
KRAUTKRAMER

Immersion probes

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Immersion probes are mainly applied for mechanized or automatic ultrasonic testing:
In principle they work the same as contact probes.

A major part of the tests is made in immersion tanks filled with water (fig. 1). In most of the cases, the test object is completely immersed and either solidly fixed or, according to shape and test task, is positioned onto a turntable or roller block and constantly moved past the probe.

The immersion probe is arranged, or is guided along the test object, so that its ultrasonic pulses are transmitted through the water and into the test object and then reflected from the borders or inhomogeneities in the test object back to the probe.

This method of coupling offers the best conditions for constant coupling and exact reproducible test results.

Frequently, large test objects cannot be completely immersed due to their size. In such cases, special holders are used which enable coupling of the immersion probe, e.g. from below via a water filled chamber (bubbler technique, see fig. 2) or via a freely flowing water jet (squirter technique, see fig. 3).
For inclined scanning, the probes are positioned at an angle to the surface of the test object.

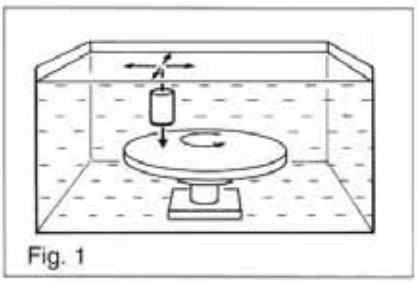


Fig. 1

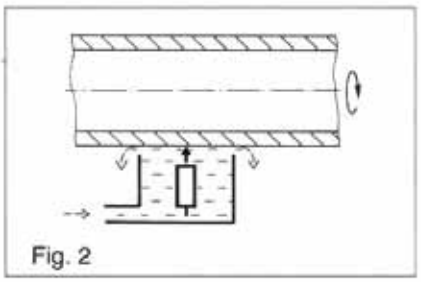


Fig. 2

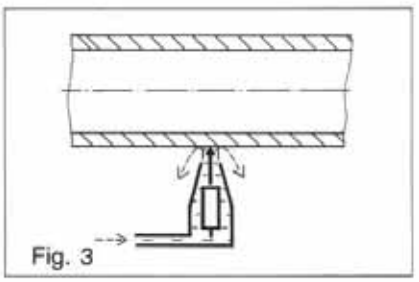


Fig. 3

Selection criteria for immersion probes

As opposed to the corresponding direct contact probes, there are a number of considerations to be made when selecting immersion probes:
With the exception of immersion near resolution, all data concerning the sound field (operating range, near field length, focal distance) are related to the propagation in water.

The shapes of the sound beams are only shown for non-focused probes because tests with focused probes are made in the direct vicinity of the focal area.The following changes are to be observed when selecting a focused probe as opposed to the non-focused probe:

a) Focusing is only possible within the near field length.
b) Flaw recognition improves due to the smaller sound beam dimensions in the focal area, as opposed to this, the working range is reduced.
c) Line focusing gives a larger lateral beam with a smaller focal width, point focusing produces a reduced sound beam in both axes vertical to the sound beam, and also gives the best possible flaw detection capability.

Immersion probe Z4N identical in design to H..N

Immersion probe Z4K identical in design to H..K

Immersion probe Z10M identical in design to H..M

Immersion probes IA 5.8, IAP-F80.2.1 and IAP-FM25.2.1 with UHF or Microdot connectors

Main features:

- Single element for transmission and reception of sound pulses
- Vertical or angle scanning of longitudinal waves or transverse waves via a water delay path (non-contact test)
- Completely watertight version, either with fixed connection cable or with watertight connection socket (except for Microdot)
- Rugged metal case
- Increased flaw recognition with line and point focused versions normally used
- Very high detection capability for very small inhomogeneities with polymer probes having higher frequencies.

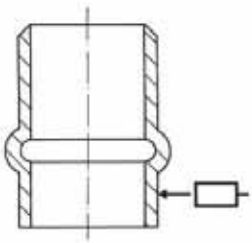
Main areas of application

General: Semi-automatic and fully automatic testing of serial or mass produced parts, via a water delay path, for small and smallest flaws or flawed material structures at the best possible reproducibility of the test results.

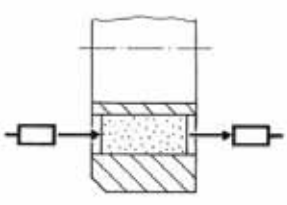
Z..N, Z..K and Z..M:
Probes with very gain reserve for testing of small to middle sized objects having an increased sound attenuation without great demands on the resolution. The main area of application is plastic composite materials (e.g. honeycomb and multi-layer structures), forgings (e.g. axles, disks and shafts) as well as weld constructions (e.g. gears and clutch parts) and rolled steel products (bars, rails, plates).

H..N, H..K and H..M:
Especially suitable for wall thickness measurement. Can also be used for testing small parts for small flaws and inhomogeneities, e.g. all types of bonding flaws in soldered joints, flaws in thin welded joints, cracks, cavities and pores in high quality castings and sintered metal, cracks in fittings made of brass or bronze.

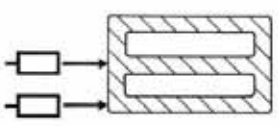
IA-... and IAP-...:
Very high resolution for the detection of the smallest flaws, in high quality parts made of metallic and non-metallic materials, which extend to under the surface; e.g. material separations, pores and inclusions in semiconductor substrates, electrical contacts and surface protection layers. This also applies likewise for diffusion welds, friction welds and adhesive bondings as well as for preformed parts made of ceramic, powder metal, titanium and other alloys.



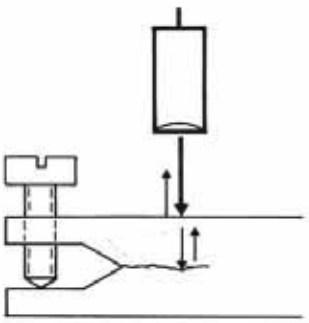
Detection of porosities in the end zone of brass fittings with probe H5M



Detection of pore clusters in the rubber of absorbers with probe H2K



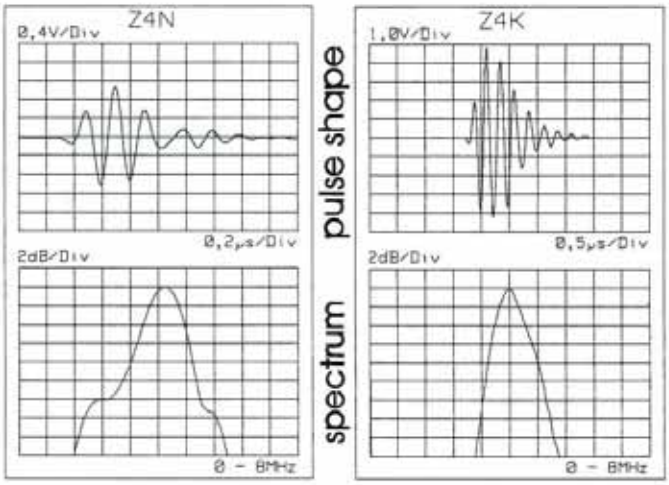
Detection of cracks in the inside web as well as density changes in the outside wall of SiC profiles with probe H10M



Mesurement of crack progression with tension crack corrosion on aluminum with probe IAP 50.3.2

Straight beam probes with sturdy watertight cases

Special feature: high gain reserve



Note

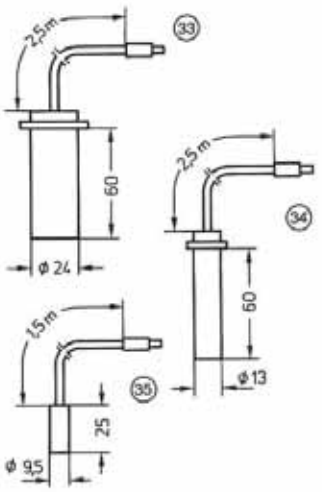
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes Refer to the beam shape no. on page 37.



