PRZEDSIĘBIORSTWO APARATURY
SPAJALNICZEJ ASPA Sp. z o. o.
ul. Macieja Miechowity 1
51-162 WROCŁAW
tel. 071 327 31 21; 071 327 31 48; 071 327 31 87
fax 071 325 13 23 Polska
www.aspa.pl e-mail: biuro@aspa.pl

Aspa
ZGRZEWANIE

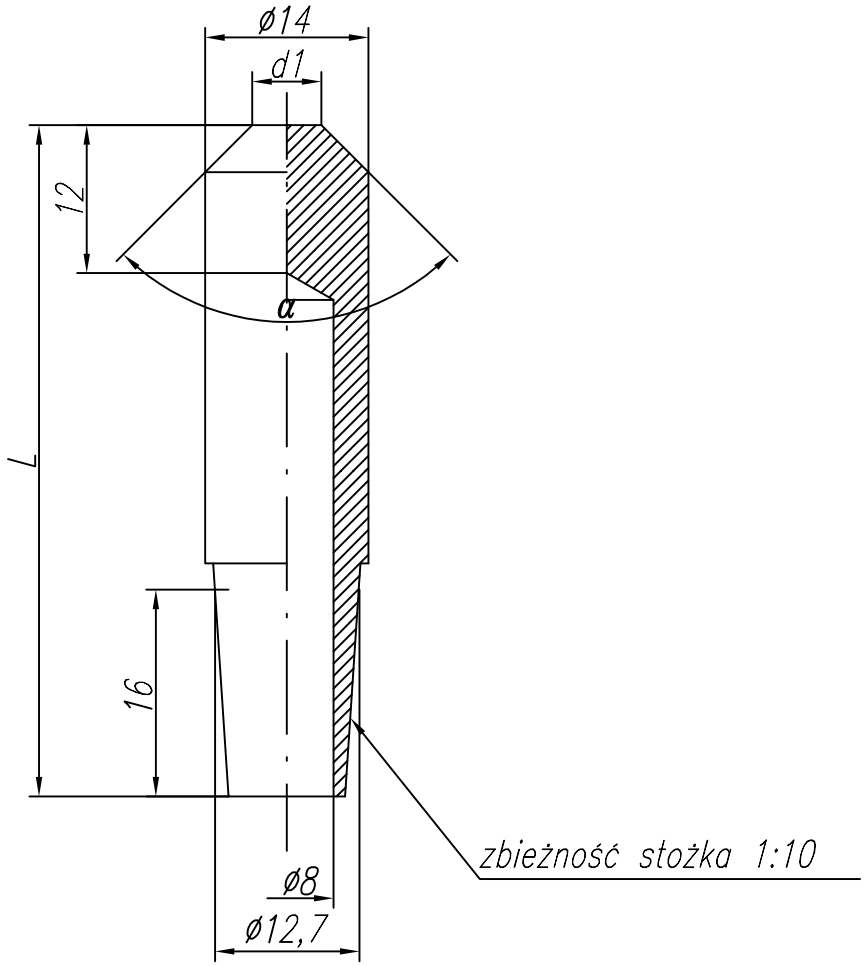
KATALOG ELEKTROD
do zgrzewania oporowego

2019

Elektrody proste kłowe z zewnętrznym chwytem stożkowym

Aspa
ZGRZEWANIE

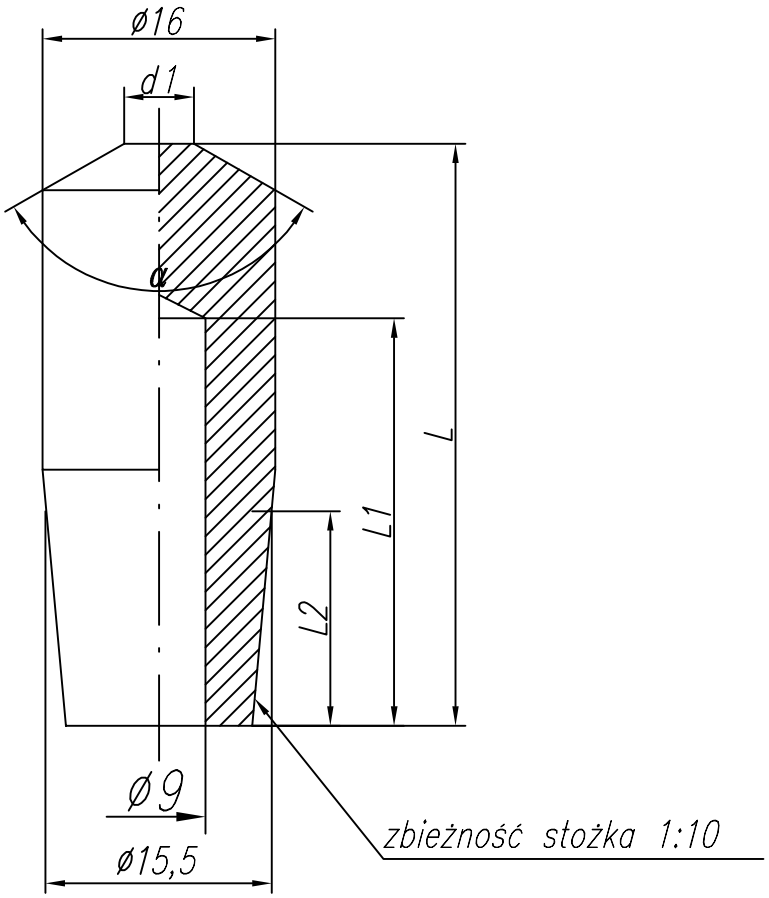
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	α		Cecha	Nr rysunku
1	25	ø6	90°		A-03-0	2-9-1622-03-0
2	35	ø6	90°		A-03-1	2-9-1622-03-1
3	45	ø6	90°		A-03-2	2-9-1622-03-2
4	50	ø4	90°		A-03-3	2-9-1622-03-3
5	55	ø6	90°		A-03-4	2-9-1622-03-4
6	80	ø4	90°		A-03-5	2-9-1622-03-5
7						
8						
9	65	ø5	30°		A-03-8	2-9-1622-11-0
10	50	ø5	30°		A-03-9	2-9-1622-11-1

Aspa
ZGRZEWANIE

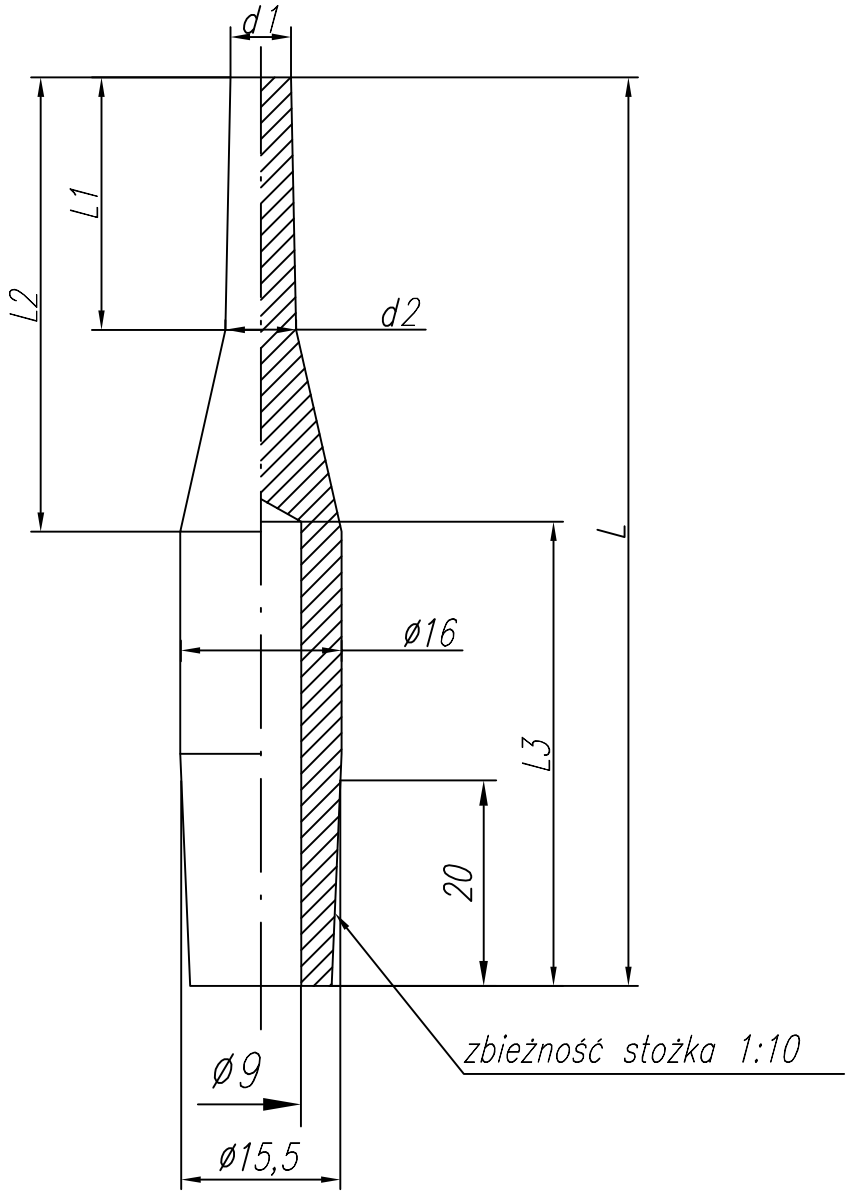
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	α	L1	L2		Cecha	Nr rysunku
1	50	ø4	120°	33	20		A-06-0	2-9-1622-23-0
2	60	ø5	120°	43	20		A-06-1	2-9-1622-23-1
3	75	ø6	120°	58	20		A-06-2	2-9-1622-23-2
4	75	ø6	120°	40	20		A-06-3	2-9-1622-23-3
5	40	ø4	90°	23	20		A-06-4	2-9-1622-23-4
6	35	ø4	90°	18	20		A-06-5	2-9-1622-23-5
7	30	ø4	120°	14	20		A-06-6	2-9-1622-23-6
8	25	ø4	120°	14	18		A-06-7	2-9-1622-23-7
9	45	ø2	90°	28	20		A-06-8	2-9-1622-23-8
10	25	ø5	120°	14	18		A-06-9	2-9-1622-23-10
11	60	ø15	90°	43	20		A-06-10	2-9-1622-23-11
12	85	ø4	90°	60	20		A-06-11	2-9-1622-23-12
13	85	ø4	30°	38	20		A-06-12	2-9-1622-23-13

Aspa
ZGRZEWANIE

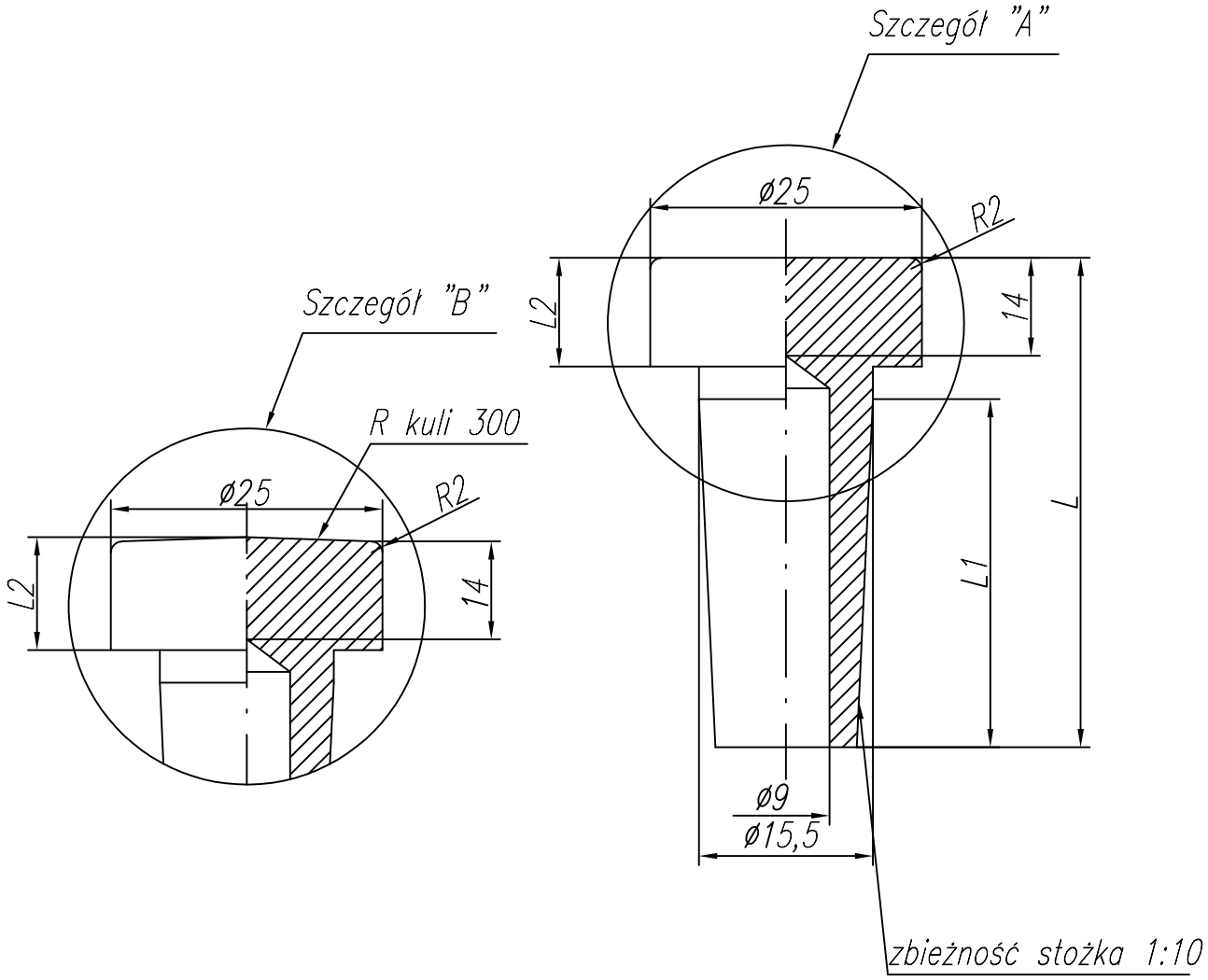
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	L2	d2	L3		Cecha	Nr rysunku
1	90	25	6	45	7	45		A-09-0	2-9-1622-36-0

Aspa
ZGRZEWANIE

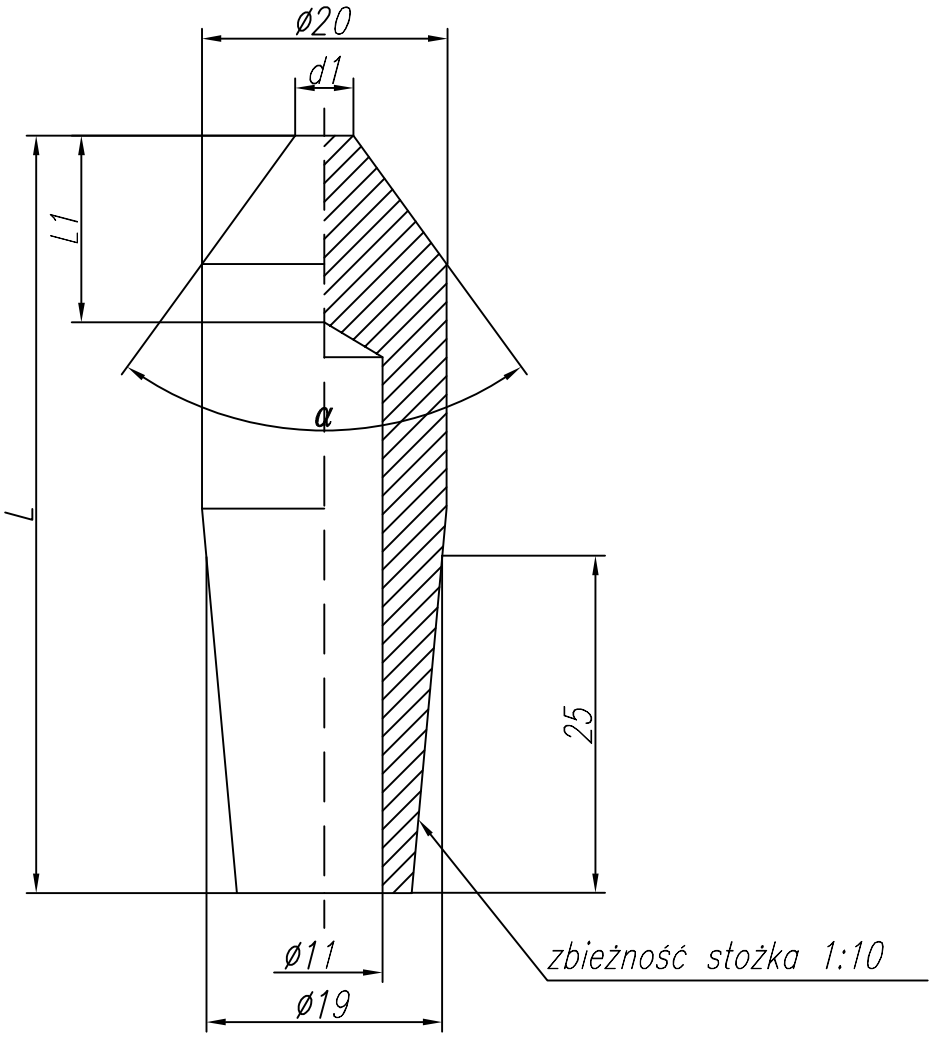
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	Szczegół		Cecha	Nr rysunku
1	45	32	10	"A"		A-10-0	2-9-1622-51-0
2	45	32	10	"B"		A-10-1	2-9-1622-51-1
3	40	20	18	"A"		A-10-2	2-9-1622-51-2
4	45	20	18	"A"		A-10-3	2-9-1622-51-3
5	55	20	32	"A"		A-10-4	2-9-1622-51-4

