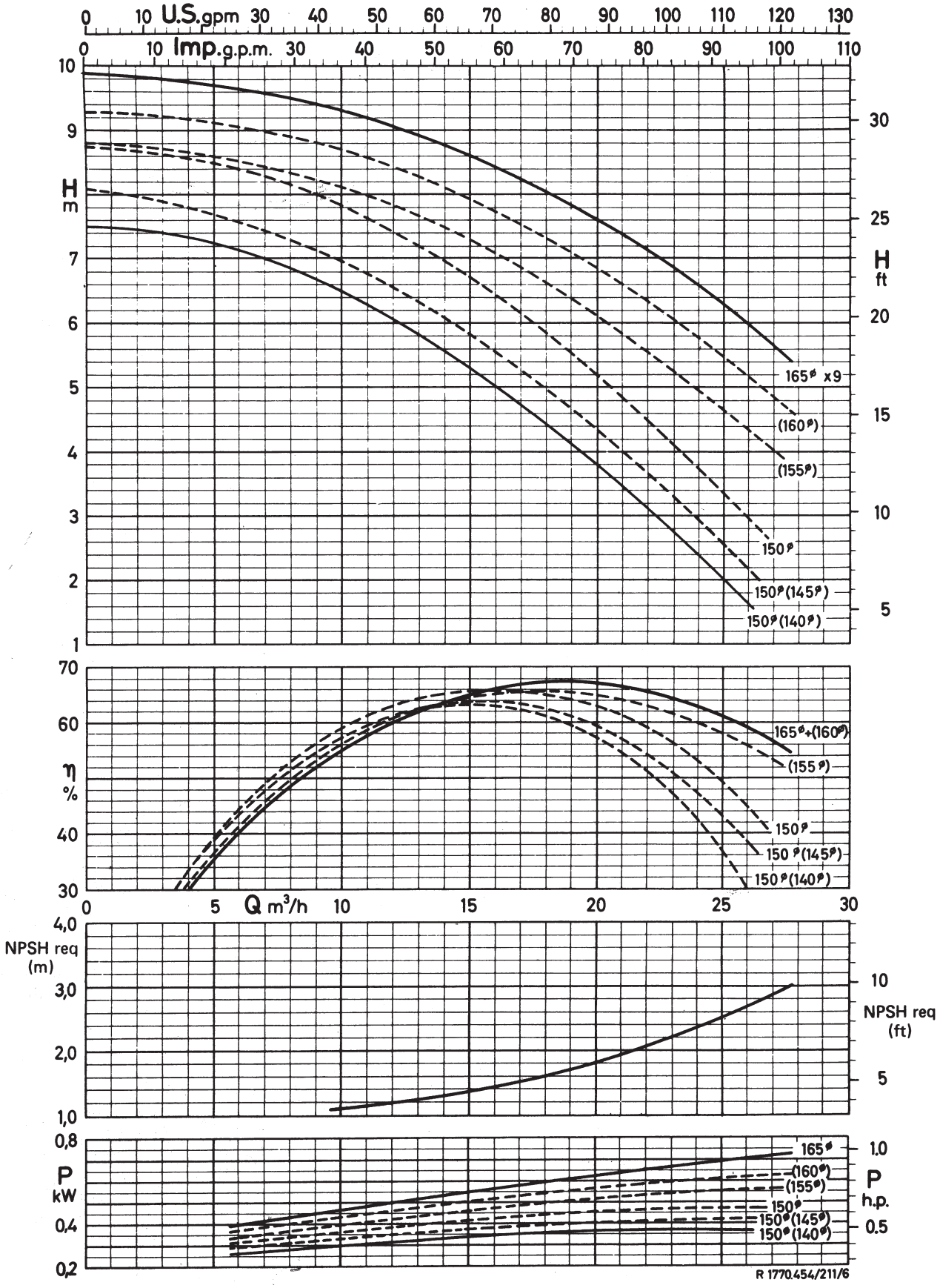
Impeller 140-125 mm Ø Impeller outlet width 7 mm **1450 R.P.M.**