Type [Order Code]	D [mm]	f [MHz]	AB 6/1[1] [mm]	N [mm]	F [mm]	Near resolution FBH [mm]	Beam-shape no.	Remark	Sketch
Large case with fixed cable; characteristic bandwidth: 40%									
Z1N	20	1	28-156	64		5 Ø in 28	1 - 20	detacha-ble collar	Typ 33
Z2N		2	50-267	127		2 Ø in 19	2 - 20		
Z4N		4	100-534	254		2 Ø in 9,6	4 - 20		
Z5N		5	127-668	318		2 Ø in 8	5 - 20		
Middle sized case with fixed cable; characteristic bandwidth: 40%									
Z2K	10	2	14-77	32		2 Ø in 9	2 - 10	detacha-ble collar	Typ 34
Z4K		4	28-154	64		2 Ø in 6,5	4 - 10		
Z4KP20		4	15-32		20	2 Ø in 6,0	-	point fokus	
Z4KL20		4	15-32		20	2 Ø in 6,0	-	line fokus	
Z5K		5	34-190	80		2 Ø in 5	5 -10		
Z10K		10	68-380	160		2 Ø in 4	10 -10		
Small case with fixed cable; characteristic bandwidth: 40%									
Z5M	5	5	8-52	20		2 Ø in 3	5 - 5		Typ 35
Z10M		10	16-104	40		2 Ø in 2	10 - 5		
Z10ML15		10	10-23		15	2 Ø in 2	-	line fokus	
Z10MP15		10	10-23		15	2 Ø in 2	-	point fokus	
Z15M		15	24-156	60		2 Ø in 1,6	15 - 5		

Alle Prüfkopfe mit Punkt- oder Linienfokus lieferbar (bitte Fokusabstand angeben). Andere Frequenzen, Wandlerdurchmesser oder Bauformen auf Anfrage

1) Bitte Definition auf Seite 5 beachten.

Delay line and adapter ZKQ2 for Z.K for mounting the delay

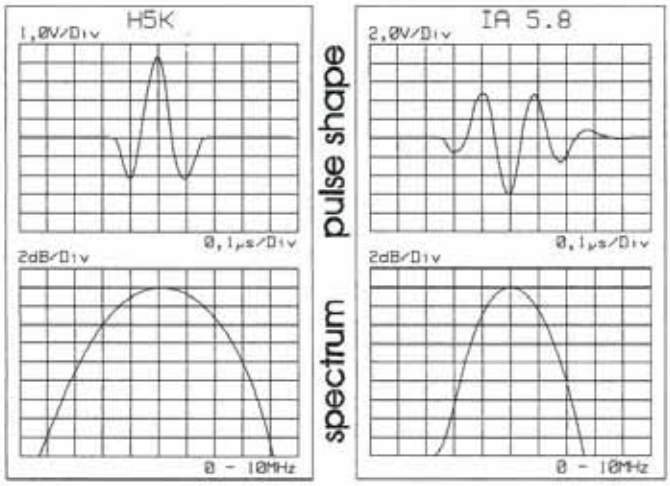
ACCESSORIES Description	Type	Remark
Delay line for contact testing with Z..K		*on request*
Coupling caps	on request	*for dry coupling see page 36*

Focusing lenses LKL and LKP and adapter ZKQ2 for Z.K for mounting the lense.

Straight beam probes with watertight sturdy cases

Immersion technique

Special features: Exellent resolution and very good flaw detectability



Note

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O = *probe data sheets are available*

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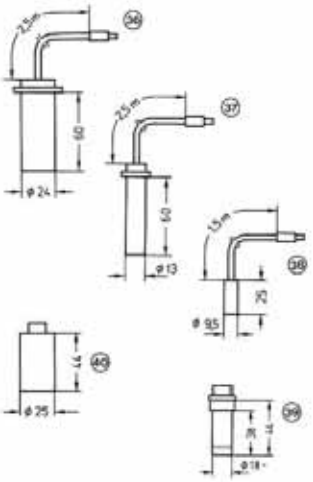
For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type [Order code]	D [mm]	f [MHz]	AB [mm]	N/F [mm]	Near resolution[1] [mm]	Beam shape no.	Remark	Sketch
High-resolution probes for flaw detection, UHF sockets, characteristic bandwidth: 80 %								
IA5.8	12.7	5	60-190	130	ZYB 0.5 Ø in 3	5 - 12.7		Type 39
IAP5.12.6	19	5	115-225	150	ZYB 0.5 Ø in 1,5	–	point-focused	Type 40
IAP10.6.3	9.5	10	55-130	75	FBB 0.4 Ø in 1,3	–	point-focused	Type 39
IAP15.6.2	9.5	15	40-65	50	FBB 0.4 Ø in 1,0	–	point-focused	Type 39
Shock-wave probes with fixed cable, characteristic bandwidth: 100 %								
H1N	20	1	28-156	64	FBB 5 Ø in 19	1 - 20		Type 36
H2N	20	2	50-267	127	FBB 2 Ø in 13	2 - 20		
H2K	10	2	14-77	32	FBB 2 Ø in 6.5	2 - 10		Type 37
H5K		5	34-190	80	FBB 2 Ø in 4	5 - 10		
H10K		10	68-380	160	FBB 2 Ø in 2	10 - 10		
H5M	5	5	8-52	20	FBB 2 Ø in 3	5 - 5		Type 38
H10M		10	16-104	40	FBB 2 Ø in 1.5	10 - 5		
H10MP15		10	10-23	15	FBB 2 Ø in 1.5	–	point-focused	
H10ML15		10	10-23	15	FBB 2 Ø in 1.5	–	line-focused	
Broad-band probes with fixed cable, characteristic bandwidth: 80 %								
L1N	20	1	28-156	63	FBB 2 Ø in 24	1 - 20		Type 36
L2N	20	2	50-264	127	FBB 2 Ø in 12	2 - 20		Type 36
L2K	10	2	14-77	32	FBB 2 Ø in 6	2 - 10		Type 37
L4K	10	4	28-154	64	FBB 2 Ø in 5	4 - 10		
L5K	10	5	34-190	80	FBB 2 Ø in 3.5	5 - 10		Type 38
L5M	5	5	8-52	20	FBB 2 Ø in 2.5	5 - 5		

All probes are available with point or line focusing (please state focal distance). Other designs on request.