Aspa
ZGRZEWANIE

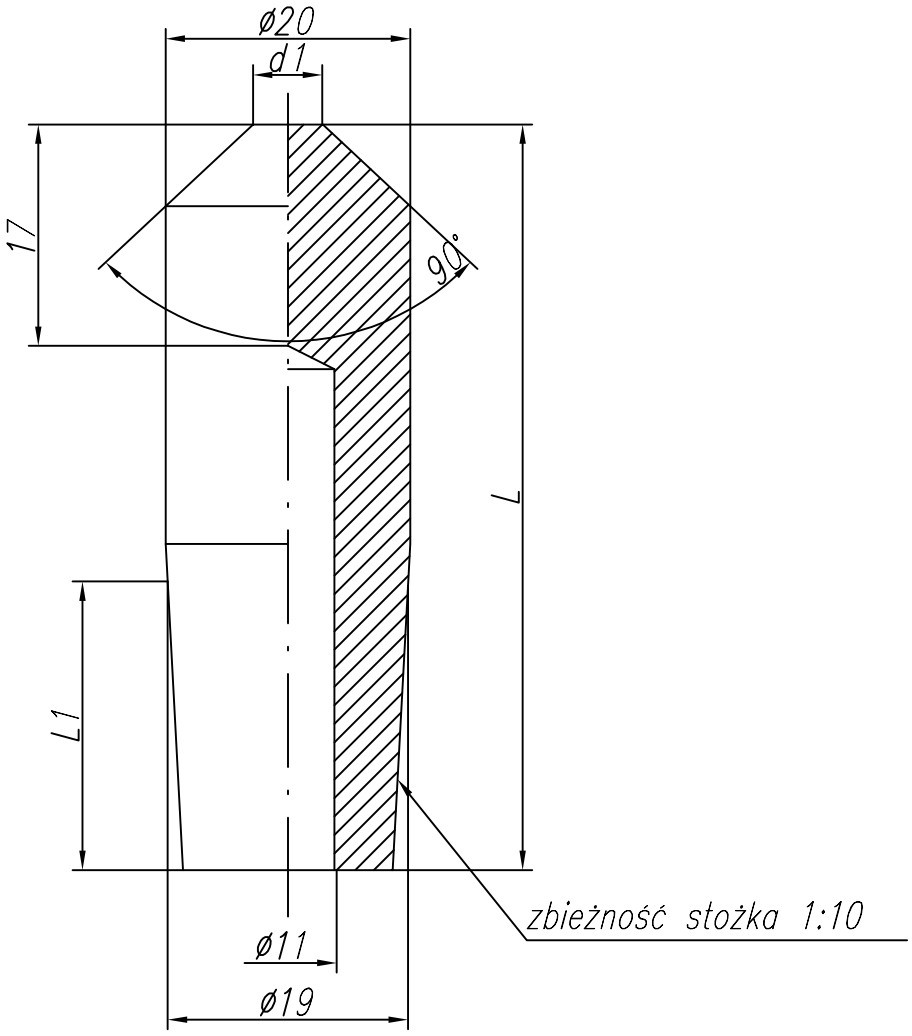
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	α	L1		Cecha	Nr rysunku
1	50	ø4	90°	17		A-11-0	2-9-1622-09-0
2	65	ø5	60°	17		A-11-1	2-9-1622-09-1
3	75	ø5	30°	22		A-11-2	2-9-1622-09-2
4							
5	100	ø6	30°	22		A-11-4	2-9-1622-09-4
6	110	ø5	30°	22		A-11-5	2-9-1622-09-5

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

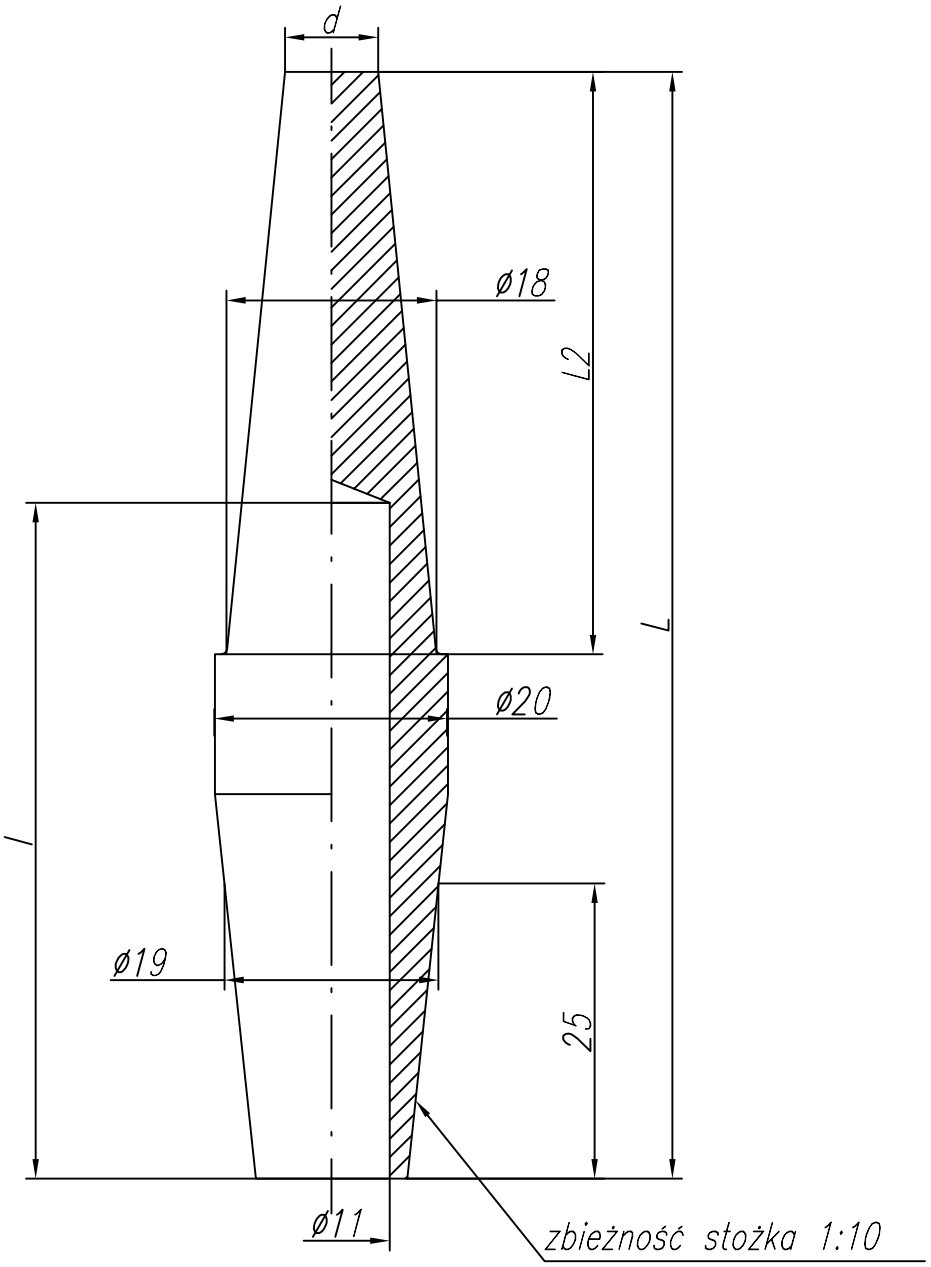


Lp	L	d1	L1		Cecha	Nr rysunku
1	60	ø5	25		A-12-0	2-9-1622-40-0
2	50	ø5	30		A-12-1	2-9-1622-40-1
3	55	ø7	20		A-12-2	2-9-1622-40-2
4	70	ø4	25		A-12-3	2-9-1622-40-3
5	130	ø7	25		A-12-4	2-9-1622-40-4
6	85	ø5	25		A-12-5	2-9-1622-40-5
7	60	ø6	25		A-12-6	2-9-1622-40-6

Aspa
ZGRZEWANIE

KATALOG

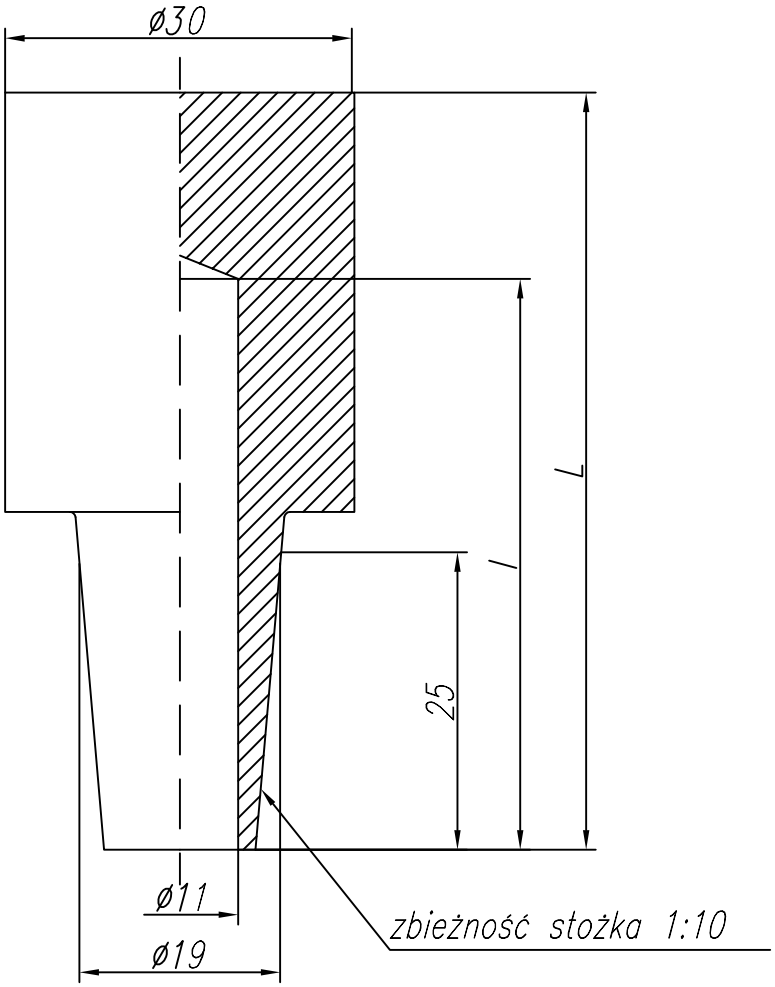
elektrod do zgrzewania oporowego



Lp	L	L2	d	l		Cecha	Nr rysunku
1	95	50	ø8	60		A-13-0	2-9-1623-19-0
2	95	50	ø9	60		A-13-1	2-9-1623-19-1
3	95	50	ø7	60		A-13-2	2-9-1623-19-2
4	95	50	ø18	60		A-13-3	2-9-1623-19-3

Aspa
ZGRZEWANIE

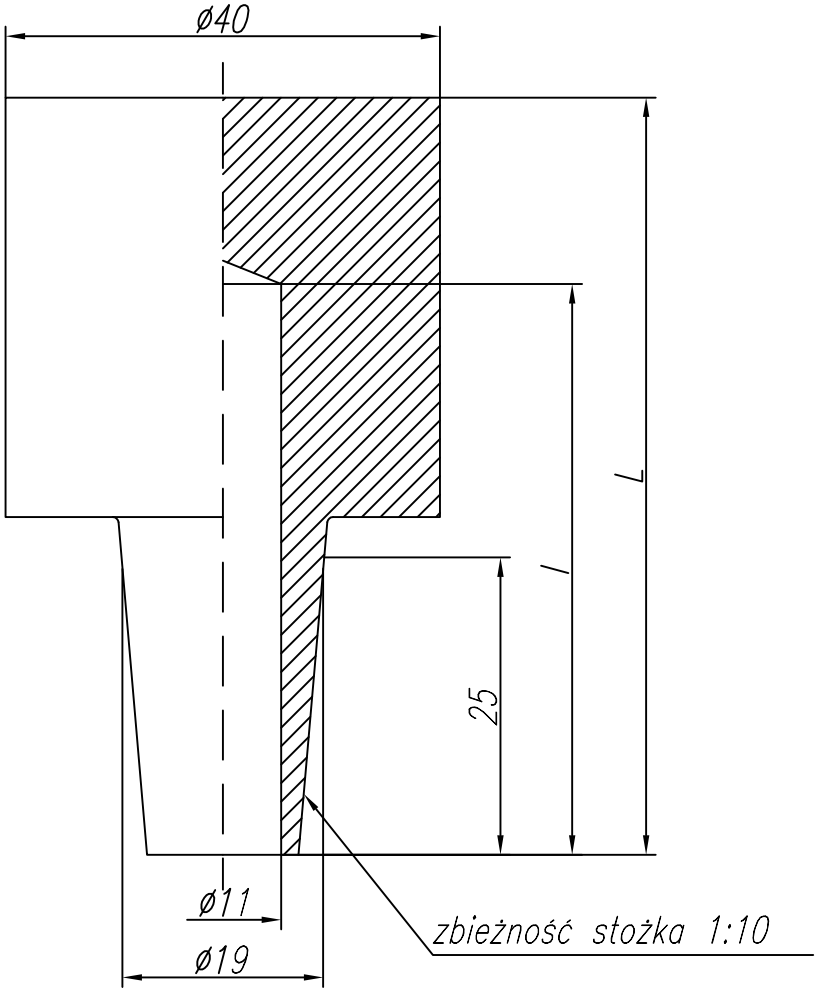
KATALOG
elektrod do zgrzewania oporowego



Lp	L	l		Cecha	Nr rysunku
1	65	50		A-15-0	2-9-1622-86-0
2	75	60		A-15-1	2-9-1622-86-1

Aspa
ZGRZEWANIE

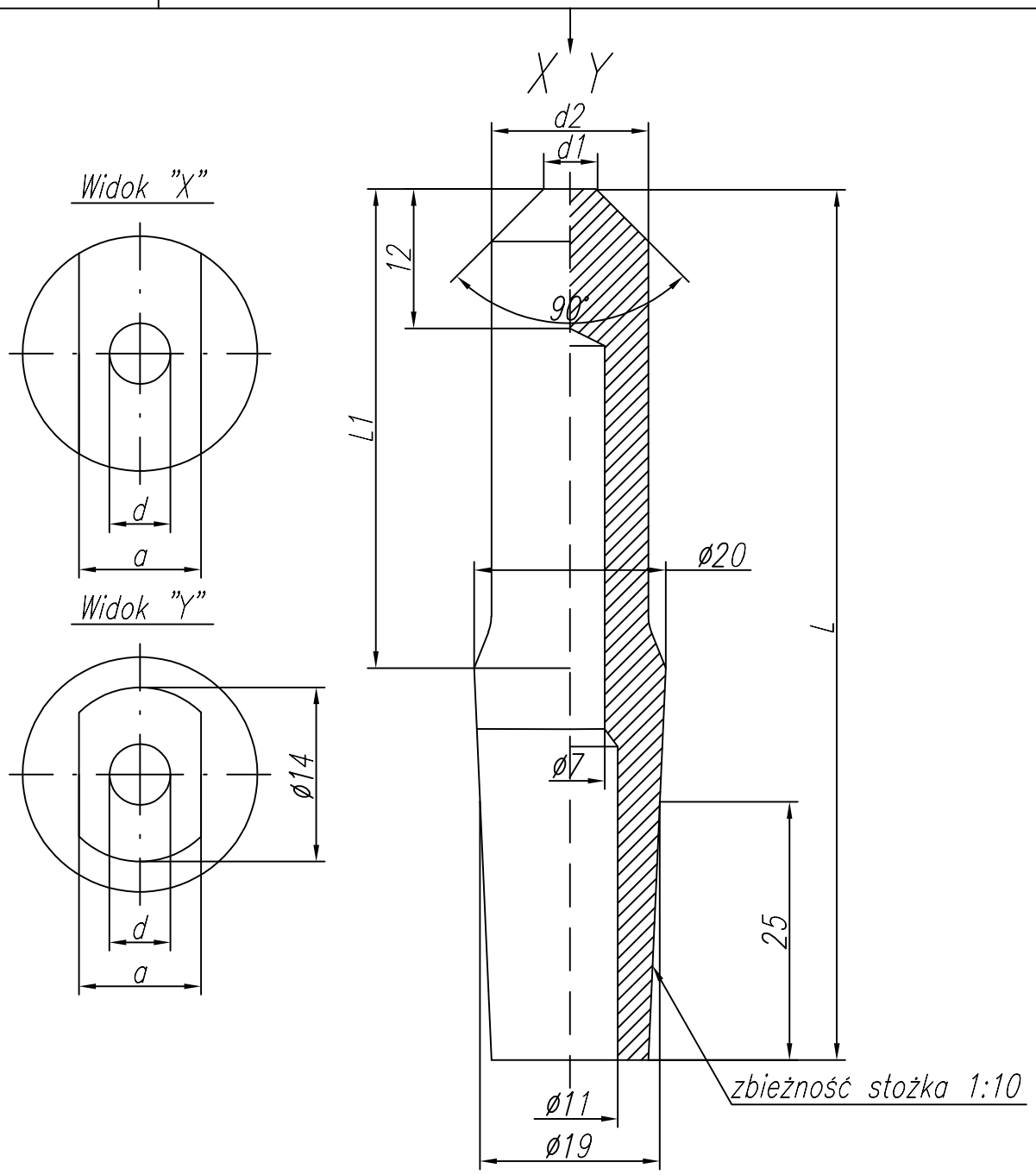
KATALOG
elektrod do zgrzewania oporowego