WKLn 40



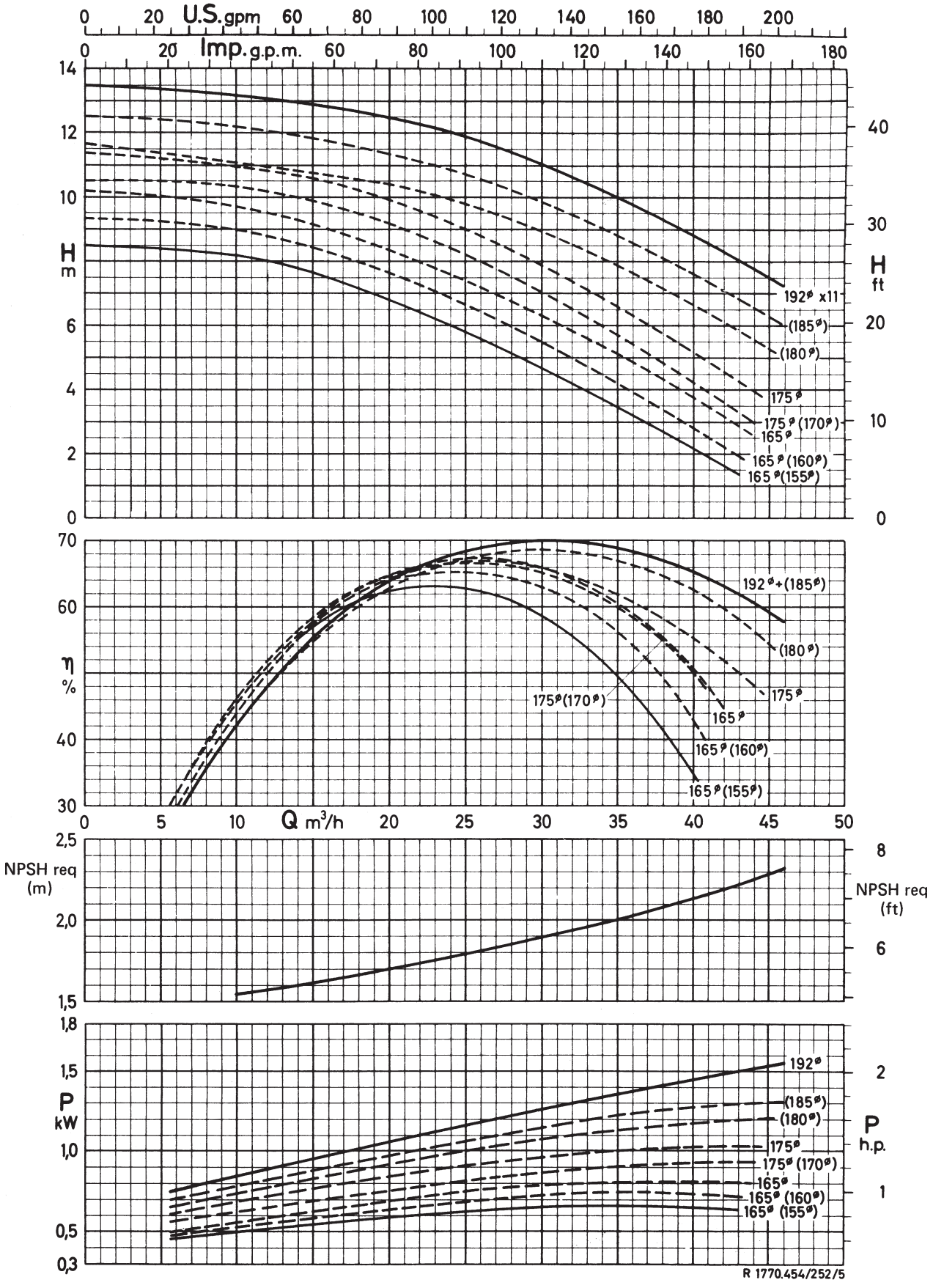
Impeller 170-155 mm Ø Impeller outlet width 8 mm **1450 R.P.M.**