1) Note the definition on page 5

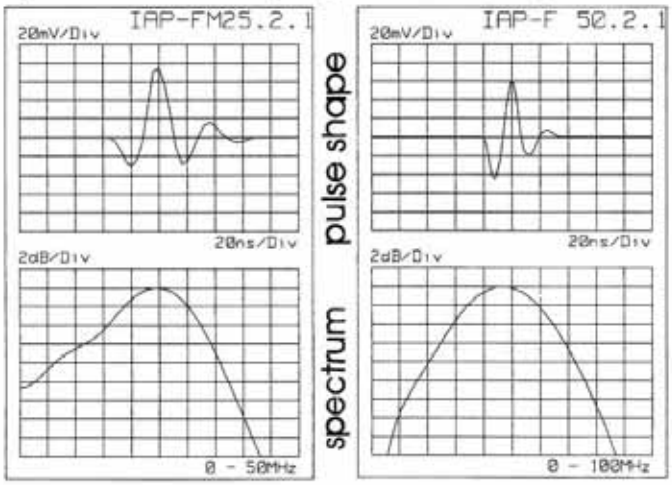
Probe cable PKI2 with UHF and Lemo 1 plug

ACCESSORIES Description	Type	Remark
Probe cable (2m)	PKI2	*for IA.. u. IAP..*
Delay line for contact testing with H..K		*on request*
Coupling caps	on request	*for dry coupling see page 36*

Adapter ZKQ2 and delay line for H..K

High frequency straight beam probes with polymer probe elements

Special features: Very high resolution, very small beam width in the focal area



Note

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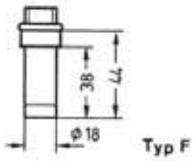
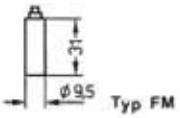
O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes Refer to the beam shape no. on page 37.





Type *) [Order Code]	D [mm]	f [MHz]	AB6/1 [mm]	N / F [mm]	FD6 1) [mm]	Beam shape no.	Sketch
Point focus, either with UHF or Microdot connectors*); characteristic bandwidth: 100%							
IAP- .. 25.2.0,5	3	25	9.4 - 20.6	12.5	0.25	-	Type F
IAP- .. 25.2.1	3	25	16 - 60	25	0.49	-	or
IAP- .. 25.3.1	5	25	20 - 35	25	0.30	-	Type FM
IAP- .. 25.3.2	5	25	34.5 - 100	50	0.59	-	
IAP- .. 50.2.0,3	3	50	6.6 - 8.4	7.5	0.07	-	
IAP- .. 50.2.0,5	3	50	10.6 - 15.8	12.5	0.12	-	
IAP- .. 50.2.1	3	50	18.5 - 41	25	0.25	-	
IAP- .. 50.3.1	5	50	21.5 - 29	25	0.15	-	
IAP- .. 50.3.2	5	50	40 - 71	50	0.30	-	
Non-focused, either with UHF or Microdot connectors*); characteristic bandwidth: 100%							
IA- .. 25.2	3	25	17 - 86	36	0.7	25 - 3	Type F
IA- .. 25.3	5	25	45 - 227	99	1.2	25 - 5	or
IA- .. 50.2	3	50	33 - 170	71	0.7	50 - 3	Type FM
IA- .. 50.3	5	50	89 - 455	198	1.2	50 - 5	

*) In place of .. in the order code for the required case design, enter the following letters: F for rugged case with UHF connector; FM for light case with Microdot connector.

1) Note the definition on page 5.

Probe cable PKIB0.18 with BNC and UHF connectors

ACCESSORIES Description	Type	Remark
Probe cable: Microdot/BNC	PKI-S0,75	*for IA(P)-FM 25/50*
Adapter: BNC socket/ Lemo-plug	PKLB1	*for PKIS ...and PKIB..*
Probe cable: UHF/BNC	PKIB0,75	*for IA(P)-F 25/50*
Adapter	ANP21	*extension tube with UHF and BNC*

Adapter ANP21

Thickness probes

Special applications

Probes for wall thickness measurement are specially matched to our digital wall thickness gauges.

Thickness Gauge	Measurement [mm]	Order code	Contact area Ø [mm]	f [MHz]	Remarks
	0.13 - 5	Alpha 2A Mini DFR	5	20	Rechangeable delay line 118-440-043
CL304/ CL3DL	0.18 - 25	CLF4	7.5	15	Rechangeable delay line CLFV1
	1.6 - 250	CLF5	9.5	10	
	1.6 - 380	CA211A	19	5	
	1.6 - 25	CA215	13	5	
	0.125 - ...	Alpha DFR-P	7.5	22	For measurements on plastics, delay line DFR-PV1
CL304	3-500	CA214	15	5	For materials showing strong sound attenuation, with rechangeable protective membrane and delay line on request.

For measurements at temperatures above 60 °C there are special delay lines.

Probes CA211A, Alpha 2A MiniDFR, CLF4 and CLF5

Probes DA305, DA301, DA317, DA312

Thickness Ganges	Range [mm]	Short code [Order code]	Contact face Ø [mm]	f [MHz]	Temperature [° C]	Cable	Remarks
DM4...	1.2 - 200 0.6 - 50	DA301 DA312	12.5 7.5	5 10	-20 ÷ 60 -20 ÷ 60	DA231 DA235	
	5 - 300 7 - 60	DA303 DA0,8G	17 29	2 0.8	-20 ÷ 60 -10 ÷ 60	DA231 DA231	
	2 - 80 1.0 - 15 5 - 150 4 - 60 1 - 50	DA317 DA319 DA315 DA305 HT400	12.5 7.5 17 16 13	5 10 2 5 5	25 ÷ 300 25 ÷ 300 25 ÷ 300 10 ÷ 600 -10 ÷ 540	DA233 DA233 DA233 DA235 KBA535	short-time contact
	0.6 - 20 0.7 - 12	DA312B11 DA312B16	4 3	10 10	-20 ÷ 60 -20 ÷ 60	fixed 1.5m Cable	
		Dialogtechnique					
	1.2 - 200 0.6 - 50	DA401 DA412	12.5 7.5	5 10	-10 ÷ 60 -10 ÷ 60	DA231 DA235	
	5 - 300 7 - 60	DA403 DA408	17 29	2 0.8	-10 ÷ 60 -10 ÷ 60	DA231 DA231	

Transverse wave straight beam probes

These probes transmit transverse waves vertically into the test object. An extremely high viscosity couplant is required. The probes are mainly used to determine the elastic properties (e.g. modulus of elasticity) of materials.

Type	f [MHz]	a x b [mm]	EB [mm]	Probe cable
B1Y	1	18 x 18	10	PKLL2
B2Y	2	18 x 18	6	PKLL2
MB2Y	2	9 x 9	6	MPKL2
MB4Y	4	9 x 9	4	MPKL2
K2NY	2	18 Ø	4	MPKM2
K4KY	4	9 Ø	3	MPKM2

Low frequency straight beam probes

There are probes with frequencies below 0.5 MHz for testing strong sound absorbing materials such as ceramic ladle plugs, natural stones, oven stones, wood, rubber and cement, below 0.1 MHz in through transmission with transmitter probe and receiver probe. The USD10NF is especially suited for such tasks.