Lp	L	l		Cecha	Nr rysunku
1	60	45		A-16-0	2-9-1622-87-0

Aspa
ZGRZEWANIE

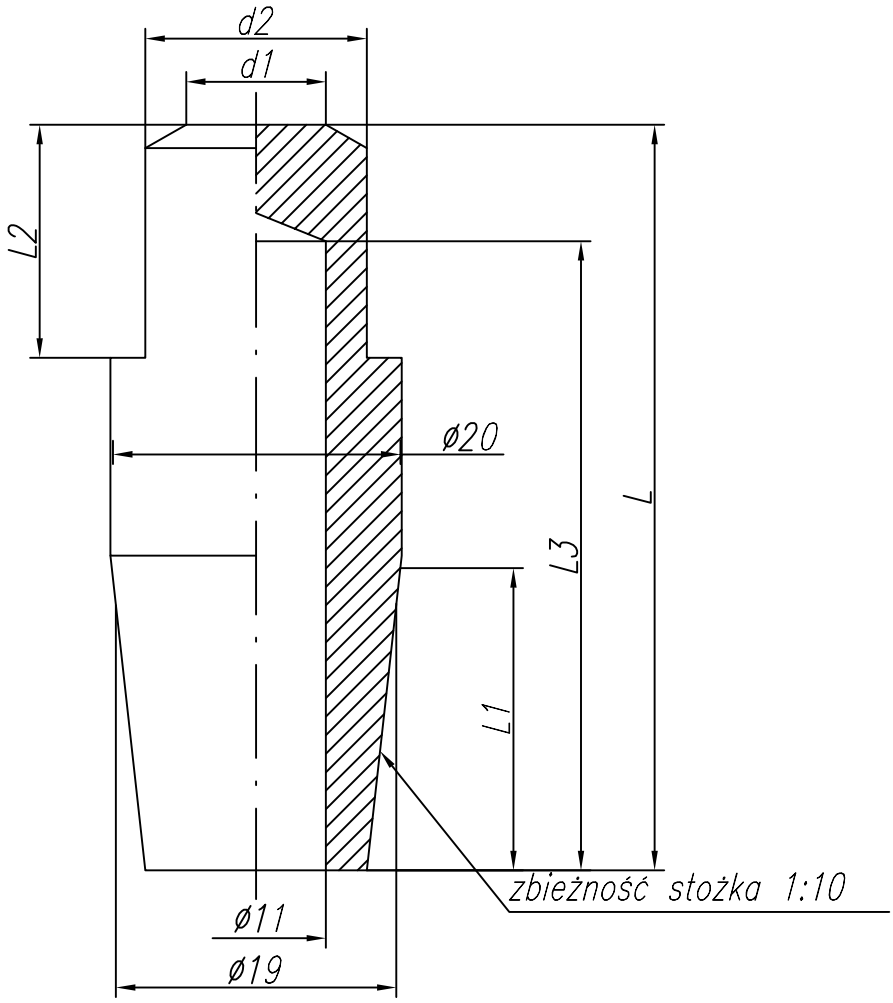
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d	L1	a	Widok		Cecha	Nr rysunku
1	80	ø5	30	10	"X"		A-17-0	2-9-1622-28-0
2	100	ø3	60	11	"Y"		A-17-1	2-9-1622-28-1

Aspa
ZGRZEWANIE

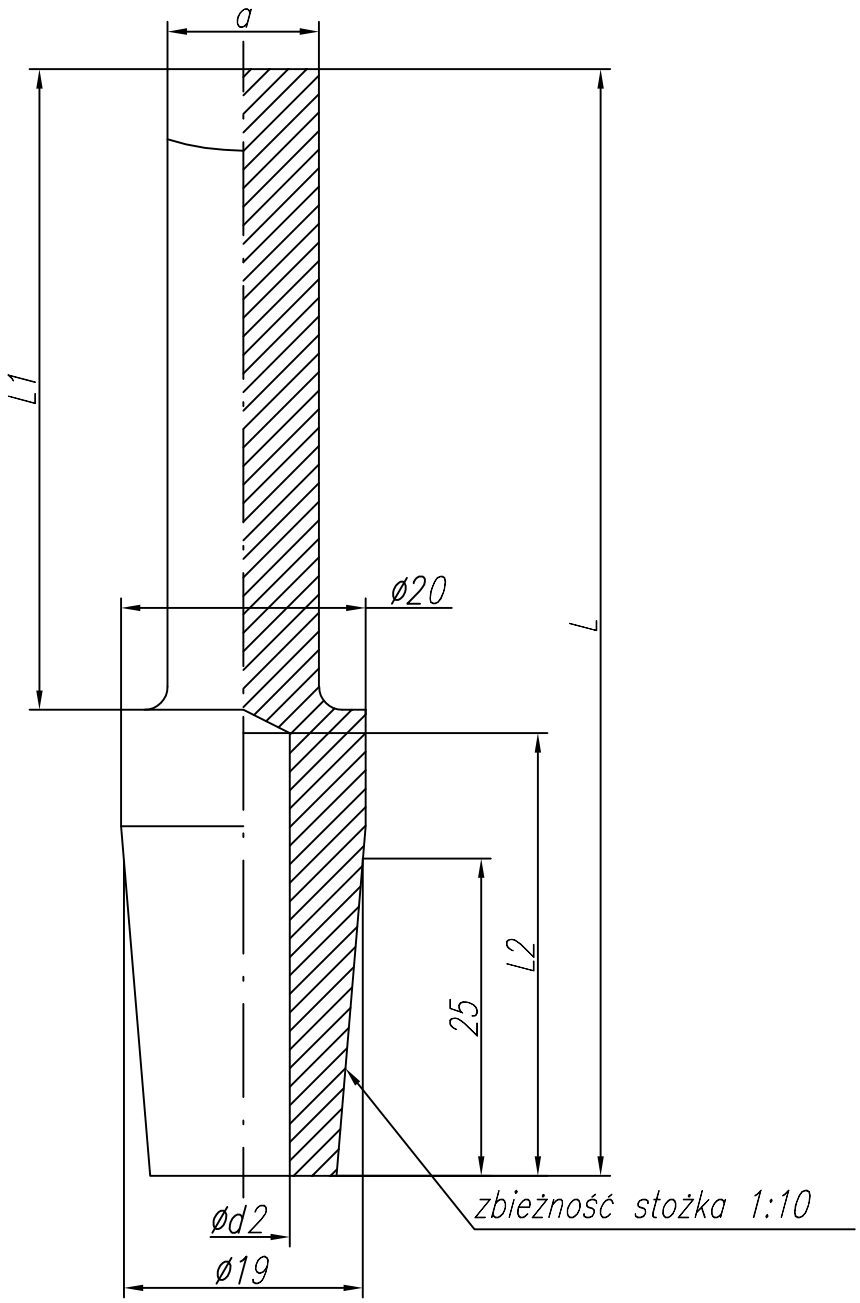
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	L2	d2	L3		Cecha	Nr rysunku
1	45	20	ø12	10	ø17	28		[A-18-0]	2-9-1622-16-0

Aspa
ZGRZEWANIE

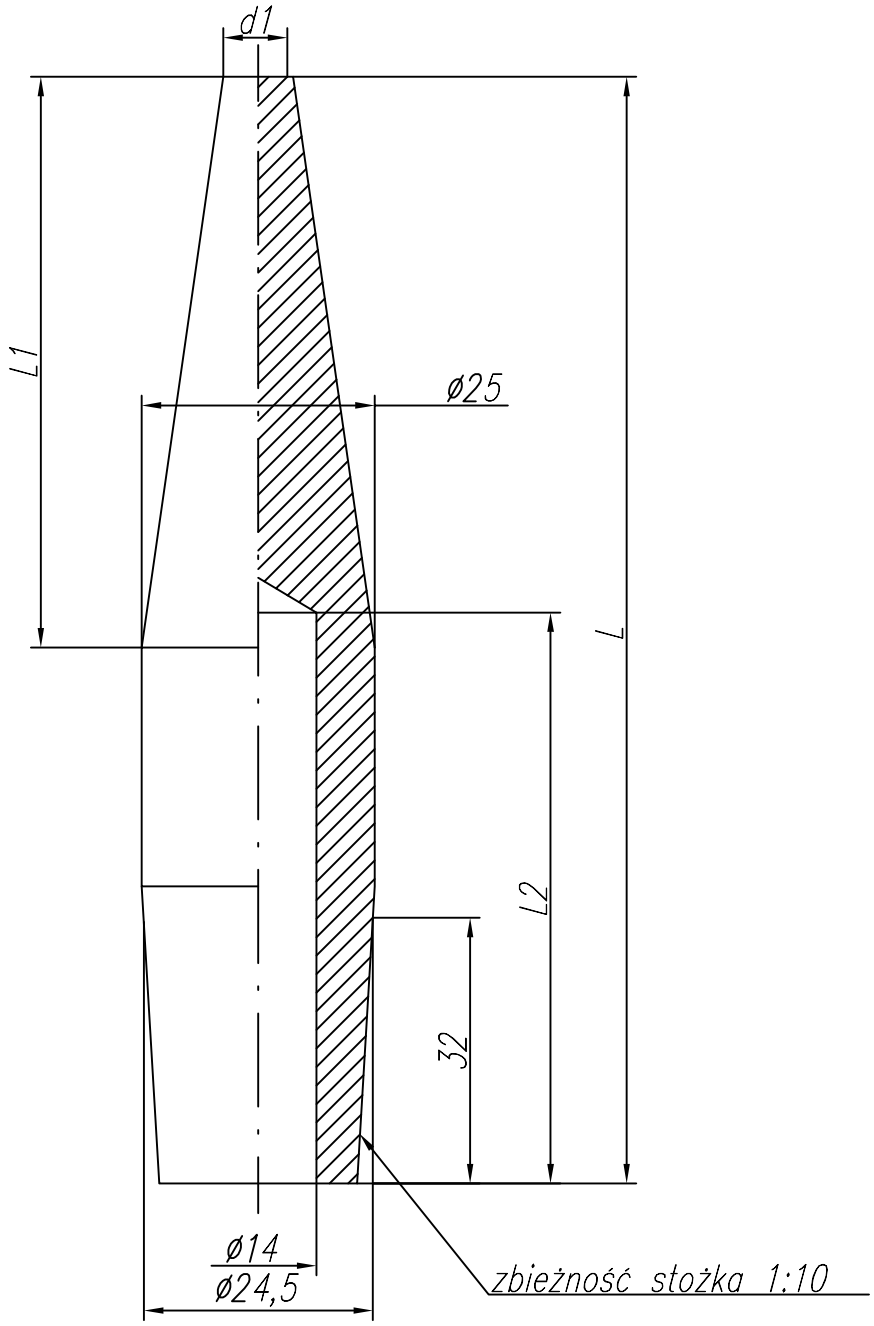
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	a	L2	d2		Cecha	Nr rysunku
1	70	25	5	40	ø11		A-19-0	2-9-1622-37-0
2	95	55	12	82	ø9		A-19-1	2-9-1622-37-1

Aspa
ZGRZEWANIE

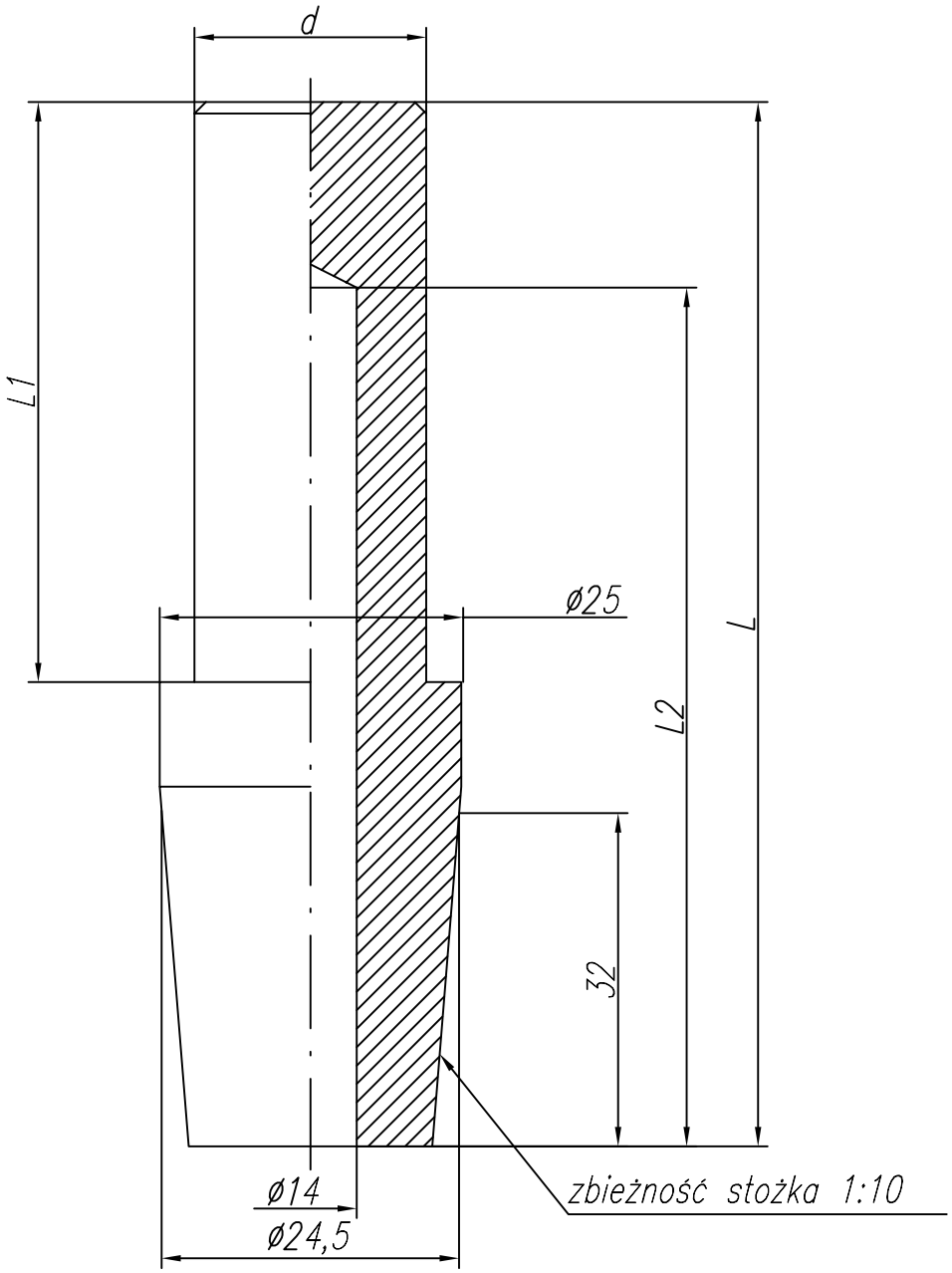
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	L2			Cecha	Nr rysunku
1	125	70	ø5	55			A-20-0	2-9-1622-07-0
2	140	70	ø8	70			A-20-1	2-9-1622-07-1

Aspa
ZGRZEWANIE

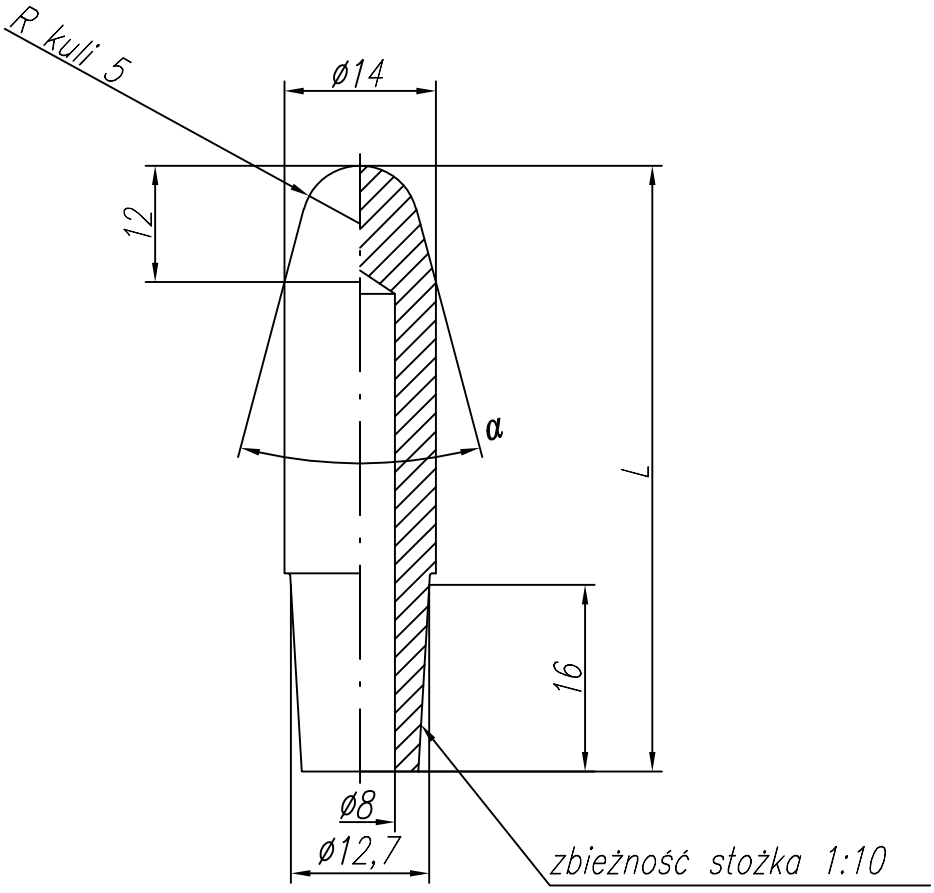
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d	L1	L2		Cecha	Nr rysunku
1	90	ø20	53	70		A-24-0	2-9-1622-18-0
2	75	ø30	38	55		A-24-1	2-9-1622-18-1