WKLn 50



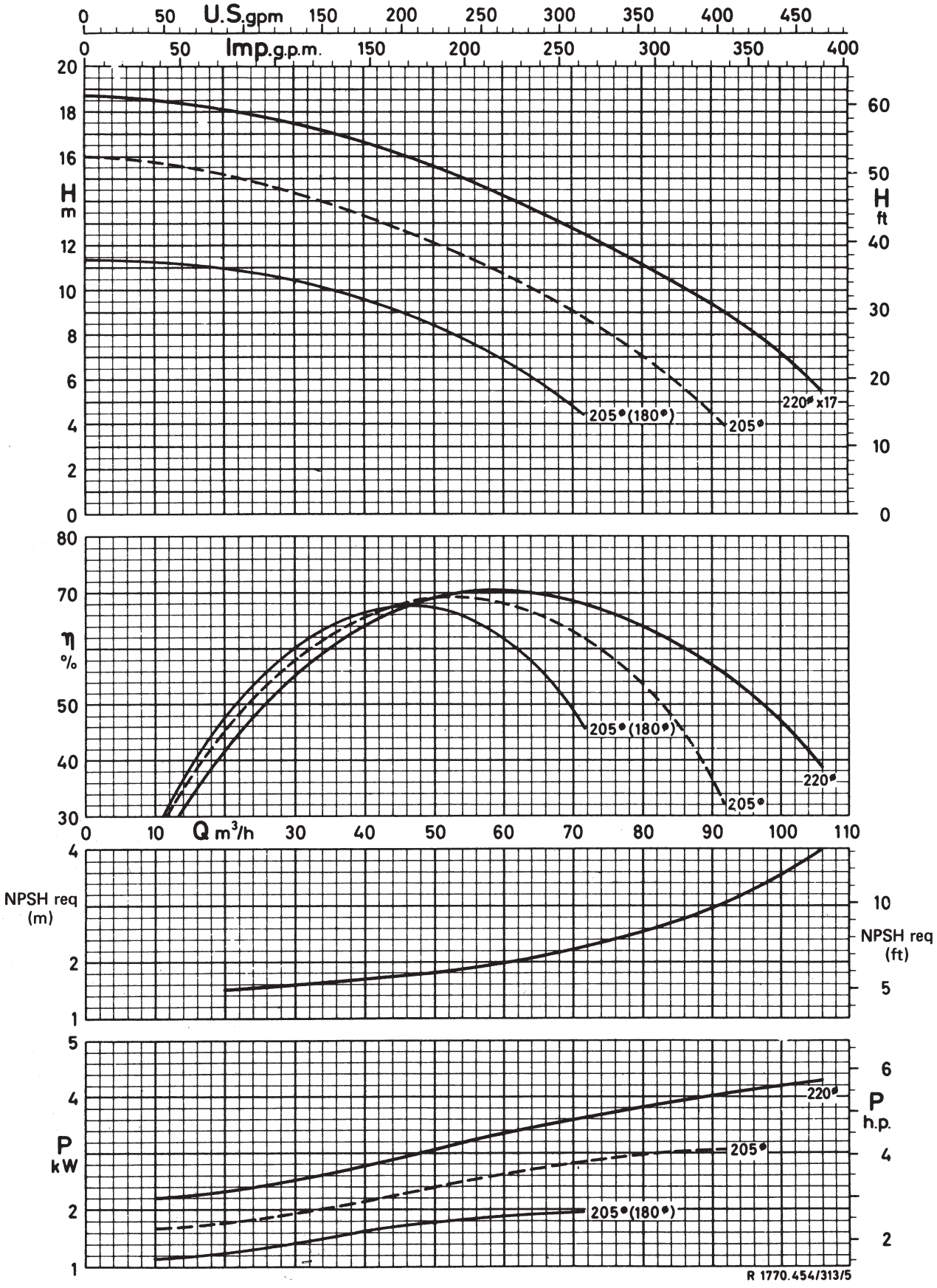
Impeller 165-140 mm Ø Impeller outlet width 9 mm **1450 R.P.M.**