Type	f [MHz]	Contact face	Probe cable
K0,25G	0,25	45 mm Ø	PKTL2
K0,1G	0,1	45 mm Ø	PKTL2
B 0,05 N	0,05	30 mm Ø	PKTL2
B 0,05 NN	0,05	5 mm Ø	PKTL2
G 0,2 R1	0,2	60 mm Ø	PKTL2
B 0,05 US	0,05	56 mm Ø	PKTL2
B 0,05 UE	0,05	56 mm Ø	PKTL2

Probes for testing spot welds

15 MHz and 20 MHz straight beam probes with a water delay path and soft protective membrane for optimum coupling to the surface of the spot weld. A certain element diameter is necessary according to the diameter of the weld nugget. The code for the probes is G15MN x.x and G20MN x.x (x.x = the element diameter). For more details ask for leaflet GK 39.

Probes for testing at high temperatures

In addition to the wall thickness probes described on page 28 there are also probes which can be used for ultrasonic testing at high temperatures. The straight beam TR probes, SEB.KV, withstand constant temperatures of 200 °C and can be used up to temperatures of 600 °C when pauses are made, between brief contacts with the hot surface, for cooling. The angle beam probes W..B.GV can withstand constant temperatures of 200 °C and can be used in intermittent operation up to about 350 °C.

Type	f [MHz]	β [degrees]	a x b[mm]	F / N [mm]	AB [mm]
SEB2KV	2	0	10	15	3 - 250
SEB4KV	4	0	10	18	2 - 750
W45B2GV	2	45	10 x 14	35	7 - 300
W60B2GV	2	60	10 x 14	35	7 - 280
W70B2GV	2	70	10 x 14	35	7 - 260
W45B4GV	4	45	10 x 14	70	5 - 450
W60B4GV	4	60	10 x 14	70	5 - 425
W70B4GV	4	70	10 x 14	70	5 - 400

Required cable MPKL2-V (two for SEB.KV). Contact surface: 12 Ø or 25 x 36 mm

Testing machine probes

Special applications

Probes for testing machines must meet special requirements regarding watertightness at changing temperatures and rudgedness. In order to achieve a high test speed and test reliability a number of elements are frequently contained in one housing.
For testing in the automobile and aerospace industries, immersion probes are mainly used. These are described on pages 22 - 27.

The following probes have been well proven in other applications [1]:

Type	Technical data	Application	
SEB2T, SEB2T0° SEB4T, SEB4T0° MSEB4T, MSEB4T0° SEZ4R10R SEZ2R20R0°T2 SEZ5R40R	TR probe, 2 MHz, 24 mm Ø TR probe, 4 MHz, 24 mm Ø TR probe, 4 MHz, 13 mm Ø TR wide beam, 4 MHz TR wide beam, 2 MHz TR wide beam, 5 MHz	Testing plates billets Heavy plate testing Billet testing	
W45Z2N W45Z4N W70Z2N W70Z4N RB45-N	Angle beam probe 45°, 2 MHz, 8 x 9 mm dito 4 MHz Angle beam probe 70°, 2 MHz, 8 x 9 mm dito 4 MHz Angle beam probe 45°, 4 MHz, 2 transducer elements	Weld testing e.g. on tubes or containers Tube testing	
Z2N12 x 12 / 12 x Z4RM10 x 10 / 6 x W45Z4RM20x18/6x	Immersion probe, 2 MHz, 12 elements 12 x 12 mm Immersion probe, 4 MHz, 6 elements 10 x 10 mm Immersion probe, 4 MHz, 6 elements 20 x 18 mm beam angle 45°	Tube testing with multi-element probes	
H10MP15 H5KP... NPK6	Immersion probe,10MHz, 5 diam., point focus 15 mm Immersion probe, 5 MHz, 10 diam., -40 °C to +125 °C, up to 60 bar Slot probe, 6 MHz	Arc welds Wall thickness measurements of pipelines from the inside Piston testing	
IAL-FG10.4 x 22.7,5	Wide beam probe, 10 MHz with 4 x 22 mm polymer element line-focused	Profile testing Lamination testing with wide beam	
H5KF H10MP15F Z4KF Z4NF	Immersion probes with water connector 5 MHz element 10 mm Ø 10 MHz element 5 mm Ø point focus 15 mm 4 MHz element 10 mm Ø 4 MHz element 20 mm Ø	Testing parts using the water bubbler or squirter technique see leaflet GK54	

[1] These probes have been selected from a great number of types. Please contact us, there is also a probe suited to your application.

B1 K/S + B1 K/E, SEB4NW: Roller probes for dry coupling (without couplant), especially used in through-transmission for testing porous and composite materials with high sound attenuation or as TR probe.

RB45N4Q: Angle beam probe, with two elements, for testing tubes for transverse flaws in both circumferential directions in a diameter range of 60 - 400 mm. 2 MHz, element size 8 x 9 mm, angle of incidence 45°. Other frequencies and sizes can be supplied. Contact surface is matchable to the curvature of the tube. TR probes can also be supplied (SEB4RB).

K20MN: Straight beam probe with delay line for point-to-point **wall-thickness measurement** on thin parts, measurement range approx 0.3 - 7 mm, also suitable for scanning the sound scattter from probes in complex parts (detection of interference echoes). Frequency 20 MHz, element diameter 2.5.

Z4NB5: Straight beam probe with a thread for attachment of plastic delay lines for vertical or angle beaming in axles or shafts from the front side in order to detect fatigue cracks. Frequency 4 MHz, element diameter 20 mm.

K5KVB4: Straight beam probe with heat resistant delay line for wall thickness measurement in blow moulds during the blowing process. Frequency and element size are selected according to the test conditions.

W70B2GT: Straight beam probe with special plastic wedge for angle beaming in polyethylene for detection of flaws in welds. Frequency 2 MHz, element diameter 10 mm, angle of incidence 70° or 65°. Probes for testing other materials can be delivered.

W75/75K5G22: Angle beam probe with two elements for testing metals using the tandem technique, e.g. determination of the welding penetration depth on aluminum coolers. Frequency 5 MHz, element size 8 x 9 mm, angle of incidence 75°. Other dimensioning is possible.

IW40B4: Probes for testing ceramic insulators. Frequency 4 MHz, the design is matched to the shape of the corresponding ceramic test object. For detection of disc cracks in installed parts.

This list of special probes only contains a very limited selection. We would be very interested to design a special probe for your application – possibly based on an application study performed by our application lab. For detailed information ask for our special probe catalog GP 87.