Aspa
ZGRZEWANIE

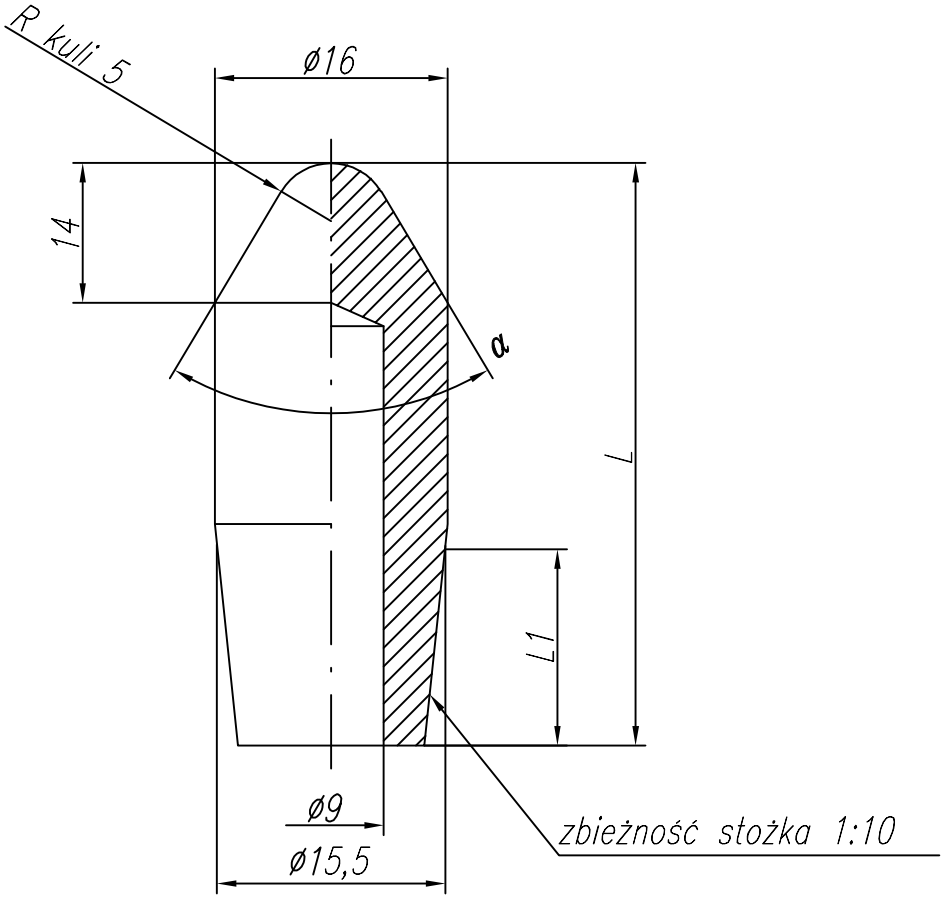
KATALOG
elektrod do zgrzewania oporowego



Lp	L	α			Cecha	Nr rysunku
1	30	45°			A-31-0	2-9-1622-11-2
2	40	30°			A-31-1	2-9-1622-11-3
3	80	15°			A-31-2	2-9-1622-11-4

Aspa
ZGRZEWANIE

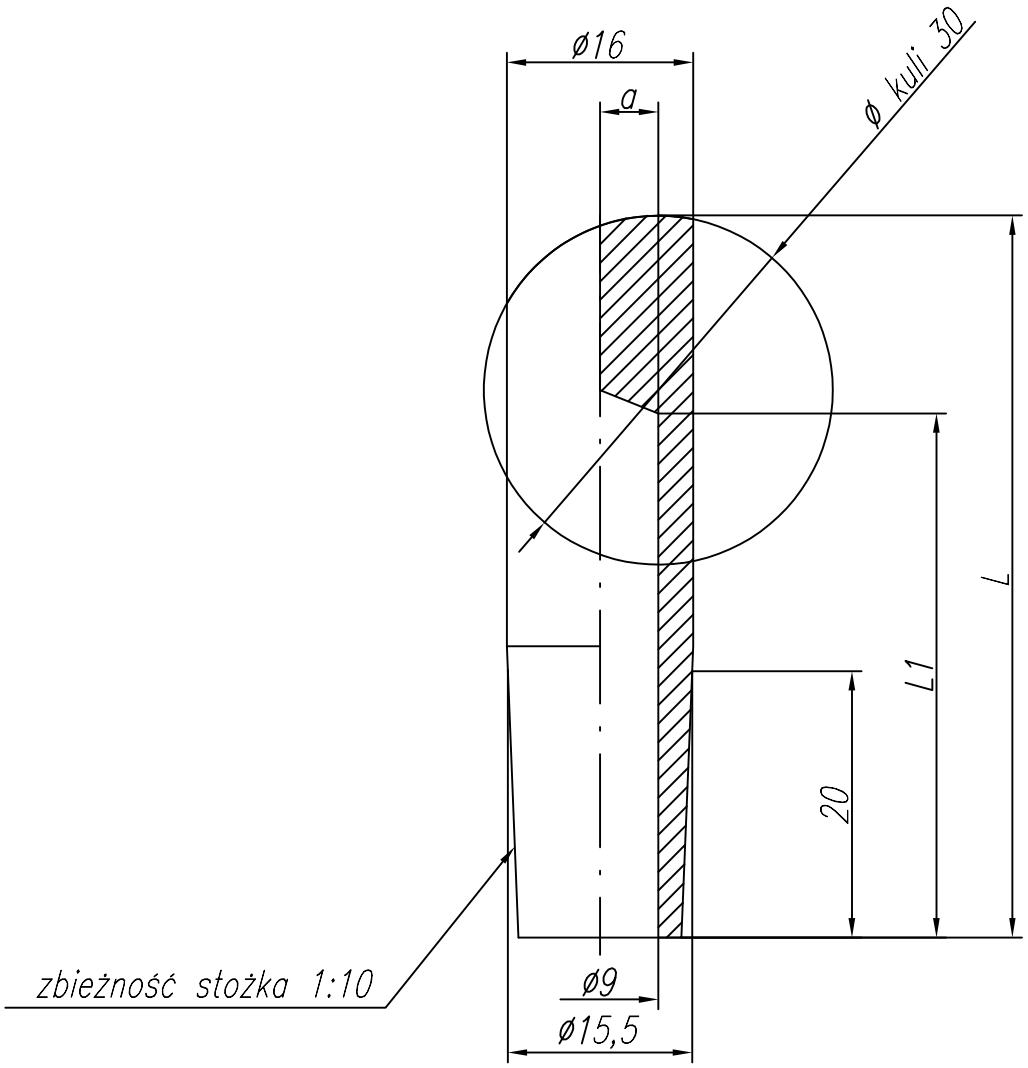
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α		Cecha	Nr rysunku
1	50	20	30°		A-33-0	2-9-1622-25-0
2	70	32	15°		A-33-1	2-9-1622-25-1
3	90	20	15°		A-33-2	2-9-1622-25-2
4	90	32	15°		A-33-3	2-9-1622-25-3
5	60	20	15°		A-33-4	2-9-1622-25-4
6	68	20	15°		A-33-5	2-9-1622-25-5
7	80	20	15°		A-33-6	2-9-1622-25-6
8	41	20	35°		A-33-6	2-9-1622-25-6

Aspa
ZGRZEWANIE

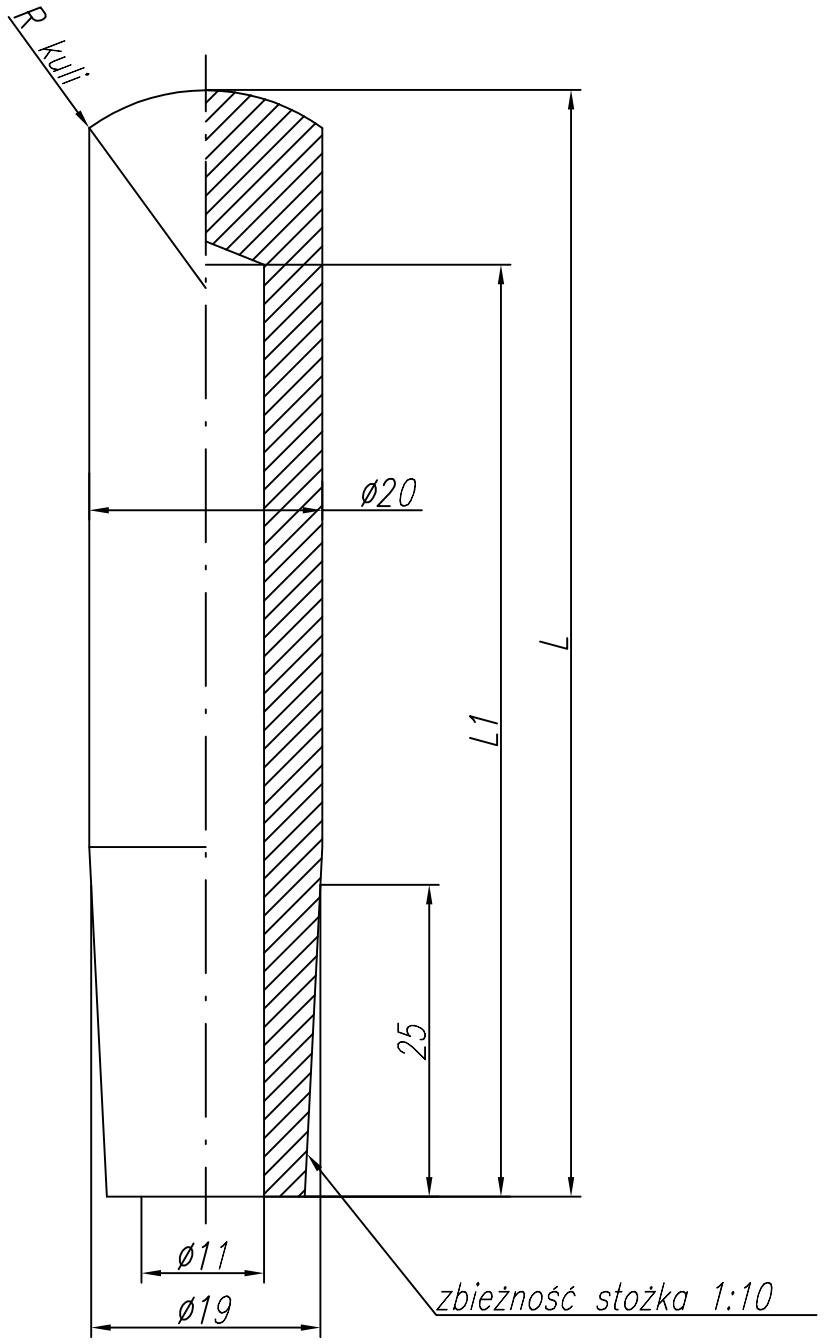
KATALOG
elektrod do zgrzewania oporowego



Lp	L	a	L1		Cecha	Nr rysunku
1	65	5	49		A-34-0	2-9-1622-60-0

Aspa
ZGRZEWANIE

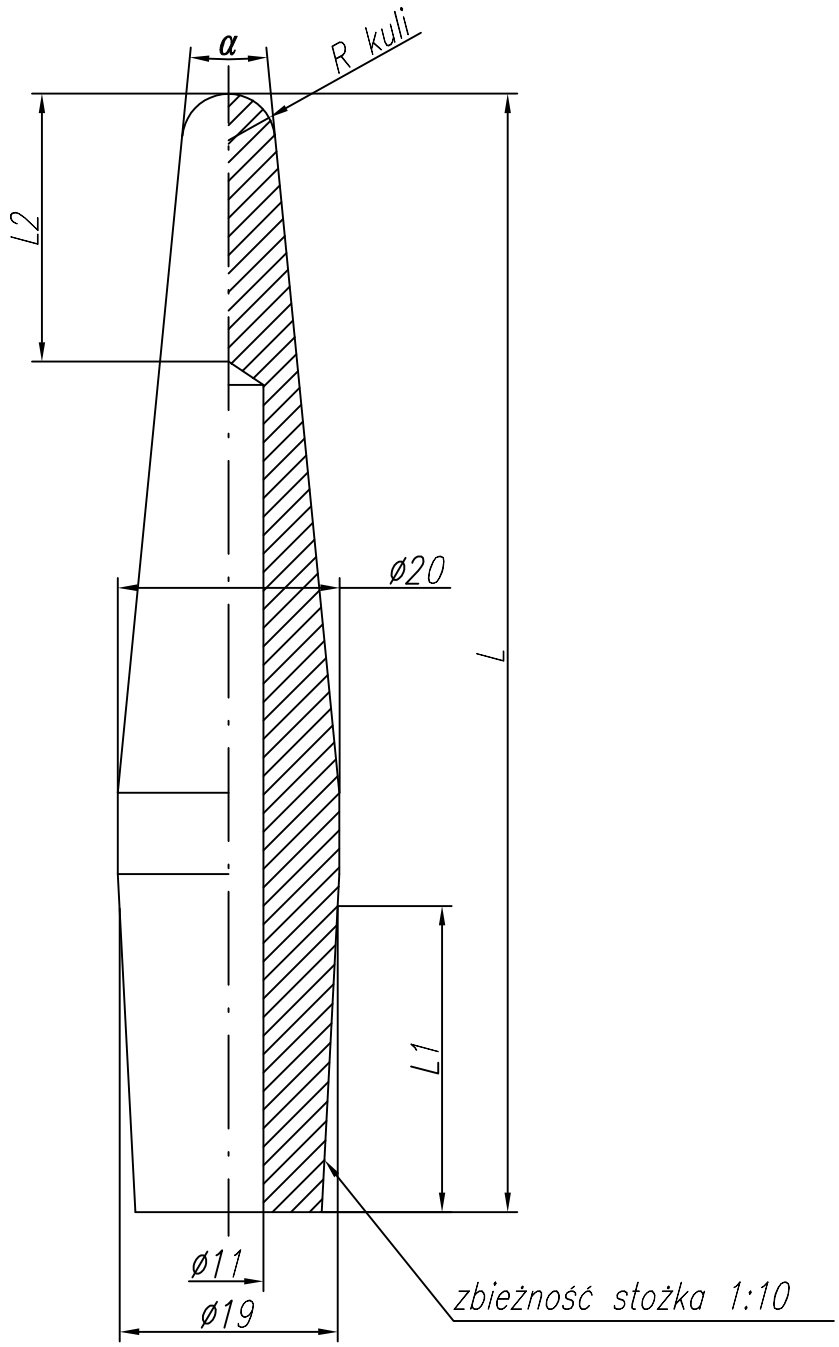
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	R kuli		Cecha	Nr rysunku
1	100	80	50		A-35-0	2-9-1622-02-0
2	50	30	15		A-35-1	2-9-1622-02-1

Aspa
ZGRZEWANIE

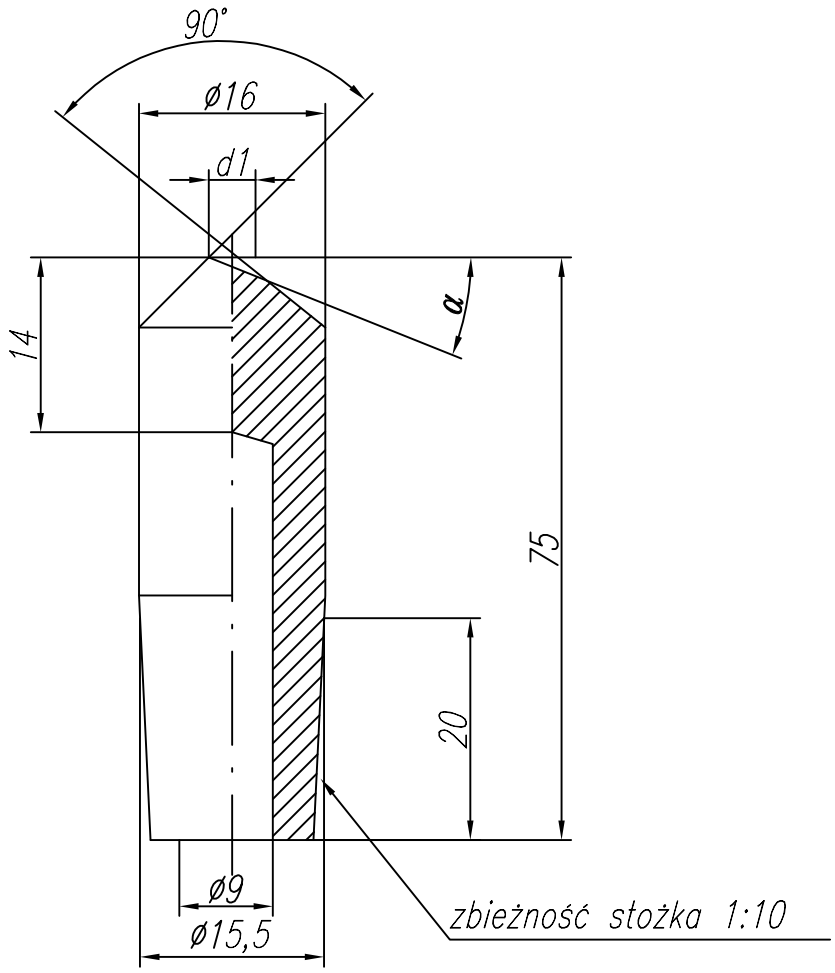
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	R kuli	α	L2		Cecha	Nr rysunku
1	115	20	5	10°	22		A-36-0	2-9-1622-24-0
2	90	40	8	10°	17		A-36-1	2-9-1622-24-1
3	110	40	8	10°	17		A-36-2	2-9-1622-24-2
4	70	25	8	15°	17		A-36-3	2-9-1622-24-3
5	50	25	8	30°	17		A-36-4	2-9-1622-24-4