WKLn 65



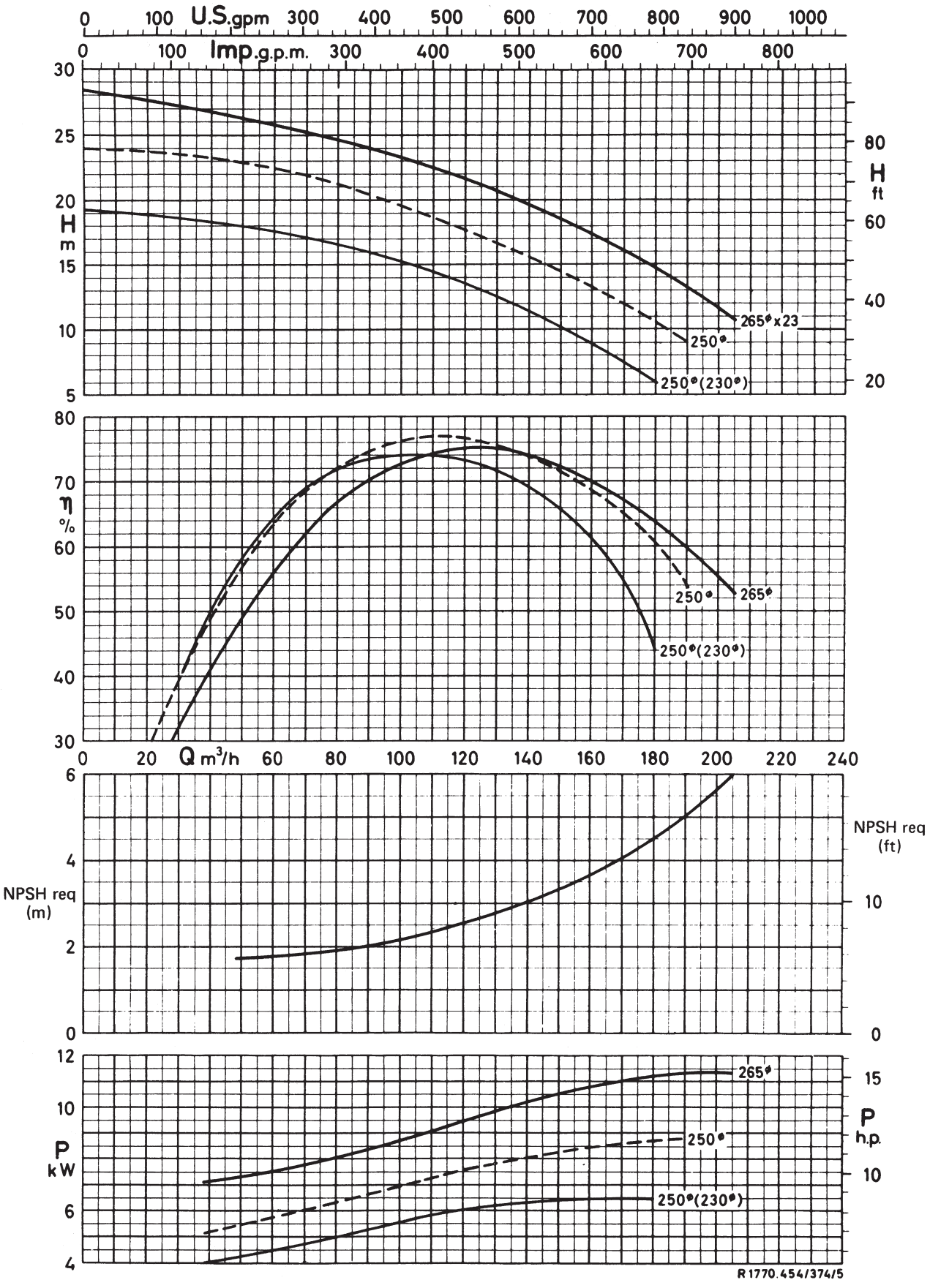
Impeller 192-155 mm Ø Impeller outlet width 11 mm **1450 R.P.M.**