Probe cable	Length	Impedance	Plug type		Notes	
Type (order code)	[m]	[ohm]	Probe	Instrument		
CL331	2	50	Microdot	LEMO-00		
DA231	1,5	50	LEMO-00 double plug	LEMO-00 double plug		
DA232	1,5	50	LEMO-00 double plug	LEMO-00 double plug	with attenuator	
DA233	1,5	50	2x LEMO-00	LEMO-00 double plug		
DA235	1,5	50	1x Microdot 1x Microdot, large	LEMO-00 double plug		
DA 336	1,5	50	1x Microdot 1x Microdot, large	LEMO-00 double plug	with attenuator	
KBA535	1,5	50	2x Mini-LEMO	LEMO-00 double plug	with metal sheath	
KBA536	1,5	50	2x Mini-LEMO	LEMO-00 double plug		
MPKL2	2	50	LEMO-00	LEMO-1		
MPKM2	2	50	Microdot	LEMO-1		
PKBM 0,5	0,5	50	Microdot	BNC		
PKP2	2	75	LEMO-03	LEMO-1	watertight up to 60 bar	
PKI 2	2	75	UHF	LEMO-1		
PKLL2	2	75	LEMO-1	LEMO-1		
PKTL2	2	50	LEMO-1 watertight	LEMO-1	watertight up to 10 bar	
SEKG2	2	50	LEMO-00 double plug	2x LEMO-1		
SEKL2	2	50	2x LEMO-00	2x LEMO-1		
SEKM2	2	50	2x Microdot	2x LEMO-1		
SEKN2	2	50	1x Microdot 1x Microdot,large	2x LEMO-1		
VKLL5	5	75	LEMO-1 coupling	LEMO-1		

Adapter	Length	Impedance	Plug type		Notes
Type (order code)	[m]	[ohm]	Probe	Instrument	
PKLB1	0,03	75	BNC socket	LEMO-1 plug	
PKBL1	0,03	75	LEMO-1 socket	BNC plug	

Notes: The itemized cables and adapters are only a selection. We are readily prepared to make special designs tailored to your requirements.

cable connectors scale 1:1

LEMO-1

LEMO-1 watertight

LEMO-00

LEMO-00 double plug

LEMO-03

2x Mini-LEMO

Microdot large

Microdot small

UHF

PKBL1

PKLB1

Probe sets

General accessories

Probe packing

Probe set for welds PKS 4

Probe case PSK

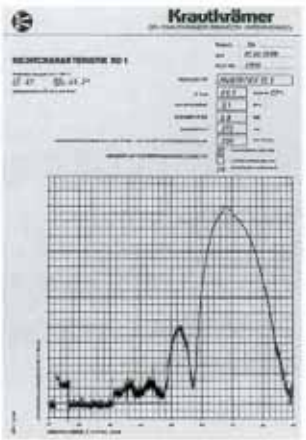
Most of the probes are delivered in practical drawers which can be inserted into a cabinet. Our probe sets for special applications or just the case PSK are other types of storage and practical sorting.

Type	Description	Probe contents
PKS 1	Coarse grain set	K0,5S; K1SM; WRY45; WRY70; WB45-1; WSY45-4, WSY70-4
PKS 2	Aircraft set	B4S; K4G; G5KB; MSEB4; K5K; CLF4; SEB10KF3; 2x MWB45-4; MWB70-4; MWB90-4
PKS 3	Steel set	B4S; SEB2; G5KB; MSEB4; MB4F; WK45-2; WK70-2; 2x MWB45-4; MWB70-4
PKS 4	Welding set	MB4S; SEB4; WB45-2; WB70-2; MWB45-2; 2x MWB45-4; MWB60-4; 2x MWB70-4
PKS 5	Casting set	B2S; SEB2; K1S; MB2S; SEB4KF8; G5KB; WB45-1; WB70-1; MWB45-2
PKS 6	Forging set	B4S; B2S; SEB2; MB4S; K2N; SEB4KF8; MB4F; WB45-2; MWB45-4; MWB70-4

Probe data sheets and certificates

Probe data sheet collection

Probe certificate PZ (E)

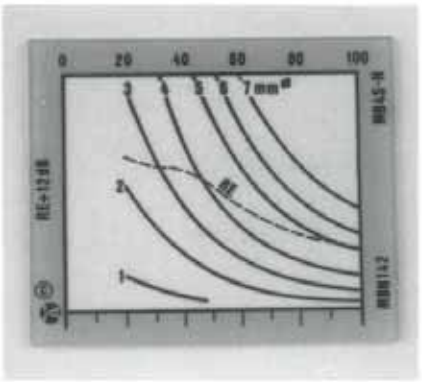


Beam profile RD1

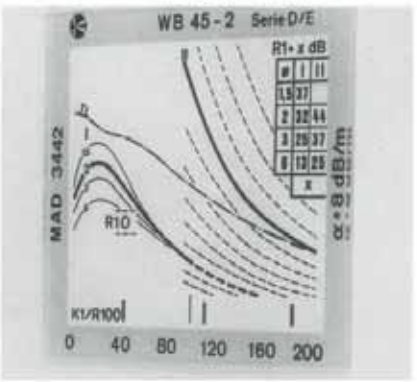
Each delivered probe is subjected to a very strict quality test which makes certain that all probes of the same type identically evaluate flaws. The corresponding probe data sheet contains proof of the data reliability. We store the data of every numbered probe for a number of years thus enabling probe certificates (PZ) to also be produced at a later date. The beam profile gives information about the sound field of a probe.

PZ(E)	Probe certificate	for an E- or F-series probe, marked with an individual probe number
PZ1	Probe certificate	for any probe, other than those of the E- or F-series
RD1	Beam profile	for an angle beam probe measured in steel
RD2	Beam profile-	for a straight beam probe measured in water

DGS scales in a file



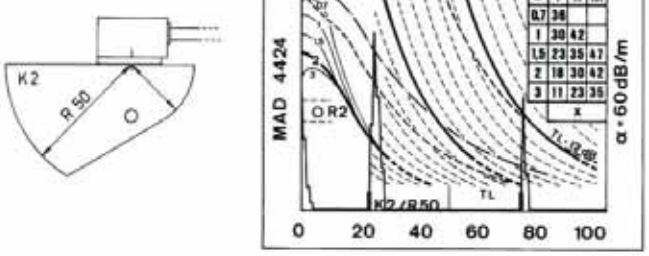
DGS scale for MB4S and USK 7



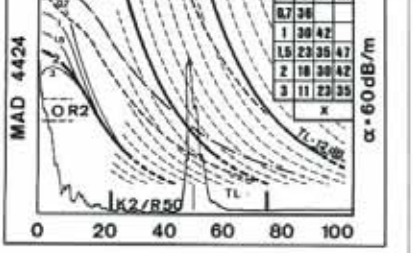
DGS scale for WB45-2 and USK 7

Probe type	f [MHz]	Range [mm]	Type of scale set	Remarks
B2S	2	500/1000/2000	MAN 22	Suitable for instruments:
B4S	4	250/500/1000/2000	MAN 24	USK6/USK7/USK7D USL31/USL32/USL48
MB2S/MB4S	2/4	100/200	MBN 14	
B2S/B4S	2/4	250/500/1000/2000	UM 100	Suitable for instruments:
MB2S/MB4S	2/4	100/200		USM3/USM3S
WB ** -2	2	200/500	MAD 32	Suitable for instruments:
MWB ** -2	2	100/200	MAD 42	USK6/USK7/USK7D USL31/USL32/USL48
MWB ** -4	4	100/200	MAD 44	
WB ** -2	2	200/500	UM 320 + UM 321 ++	Suitable for instruments:
MWB ** -2	2	100/200	UM 420 + UM 421 ++	USM3/USM3S
MWB ** -4	4	100/200	UM 440 + UM 441 ++	+ without sound attenuation ++ with sound attenuation

** represents the angles 45°, 60° and 70°.

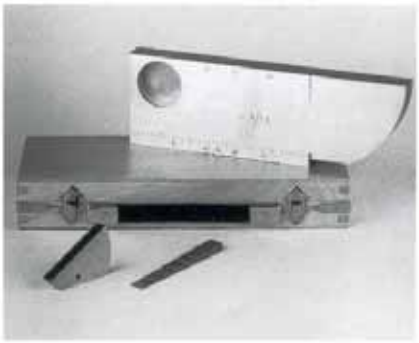


Range calibration using calibration marks on the DGS scale for the MWB45-4 and the echoes from reference block 2



Signal of a weld flaw equal to a reference reflector size 2 + 6dB

Couplants ZG-F, ZGT und ZGM



Calibration blocks V1, V2 and VW

Standard N23

Couplants are used for coupling the probe directly onto the surface of the test object. This is necessary in order to avoid air gaps occurring between probe and test object which would stop transmission of the sound pulse. Basically, all fluids and pastes can be used as couplants. However, it has been proven that special couplants have clear advantages.
At high surface temperatures it is necessary to use special pastes.