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

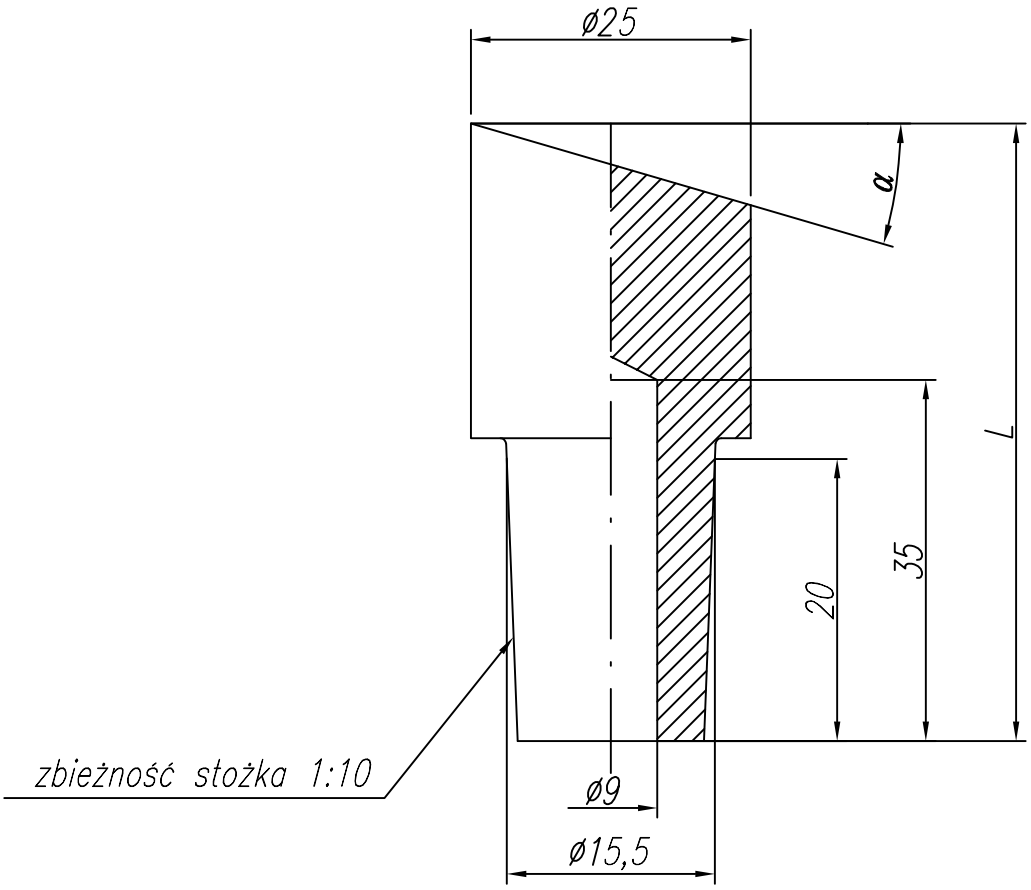


Lp	L	d1	α		Cecha	Nr rysunku
1	50	ø4	15°		A-43-0	2-9-1622-48-0

Aspa
ZGRZEWANIE

KATALOG

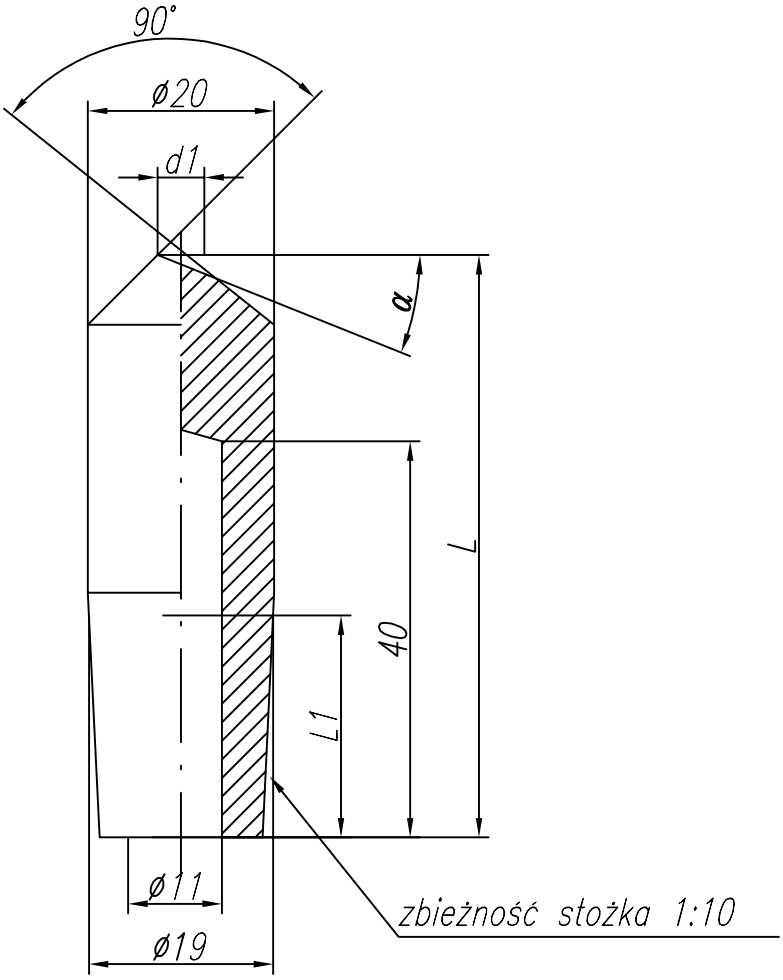
elektrod do zgrzewania oporowego



Lp	L	α		Cecha	Nr rysunku
1	55	15°		A-44-0	2-9-1622-62-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

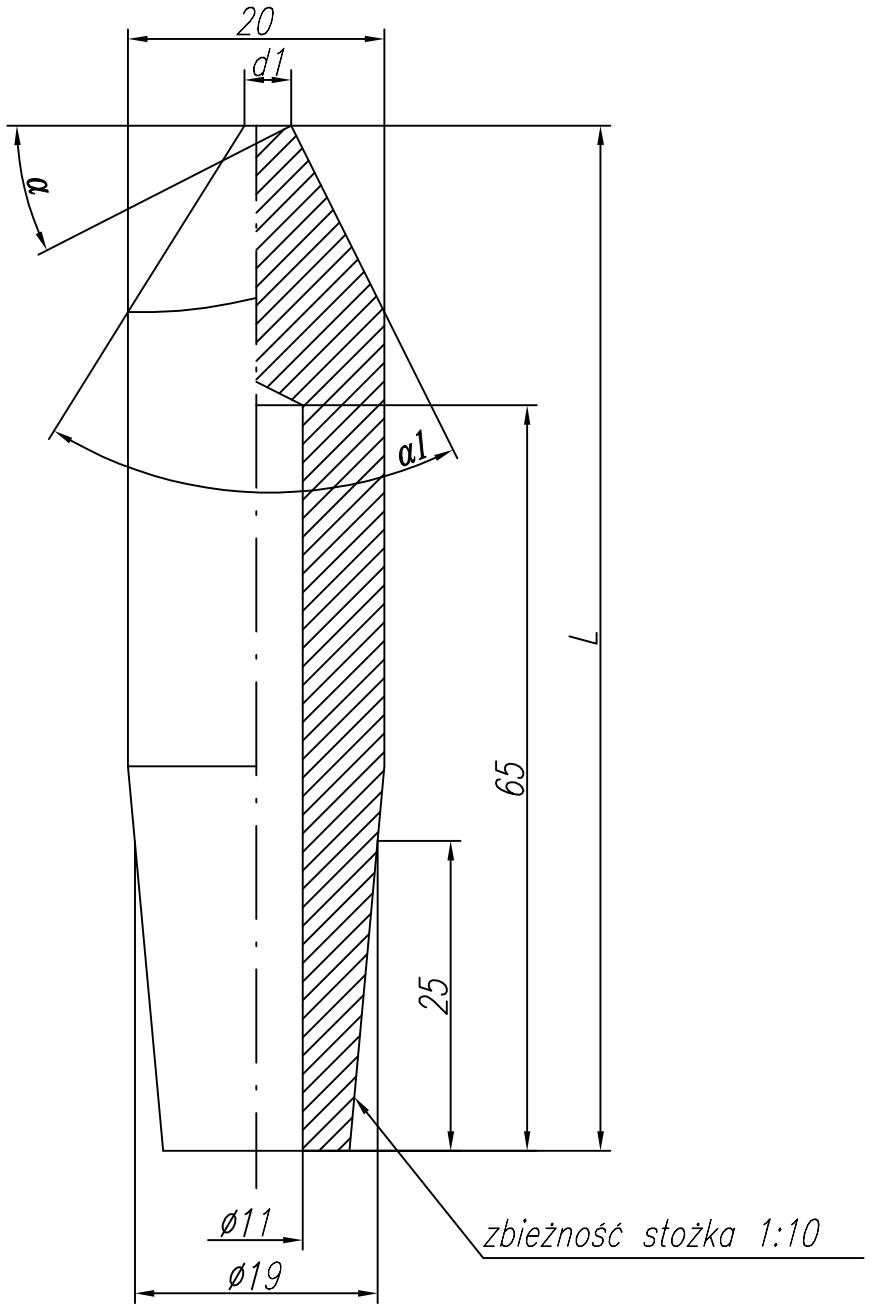


Lp	L	L1	d1	α		Cecha	Nr rysunku
1	60	30	ø5	15°		A-45-0	2-9-1622-47-0

Aspa
ZGRZEWANIE

KATALOG

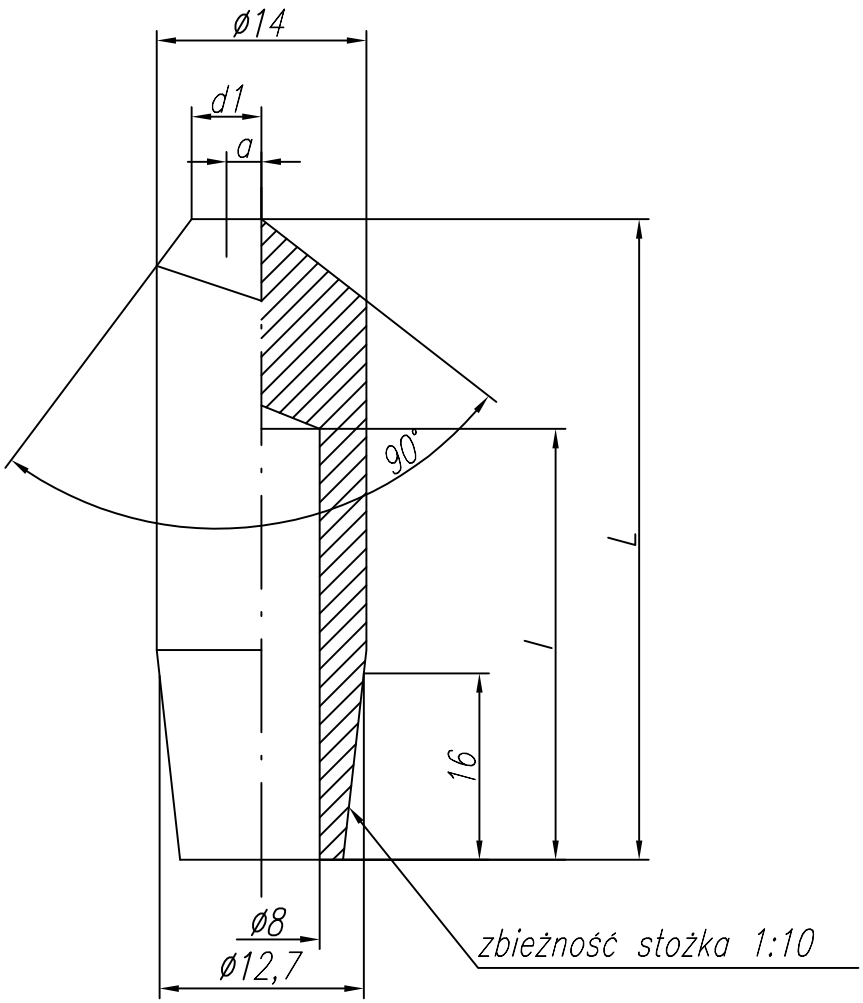
elektrod do zgrzewania oporowego



Lp	L	d1	α	α1		Cecha	Nr rysunku
1	85	ø5	30°	60°		A-46-0	2-9-1622-95-0

Aspa
ZGRZEWANIE

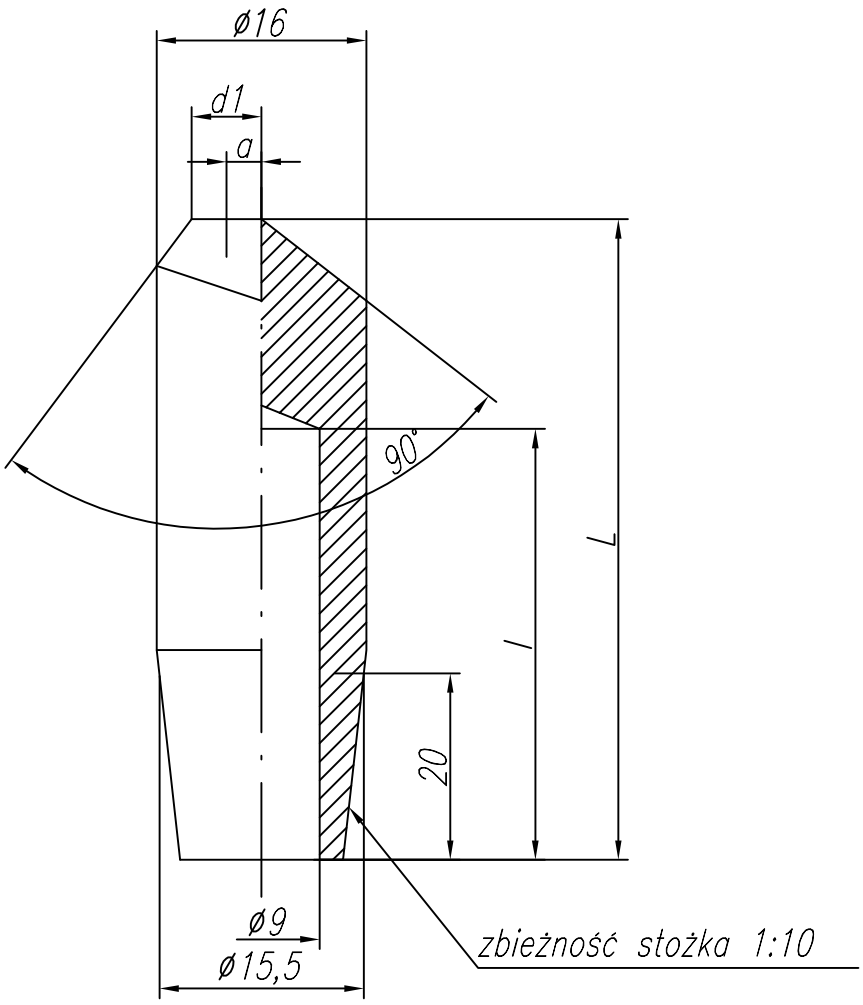
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a	l		Cecha	Nr rysunku
1	55	ø5	4,5	40		A-51-0	2-9-1622-05-0
2	50	ø4	2	35		A-51-1	2-9-1622-05-1
3	45	ø4	3	30		A-51-2	2-9-1622-05-2

Aspa
ZGRZEWANIE

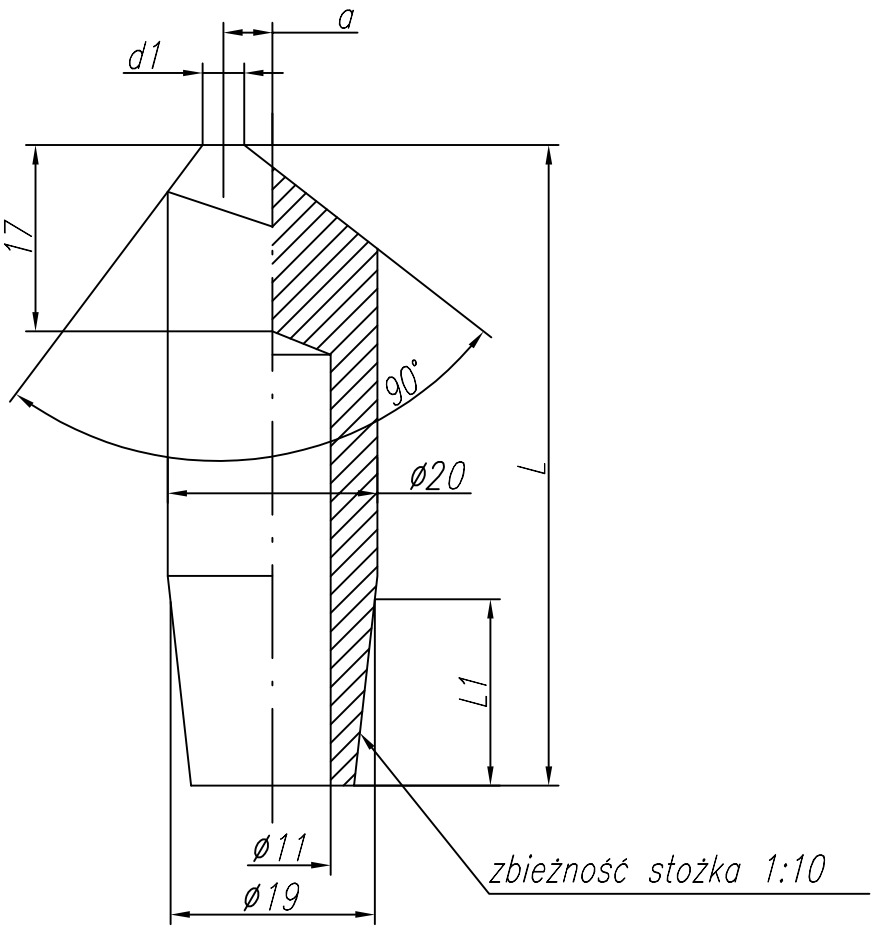
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a	l		Cecha	Nr rysunku
1	50	ø4	4	33		A-53-0	2-9-1622-26-0
2	70	ø5	5,5	53		A-53-1	2-9-1622-26-1
3	35	ø4	4	18		A-53-2	2-9-1622-26-2
4	60	ø4	4	43		A-53-3	2-9-1622-26-3
5	40	ø6	5	23		A-53-4	2-9-1622-26-4
6	50	ø6	5	33		A-53-5	2-9-1622-26-5