WKLn 80



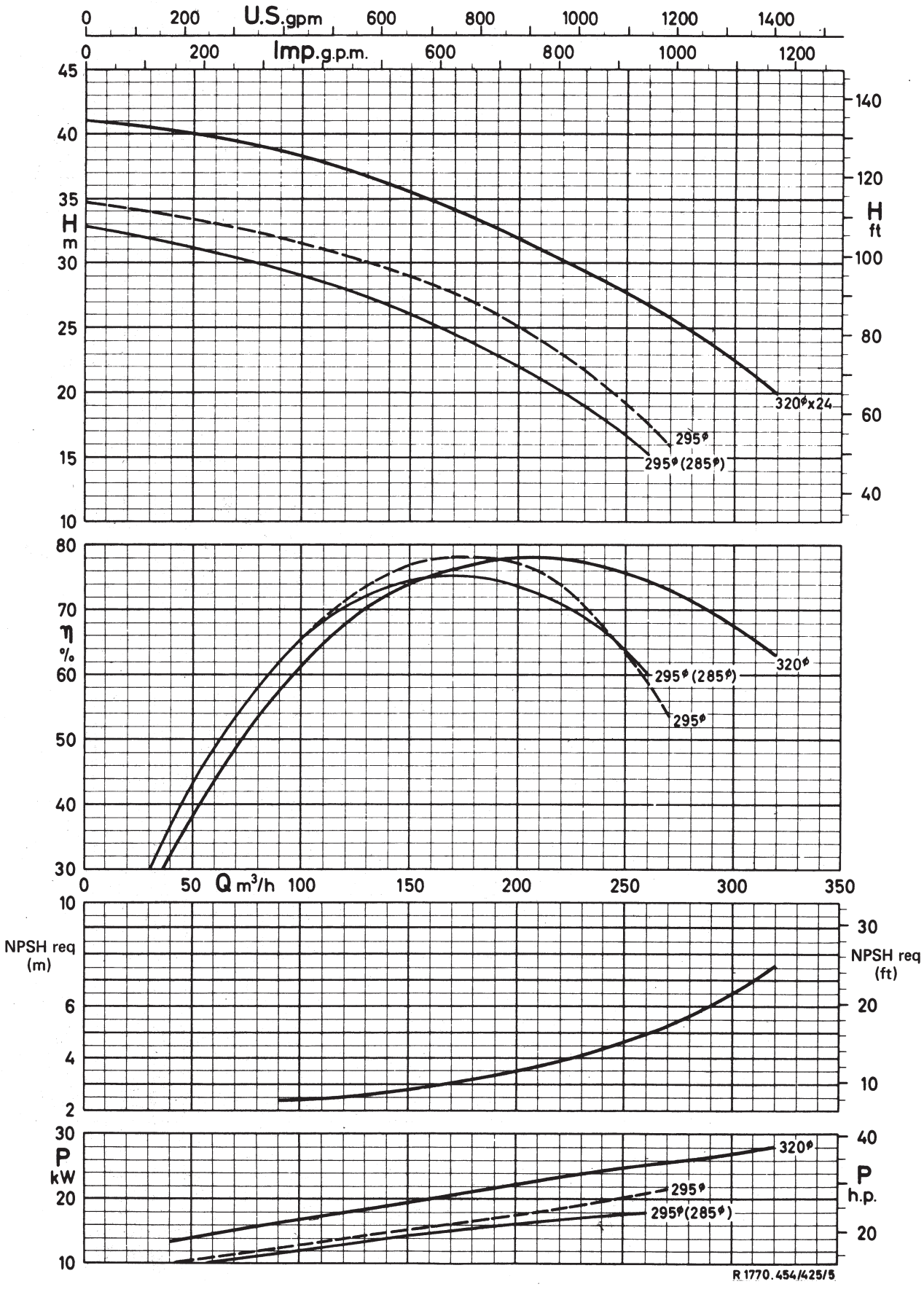
Impeller 220-180 mm ∅ Impeller outlet width 17 mm **1450 R.P.M.**