If couplant is unsuitable or prohibited, it is possible to use dry coupling in some cases. For this purpose couplant caps are used with standard probes – immersion probes can also be used – or one can apply special roller probes which roll over the test object on wheels.

Calibration blocks produce echo indications which are used for range calibration and gain adjustment of the instrument. They are very often used as a reference for evaluation of echo indications from possible flaws.

Type	Description	Remarks
ZG-F (2.5 kg)	Universal coupling paste	Thixotrope paste, non-drip, washable, non-corrosive, reaction neutral; temperature range: -20 °C to +100 °C; in a 2.5 kg container. Safety data sheet according to 91/155/EEC is available.
ZG-F (5 bottles)	Universal coupling paste	The same as above, but in batches of 5 bottles each containing 200 cm^3, can be refilled. Safety data sheet according to 91/155/EEC is available.
ZGT	Multigrade coupling paste	Paste with medium viscosity, water resistant, non-corrosive, universally applicable; temperature range: -30 °C to +250 °C; in 100 g tubes. Safety data sheet according to 91/155/EEC is available.
ZGM	High temperature coupling paste	Paste with a high viscosity, with solid filling, specially made for wall thickness measurements on hot parts; temperature range: +200 °C to +600 °C; in 100 g tubes.
K1	Calibration block no. 1 (DIN EN 12223)	Large calibration block made of fine grain steel for range adjustment with angle beam probes as well as checking the angle of incidence.
K2	Calibration block no. 2 (DIN EN ISO 27963)	Small calibration block made of fine grain steel for range adjustment with small angle beam probes as well as checking the angle of incidence.
VW	Stepped calibration block	Calibration block made of fine grain steel with steps ranging from 1 mm to 8 mm. Used for range calibration with small TR probes.
N23 N30	Standards	For direct connection to an ultrasonic flaw detector. Produces multiple echoes at distances of 50 mm in steel; also enables instrument gain checks to be made over a long period.

Sound beam shapes

Frequency, element shape, sound velocity and sound attenuation all determine the shape of the probe's sound beam. The sound field near the element is almost the same size as the element, at the near field distance it has its smallest size, and as the distance becomes greater it widens.
Exact details are contained in our beam profiles and also in the data sheets.

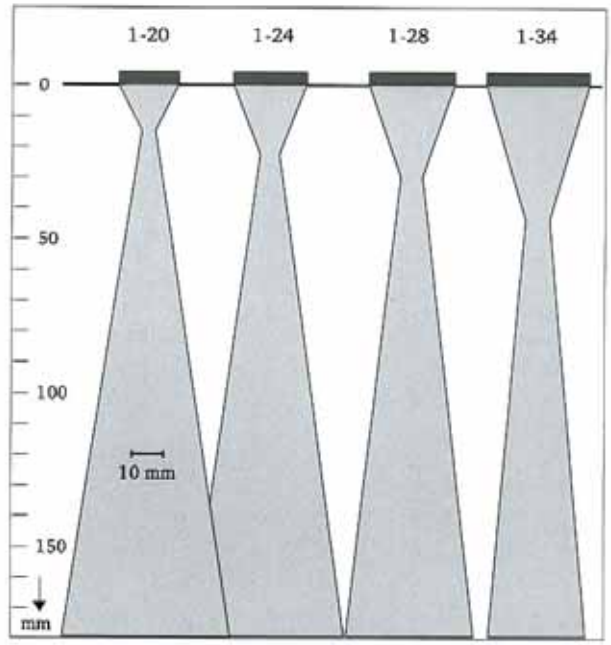
In order to help you in selecting probes quickly we have, in the following, shown the sound beam limits for a 6 dB drop of the echo amplitude in steel (C_L = 5920 m/s for straight beam probes and C_T = 3255 m/s for angle beam probes).
The zero point in the graphics corresponds to the sound exit point on the contact surface of the probe.

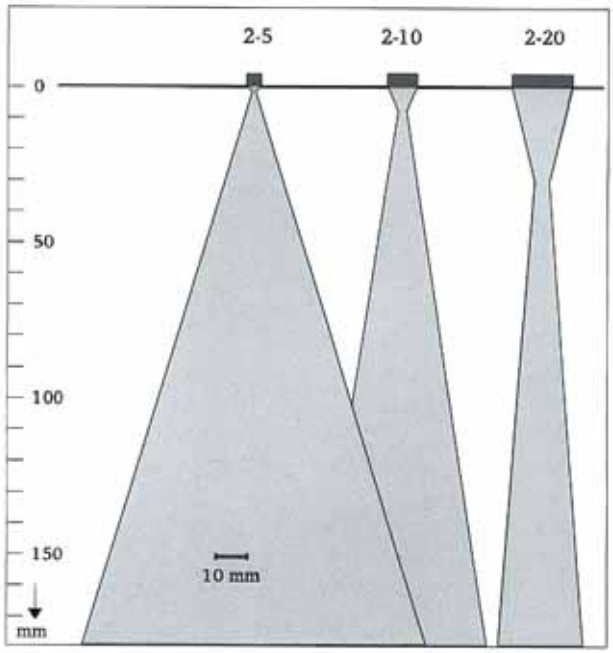
With immersion probes it is assumed that the surface of the test object is positioned in water at the near field length distance.

It is to be noted that with TR probes, when the sound field is vertical to the indicated plane it has another shape.
With all sound field data, the effect of sound attenuation has not been taken into account.

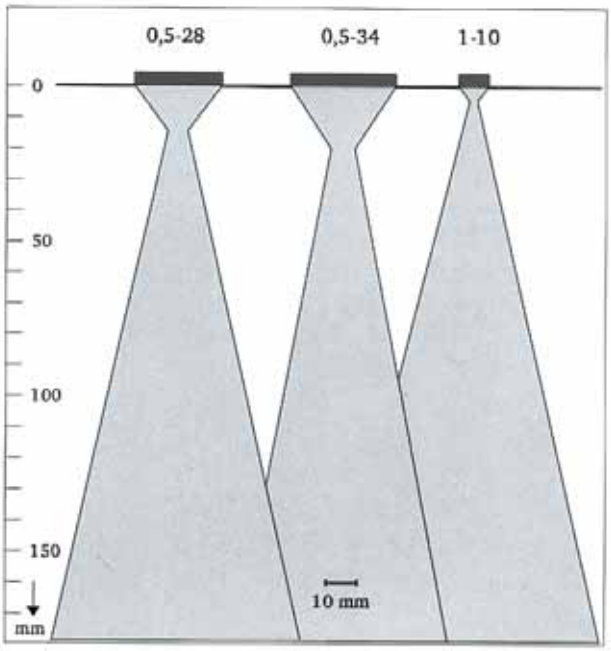
Due to the vast range of probes, only the beam shapes of the most used probes are given. However, we will gladly supply the beam profiles of the sound field of a special probe.