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

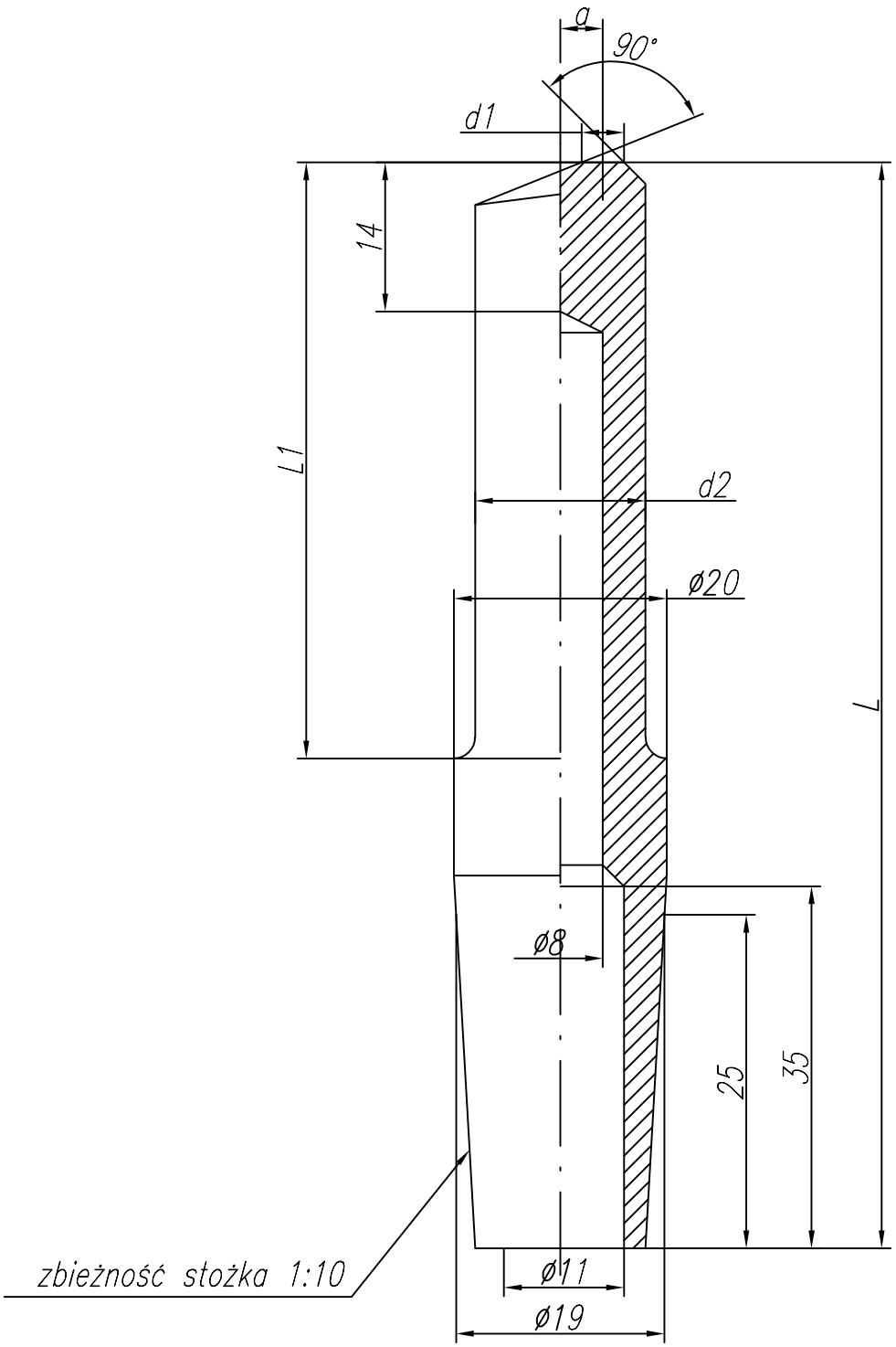


Lp	L	L1	d1	a		Cecha	Nr rysunku
1	55	20	ø7	6,5		A-55-0	2-9-1622-10-0
2	130	20	ø7	6,5		A-55-1	2-9-1622-10-1
3	45	25	ø5	5		A-55-2	2-9-1622-10-2
4	65	25	ø5	5		A-55-3	2-9-1622-10-3
5	75	25	ø5	5		A-55-4	2-9-1622-10-4
6	80	25	ø5	5		A-55-5	2-9-1622-10-5
7	90	20	ø5	5		[A-55-6]	2-9-1622-10-6
8	95	25	ø5	5		A-55-7	2-9-1622-10-7
9	55	25	ø5	5		A-55-8	2-9-1622-10-8

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego

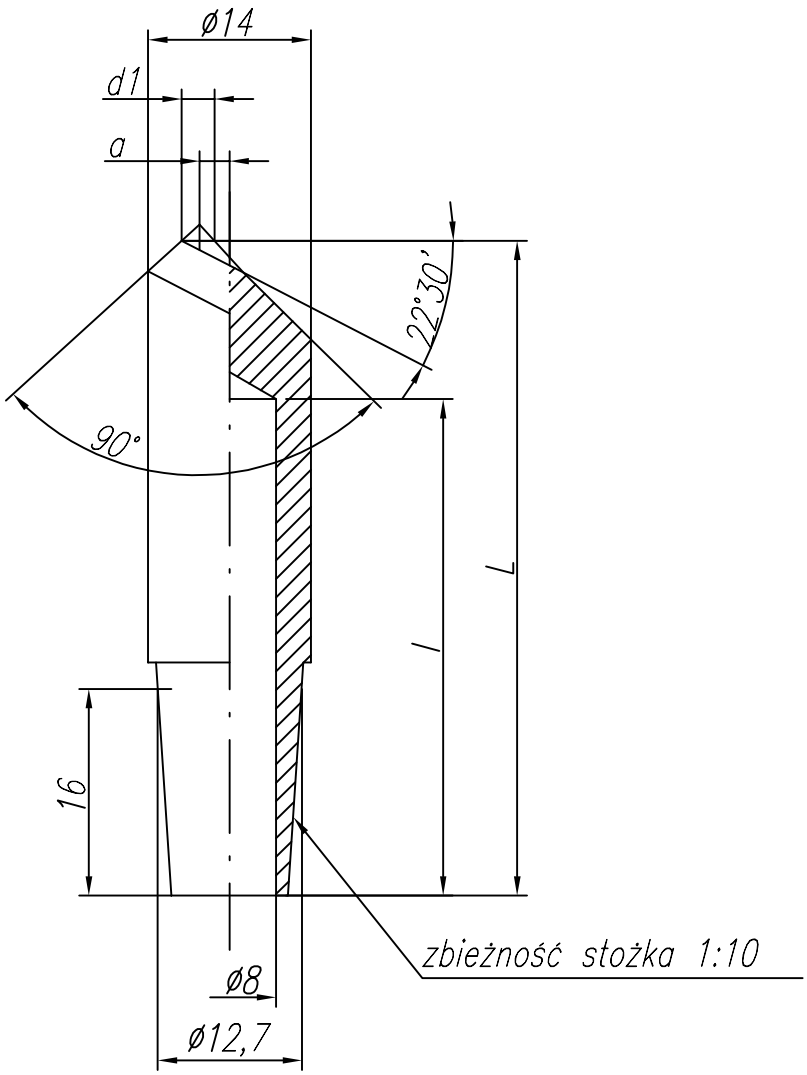


Lp	L	d1	L1	d2	a		Cecha	Nr rysunku
1	100	ø4	60	ø16	4		A-56-0	2-9-1622-66-0

Aspa
ZGRZEWANIE

KATALOG

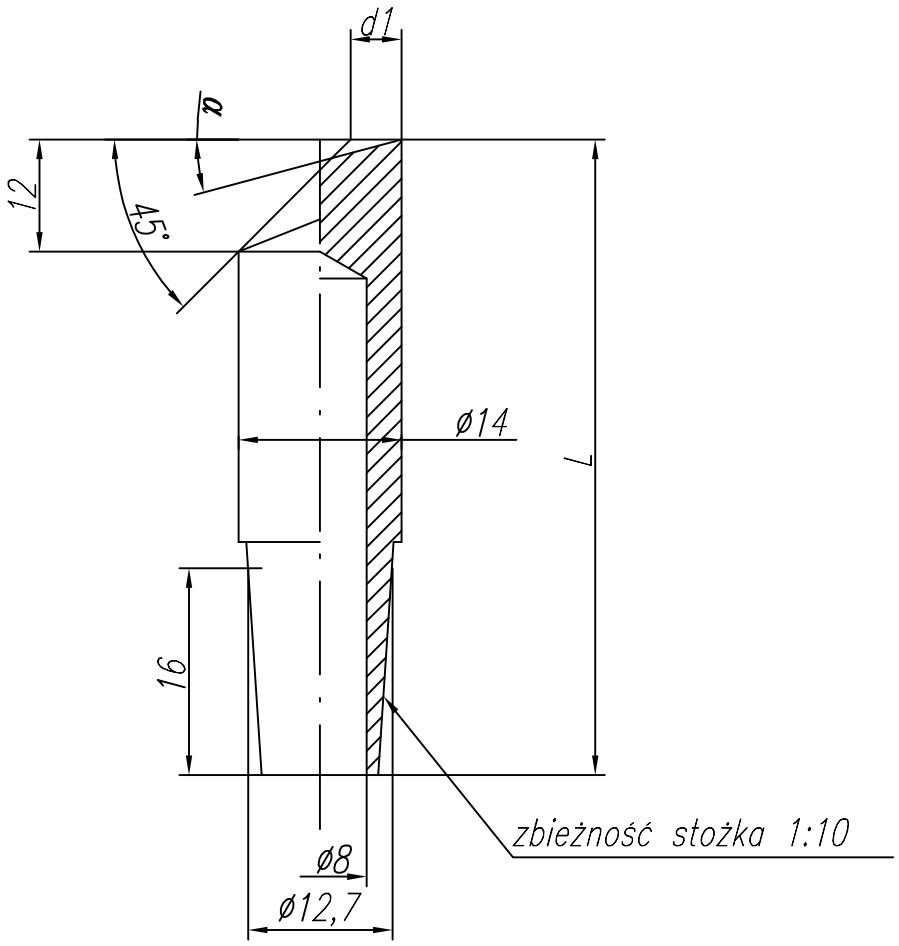
elektrod do zgrzewania oporowego



Lp	L	d1	a	l		Cecha	Nr rysunku
1	50	ø3	3	35		A-61-0	2-9-1622-20-0
2	35	ø3	3	20		A-61-1	2-9-1622-20-1

Aspa
ZGRZEWANIE

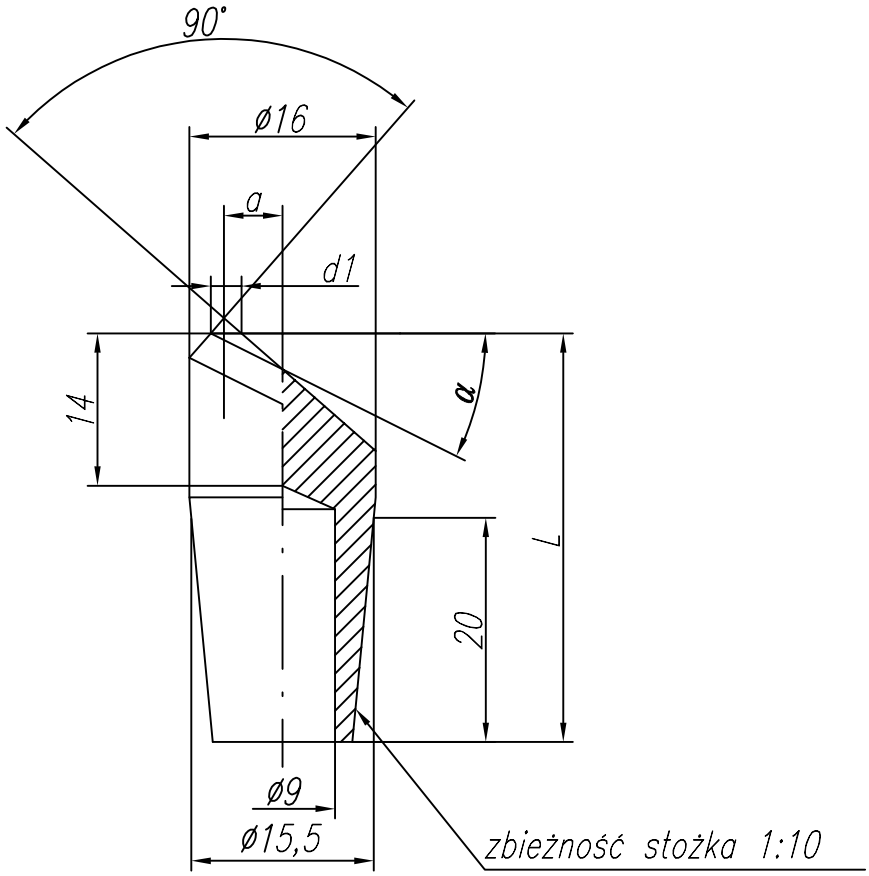
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	α		Cecha	Nr rysunku
1	45	ø5	15°		A-62-0	2-9-1622-34-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

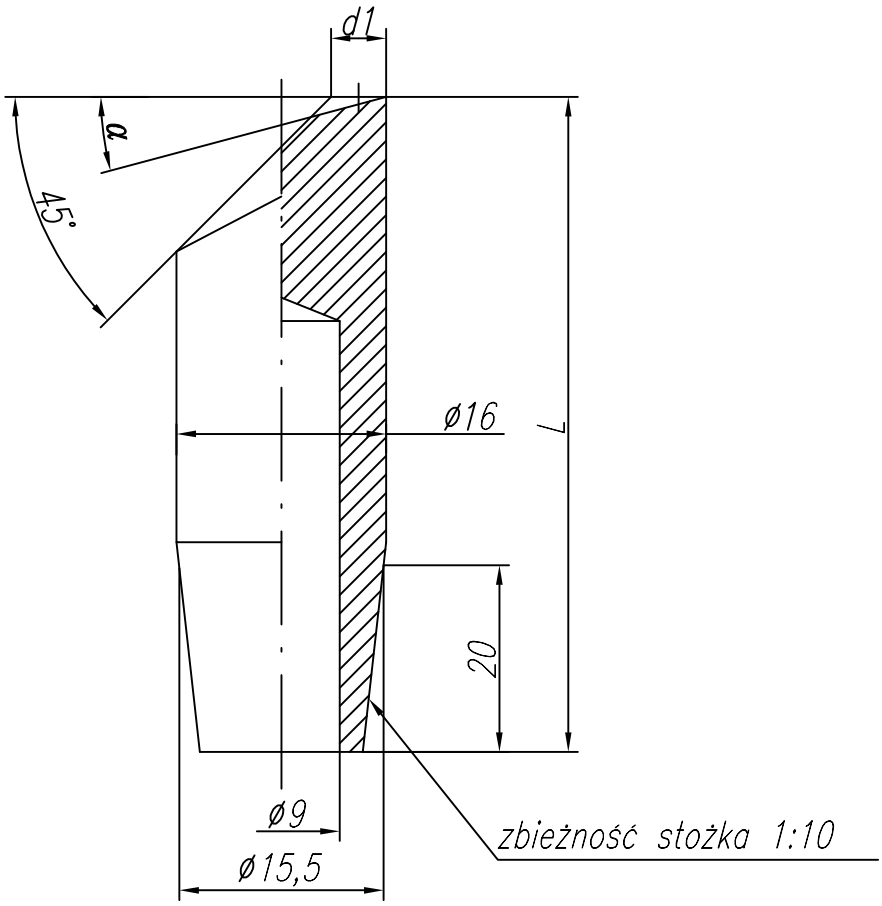


Lp	L	d1	a	α		Cecha	Nr rysunku
1	35	ø4	4	20°		A-63-0	2-9-1622-49-0
2	40	ø4	4	25°		A-63-1	2-9-1622-49-1