WKLn 100



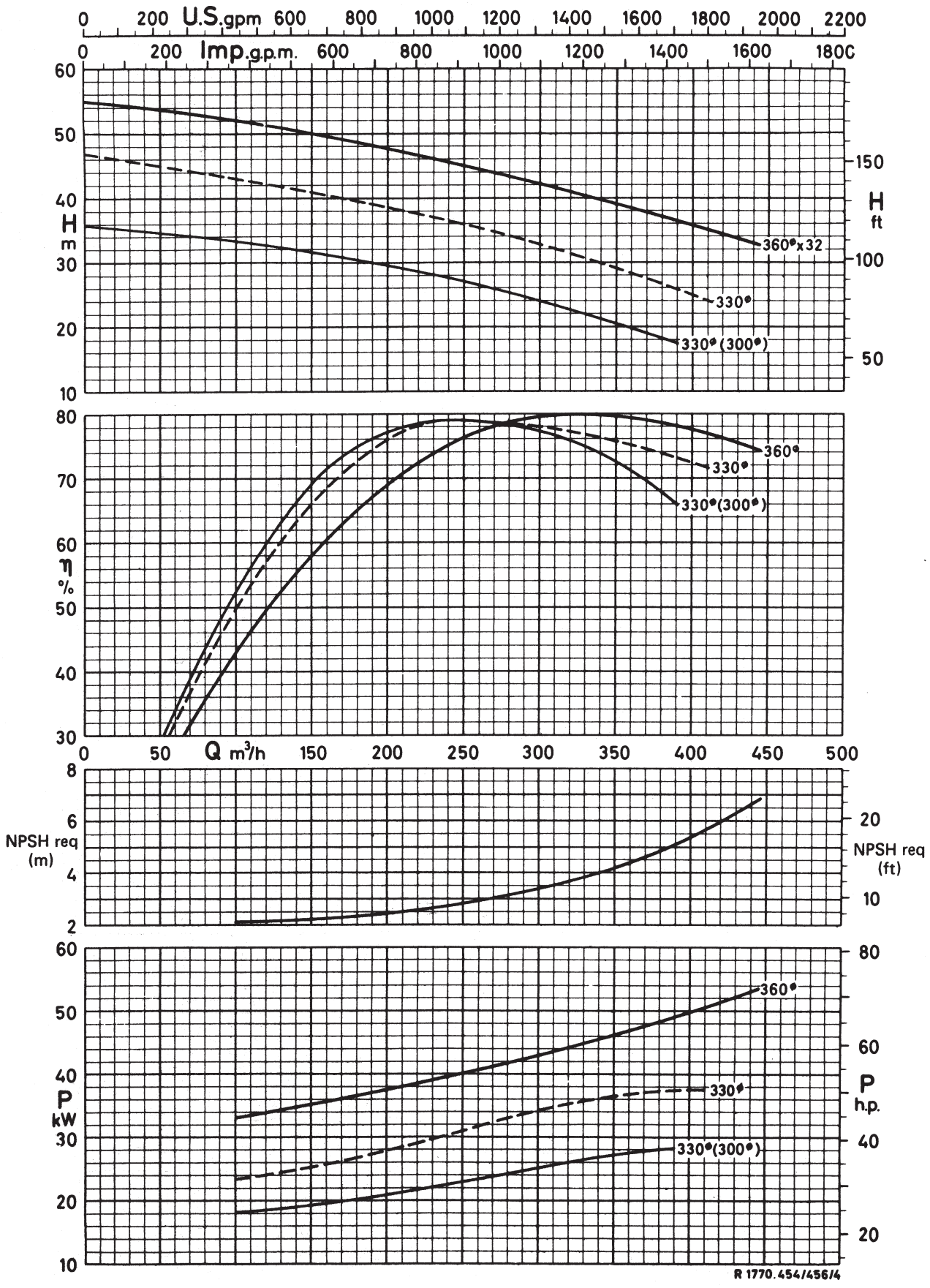
Impeller 265-230 mm Ø Impeller outlet width 23 mm **1450 R.P.M.**