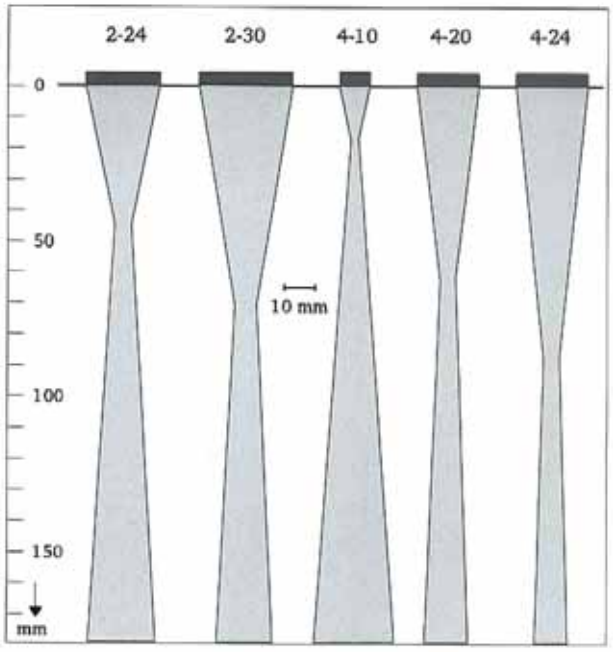
The code of the sound beam shapes corresponds to the beam shape number in the probe tables.