Aspa
ZGRZEWANIE

KATALOG

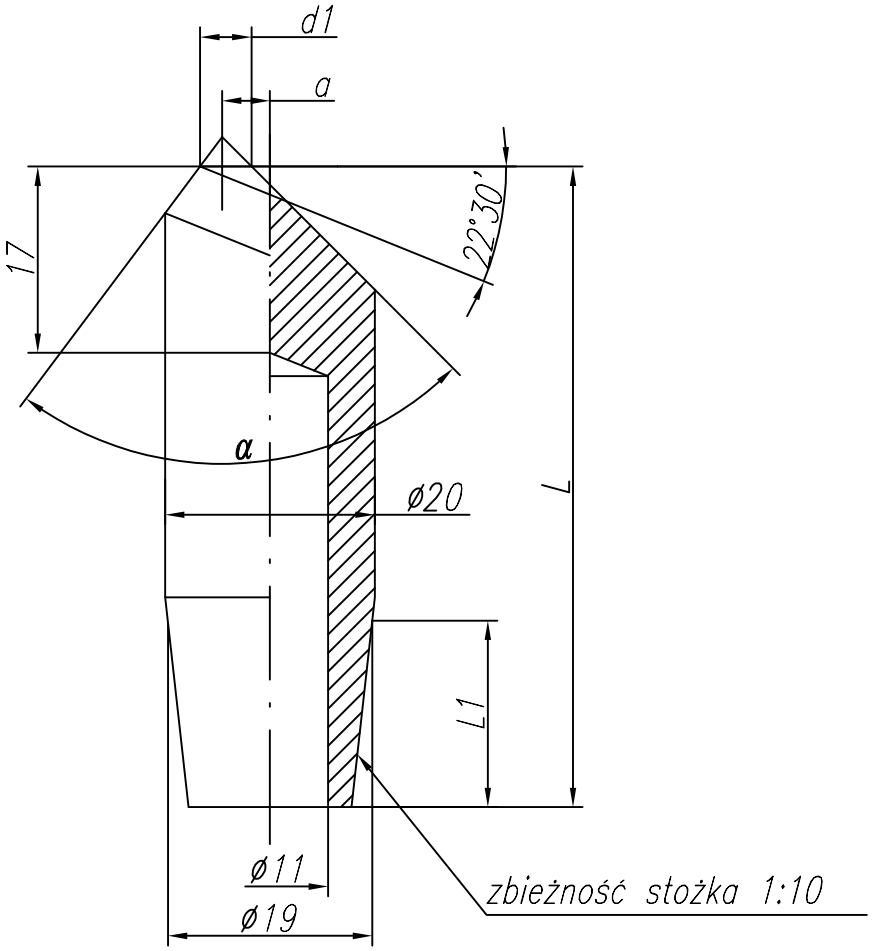
elektrod do zgrzewania oporowego



Lp	L	d1	α		Cecha	Nr rysunku
1	65	ø5	15°		A-64-0	2-9-1622-32-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

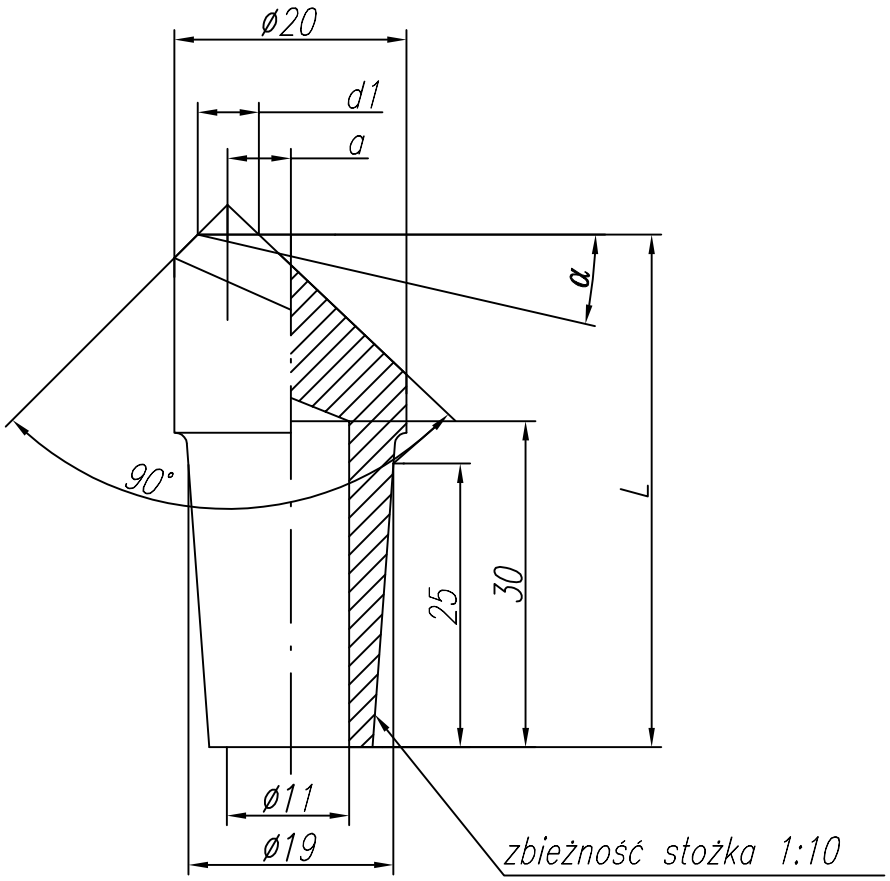


Lp	L	L1	d1	a	α		Cecha	Nr rysunku
1	35	20	ø3	3	120°		A-65-0	2-9-1622-22-0
2	45	25	ø5	5	90°		A-65-1	2-9-1622-22-1
3	55	20	ø4	4	90°		A-65-2	2-9-1622-22-2

Aspa
ZGRZEWANIE

KATALOG

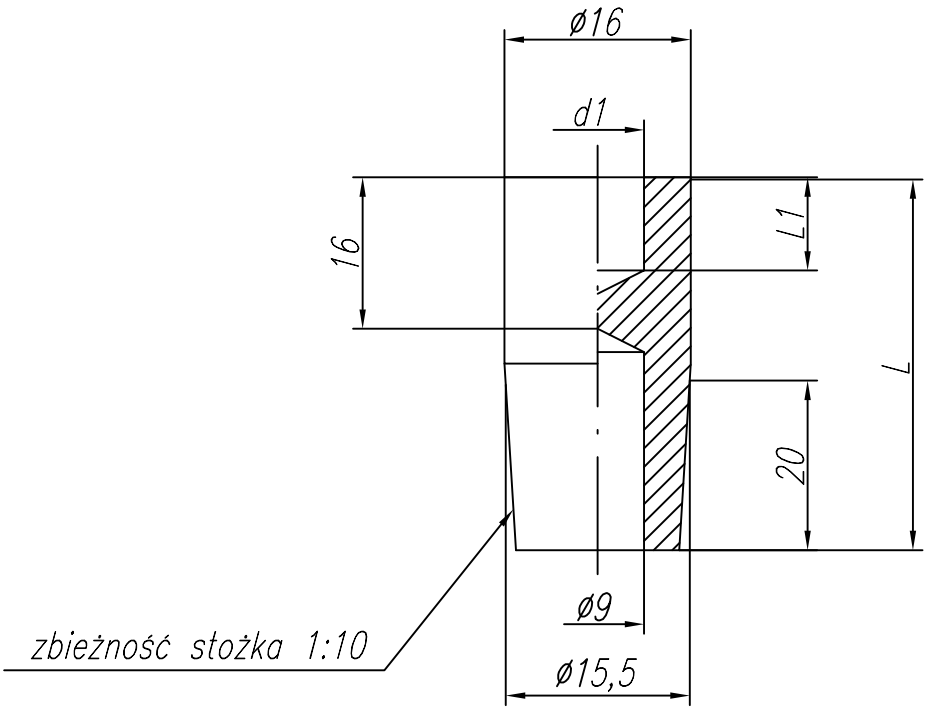
elektrod do zgrzewania oporowego



Lp	L	d1	a	α		Cecha	Nr rysunku
1	50	ø5	5	15°		A-66-0	2-9-1622-94-0

Aspa
ZGRZEWANIE

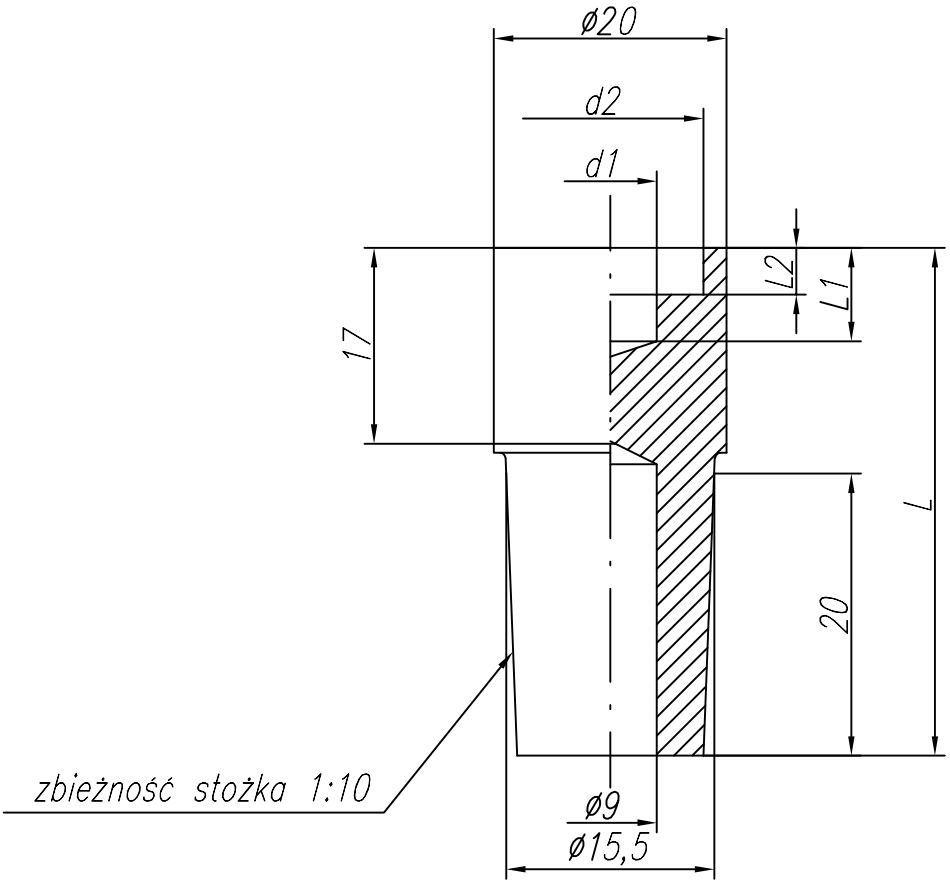
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1		Cecha	Nr rysunku
1	35	7	ø8,3		A-70-0	2-9-1622-56-0
2	40	–	–		A-70-1	2-9-1622-56-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

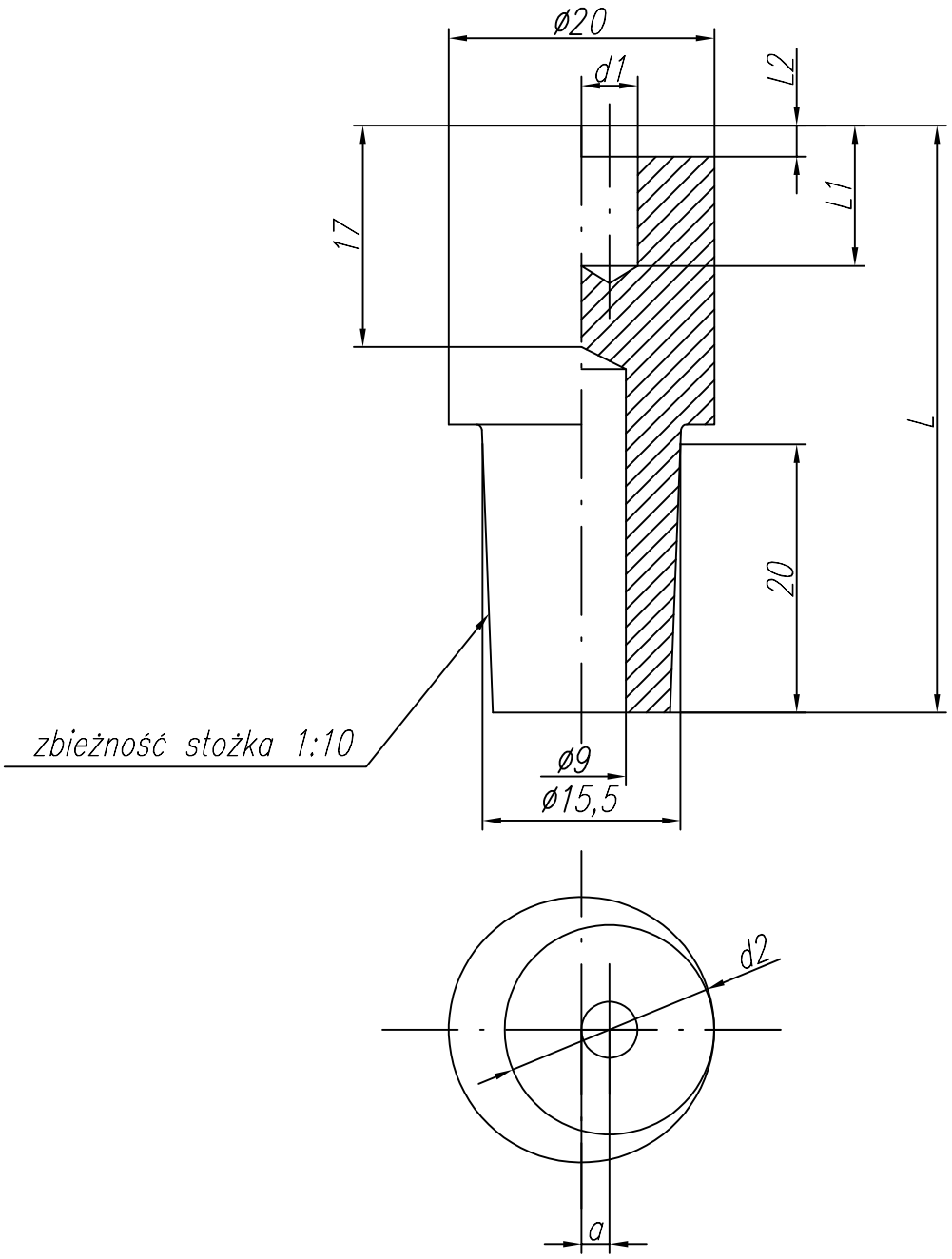


Lp	L	L1	L2	d1	d2		Cecha	Nr rysunku
1	35	6	3	ø7	ø15		A-71-0	2-9-1622-58-0
2	35	7	–	ø11,3	–		A-71-1	2-9-1622-58-1