WKLn 125



Impeller 320-285 mm Ø Impeller outlet width 24 mm **1450 R.P.M.**

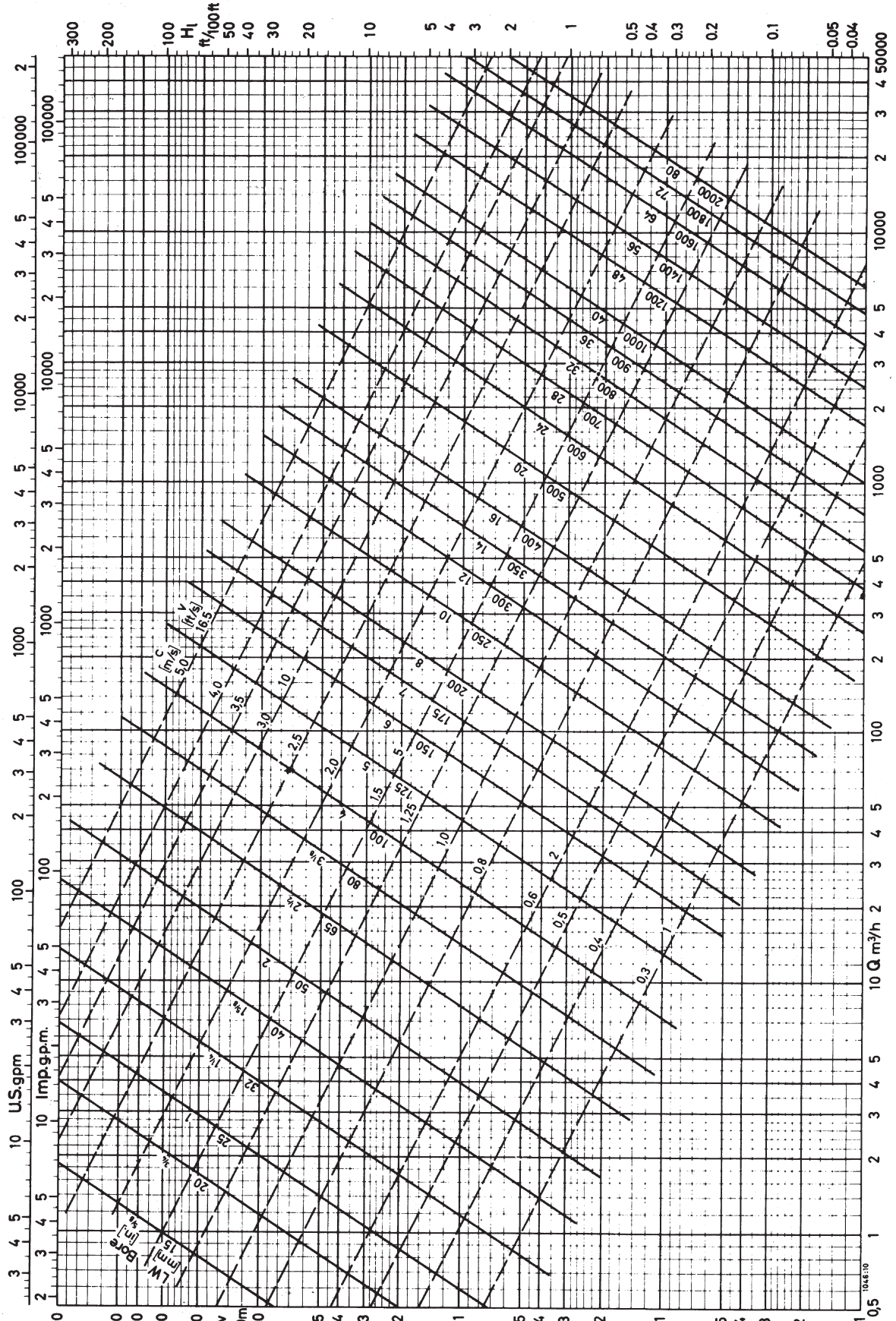
WKLn 150



Impeller 360-300 mm Ø

Impeller outlet width 32 mm

1450 R.P.M.



The loss of pressure given by the diagram is applicable to new cast iron pipes and to pipes made by rolling and welding steel plate. For new solid drawn or rolled steel tubes the resistance to flow is about 0,80 times that given by the charge. For fairly old rusty C.1. pipes the actual pressure drop may be as much as 1,25 times the figure calculated from the diagram. For tubes with light incrustation, the flow resistance increases to about 1,7 times the value shown on the above diagram and calculated for the actual (not the nominal) diameter of the incrusted pipes.

For heavily incrusted pipes the pressure loss can only be determined by tests. Deviations from the nominal diameter have a considerable effect on the result.

For example a decrease in the required diameter by about 596 will increase the flow resistance by about 1,3 times for the same degree of roughness.