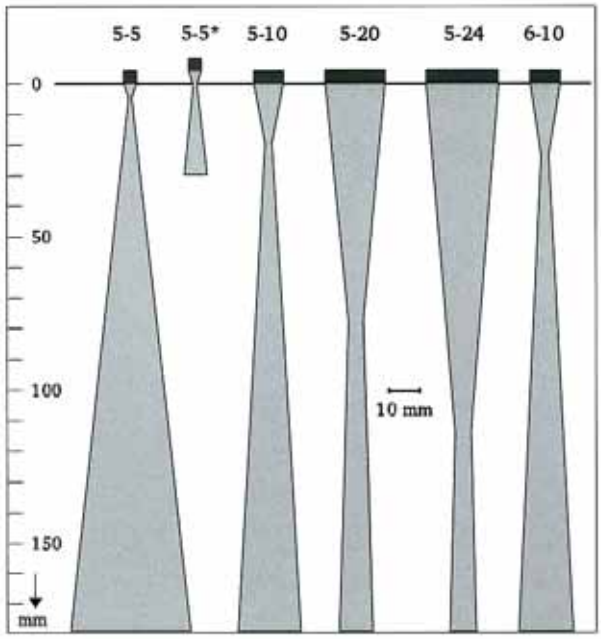


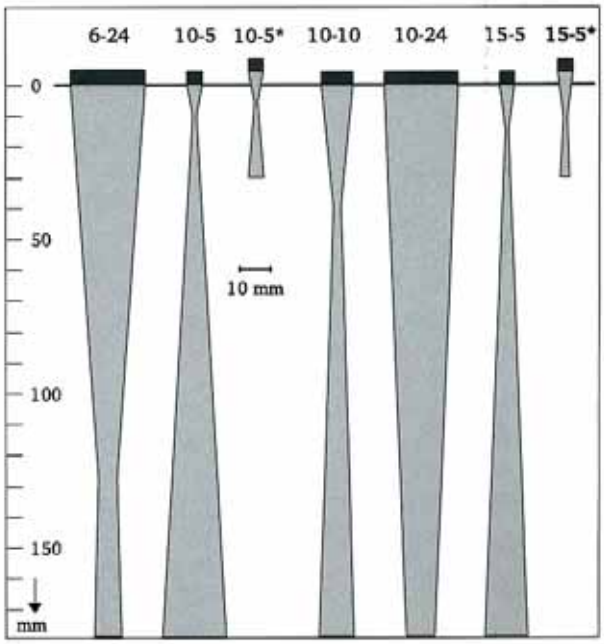


Straight beam probes

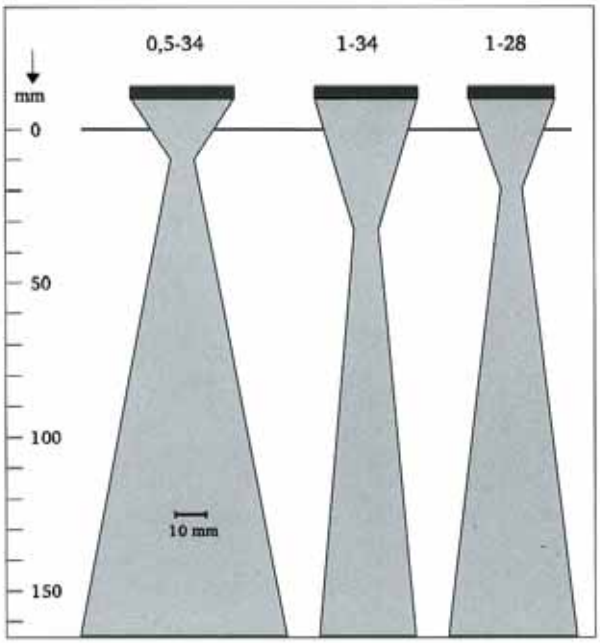


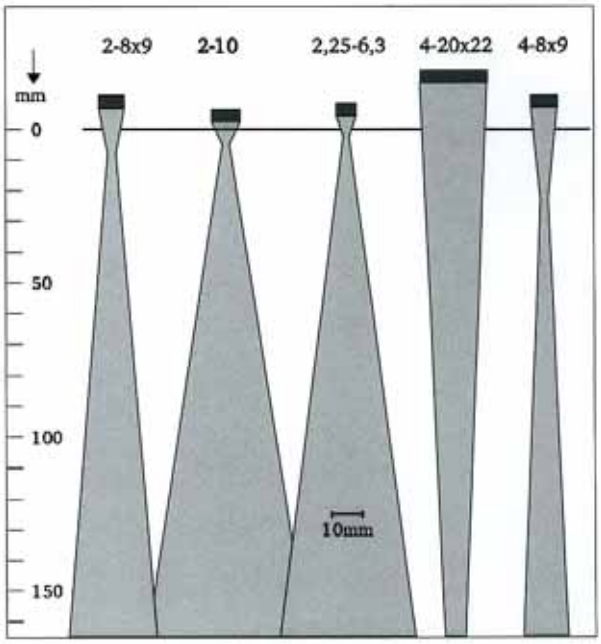


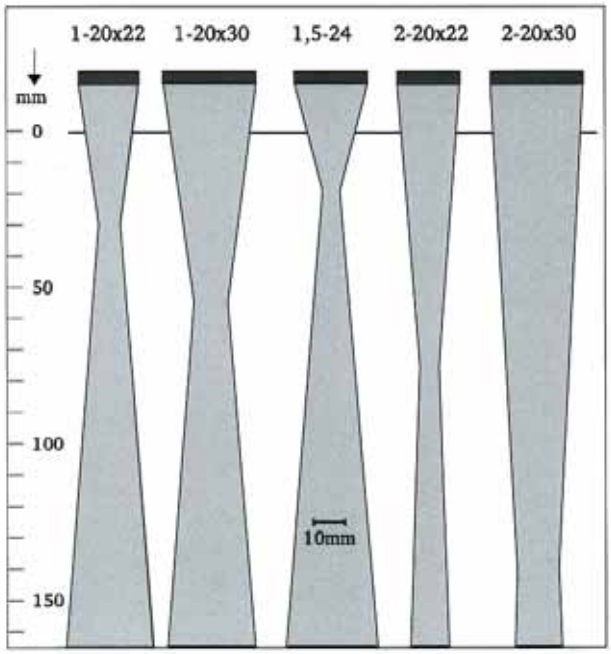


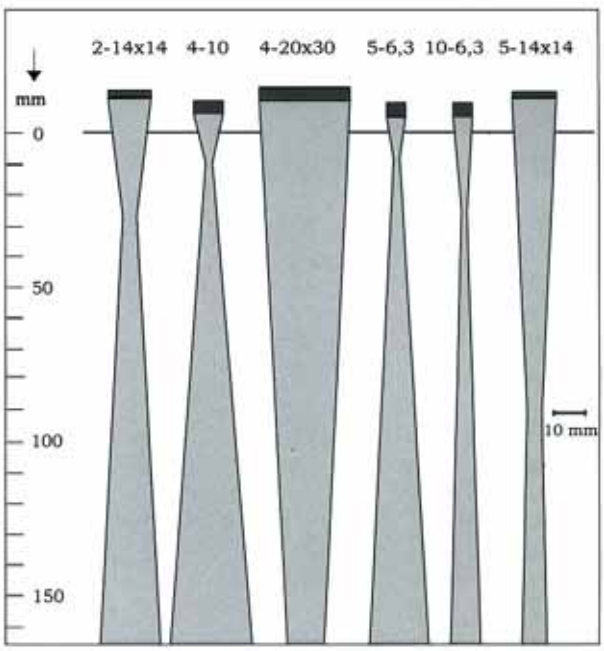


Angle beam probes (with one element; TR angle beam probes. See under TR Probes)

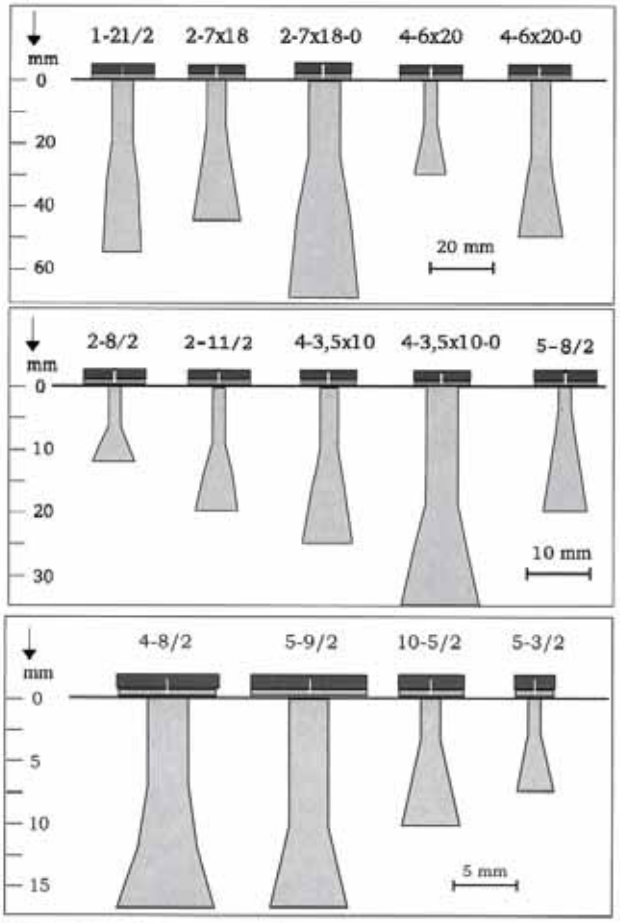


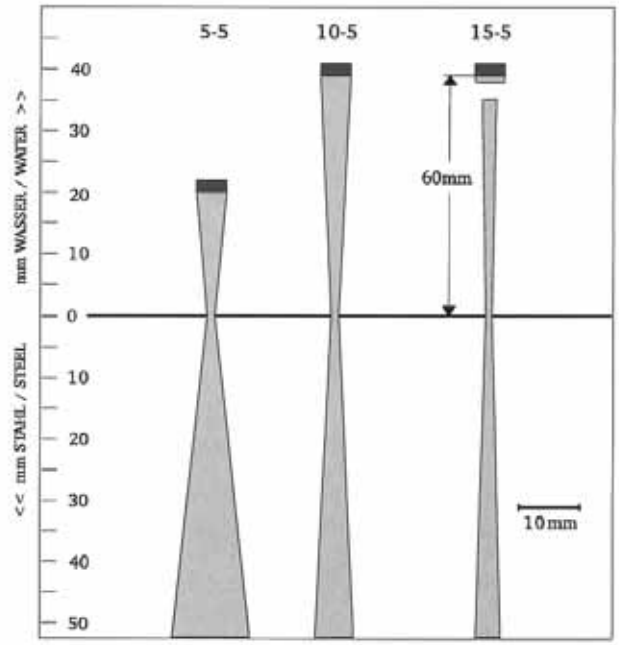


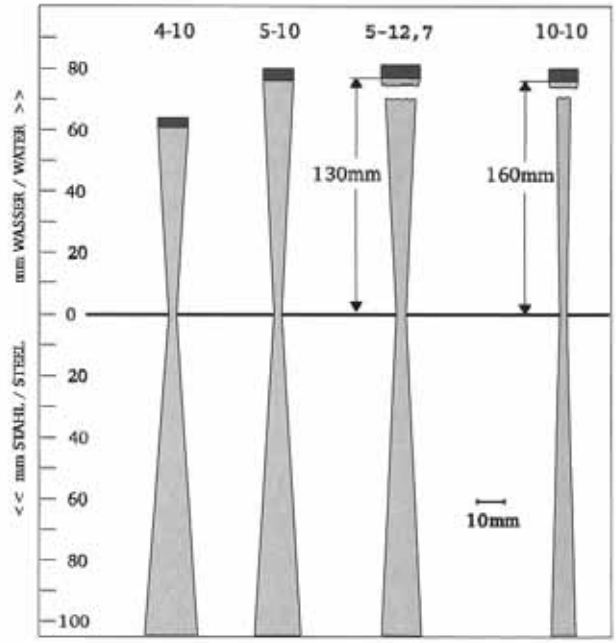




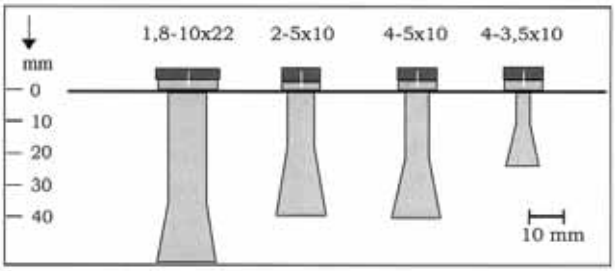
TR probes







TR angle beam probes



Immersion probes