Aspa
ZGRZEWANIE

KATALOG

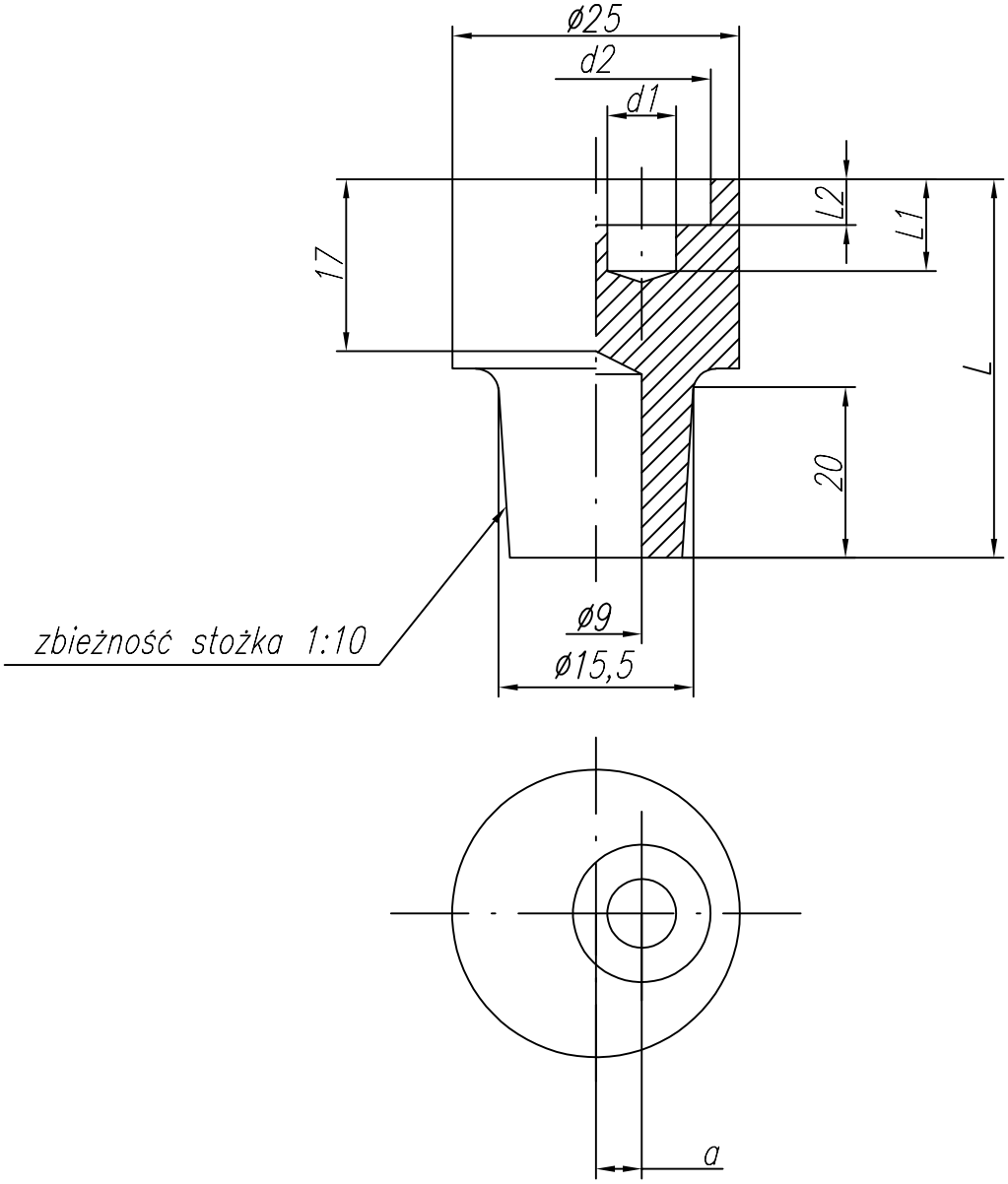
elektrod do zgrzewania oporowego



Lp	L	L1	L2	d1	d2	a		Cecha	Nr rysunku
1	45	9	3	ø6	ø14	3		A-72-0	2-9-1622-57-0

Aspa
ZGRZEWANIE

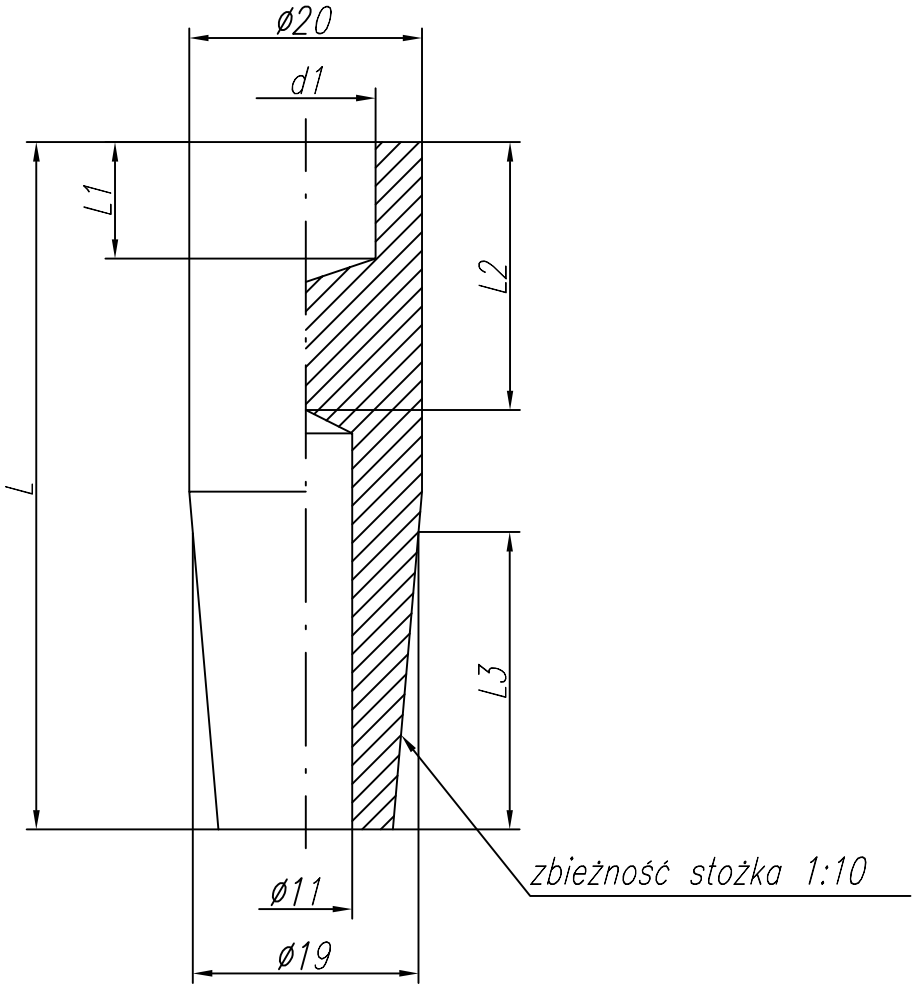
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	d1	d2	a		Cecha	Nr rysunku
1	35	6	3	ø7	ø15	4		A-73-0	2-9-1622-55-0

Aspa
ZGRZEWANIE

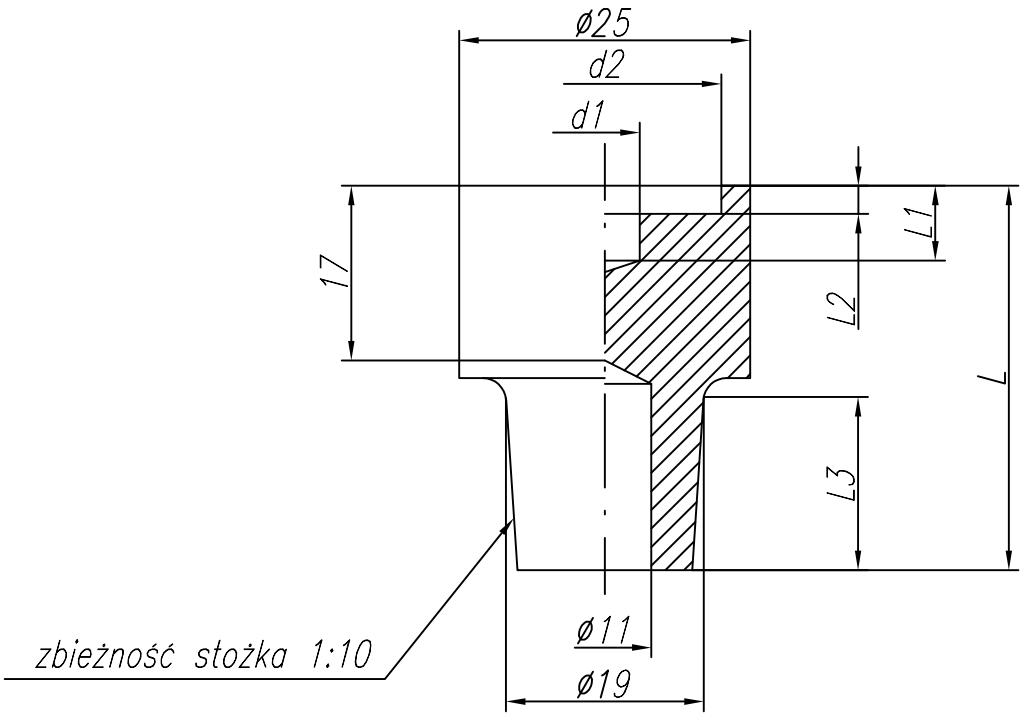
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L3	d1	L1	L2		Cecha	Nr rysunku
1	35	20	ø11,3	7	17		A-74-0	2-9-1622-17-0
2	40	20	–	–	17		A-74-1	2-9-1622-17-1
3	60	20	–	–	17		A-74-2	2-9-1622-17-2
4	55	25	–	–	17		A-74-3	2-9-1622-17-3
5	65	25	–	–	17		A-74-4	2-9-1622-17-4
6	85	25	–	–	17		A-74-5	2-9-1622-17-5
7	55	25	ø9,5	28	35		A-74-6	2-9-1622-17-6
8	65	25	ø12	3	17		A-74-7	2-9-1622-17-7
9	65	25	ø9,5	10	17		A-74-8	2-9-1622-17-8
10	85	25	ø10	13	20		A-74-9	2-9-1622-17-9
11	65	25	ø7	10	17		A-74-10	2-9-1622-17-10
12	65	25	ø9,5	17	22		A-74-11	2-9-1622-17-11

Aspa
ZGRZEWANIE

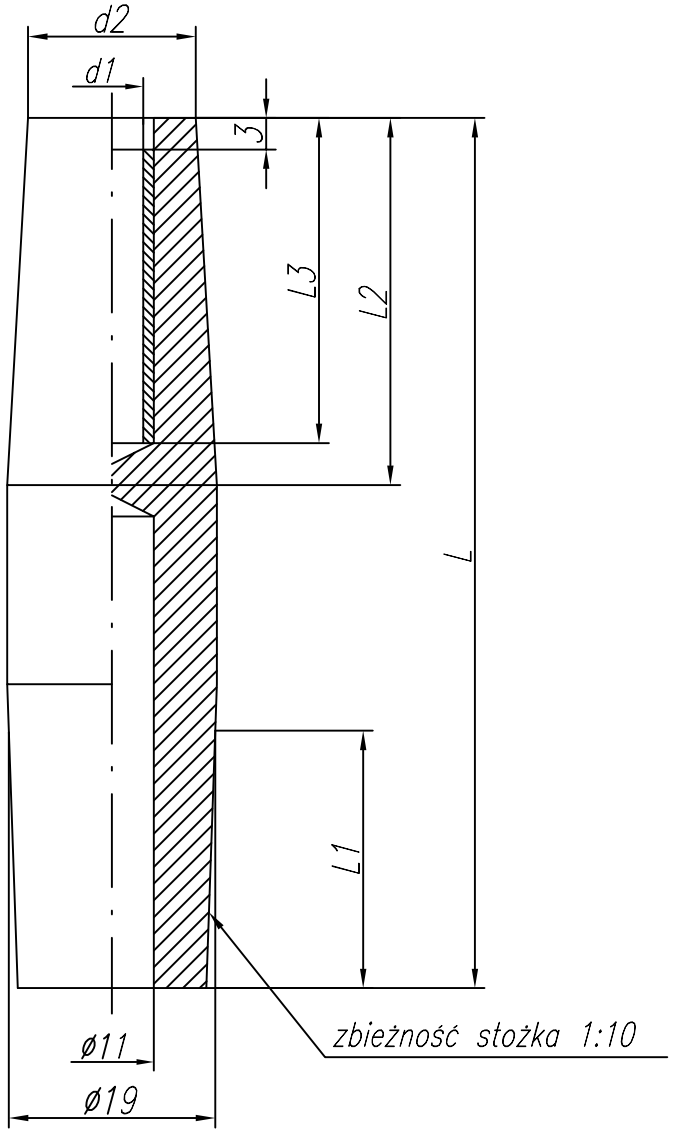
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L3	d1	L1	d2	L2		Cecha	Nr rysunku
1	35	20	ø12	8	ø21,9	4		A-75-0	2-9-1622-08-0
2	35	20	ø9	7	ø19,6	3,5		A-75-1	2-9-1622-08-1
3	35	20	–	–	ø13,4	7		A-75-2	2-9-1622-08-2
4	65	20	–	–	ø14	4		A-75-3	2-9-1622-08-3
5	70	30	–	–	–	–		A-75-4	2-9-1622-08-4
6	70	30			ø16,5	4		A-75-5	2-9-1622-08-5

Aspa
ZGRZEWANIE

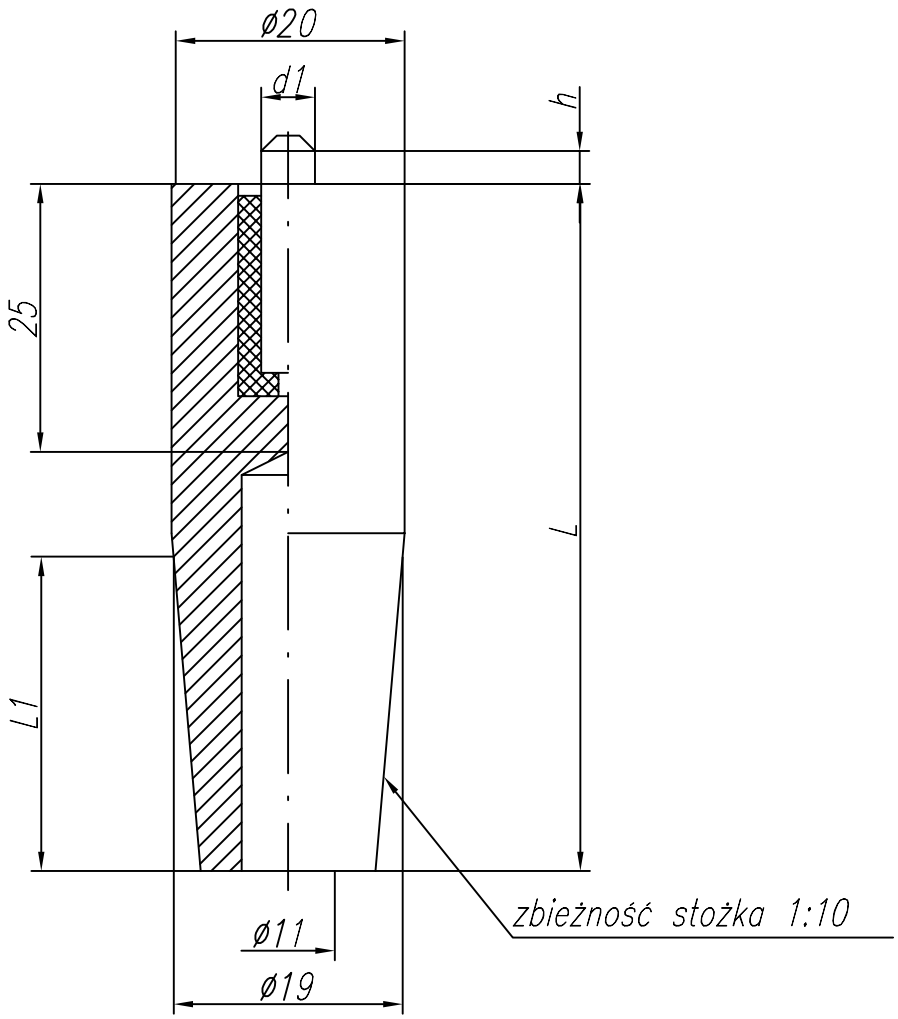
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3	d1	d2		Cecha	Nr rysunku
1	85	25	40	30	ø6,2	ø18		A-76-0	2-7-1197-10-0
2	80	30	–	30	ø6,5	ø20		A-76-1	2-7-1197-10-1
3	80	30	–	33	ø8,5	ø20		A-76-2	2-7-1197-10-2
4	85	30	–	35	ø6,5	ø20		A-76-3	2-7-1197-10-3
5	90	30	–	45	ø8,5	ø20		A-76-4	2-7-1197-10-4
6	100	30	–	50	ø6,5	ø20		A-76-5	2-7-1197-10-5
7	100	30	–	55	ø8,5	ø20		A-76-6	2-7-1197-10-6
7	90	30	53	53	ø10,5	ø25		A-76-7	2-7-1197-10-7
7	90	30	53	53	ø12,5	ø25		A-76-8	2-7-1197-10-8
7	65	30	–	28	ø4	ø20		A-76-9	2-7-1197-10-9
7	100	30	65	63	ø10,5	ø25		A-76-10	2-7-1197-10-10
7	70	30	30	20	ø12,5	ø25		A-76-11	2-7-1197-10-11
7	80	30	40	30	ø16,5	ø25		A-76-12	2-7-1197-10-12

Aspa
ZGRZEWANIE

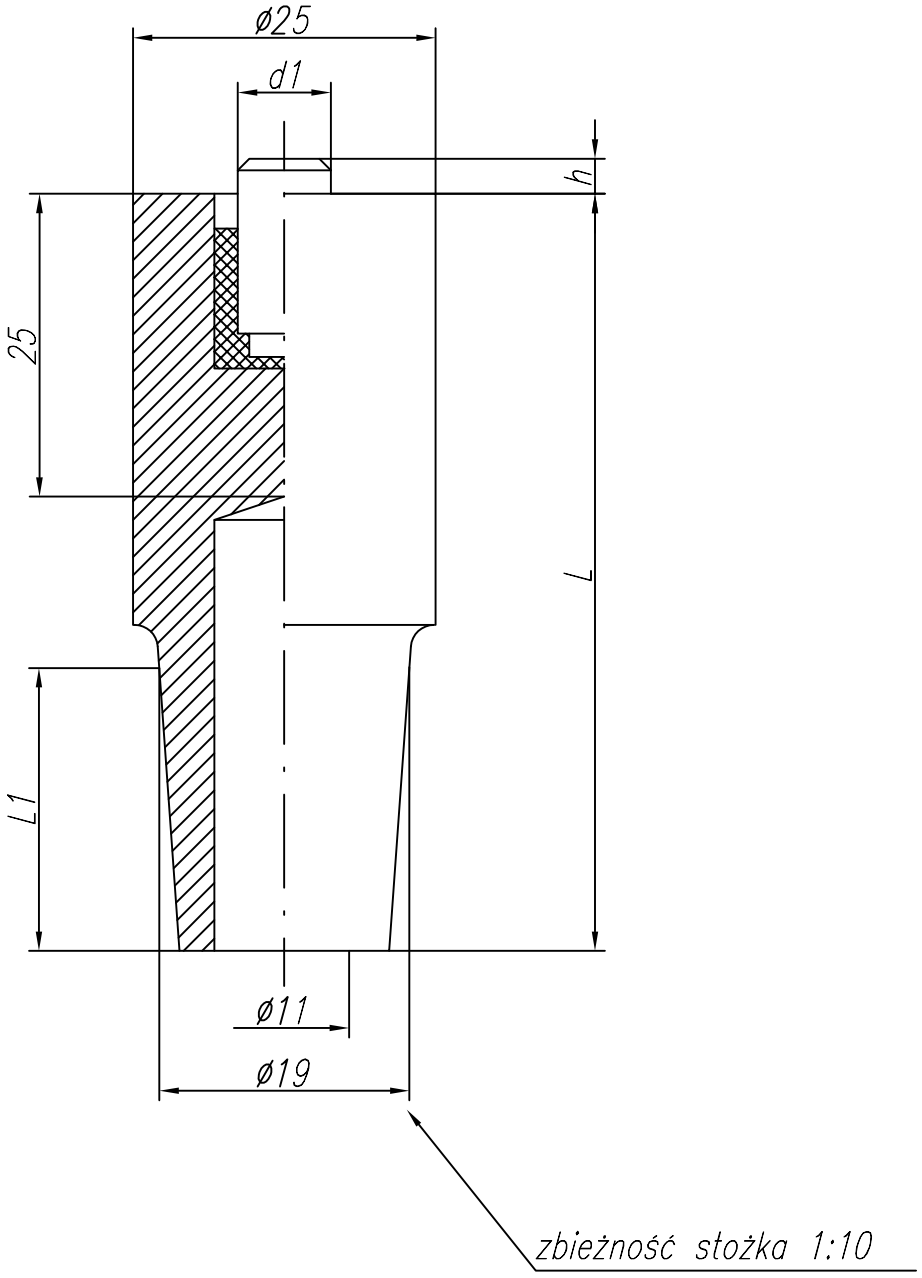
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	h		Cecha	Nr rysunku
1	65	20	ø4,6	4		A-77-0	2-7-1197-20-0
2	65	30	ø4	4		A-77-1	2-7-1197-20-1
3	65	30	ø6,4	4		A-77-2	2-7-1197-20-2
4	80	30	ø5	4		A-77-3	2-7-1197-20-3
5	80	30	ø6,4	4		A-77-4	2-7-1197-20-4

Aspa
ZGRZEWANIE

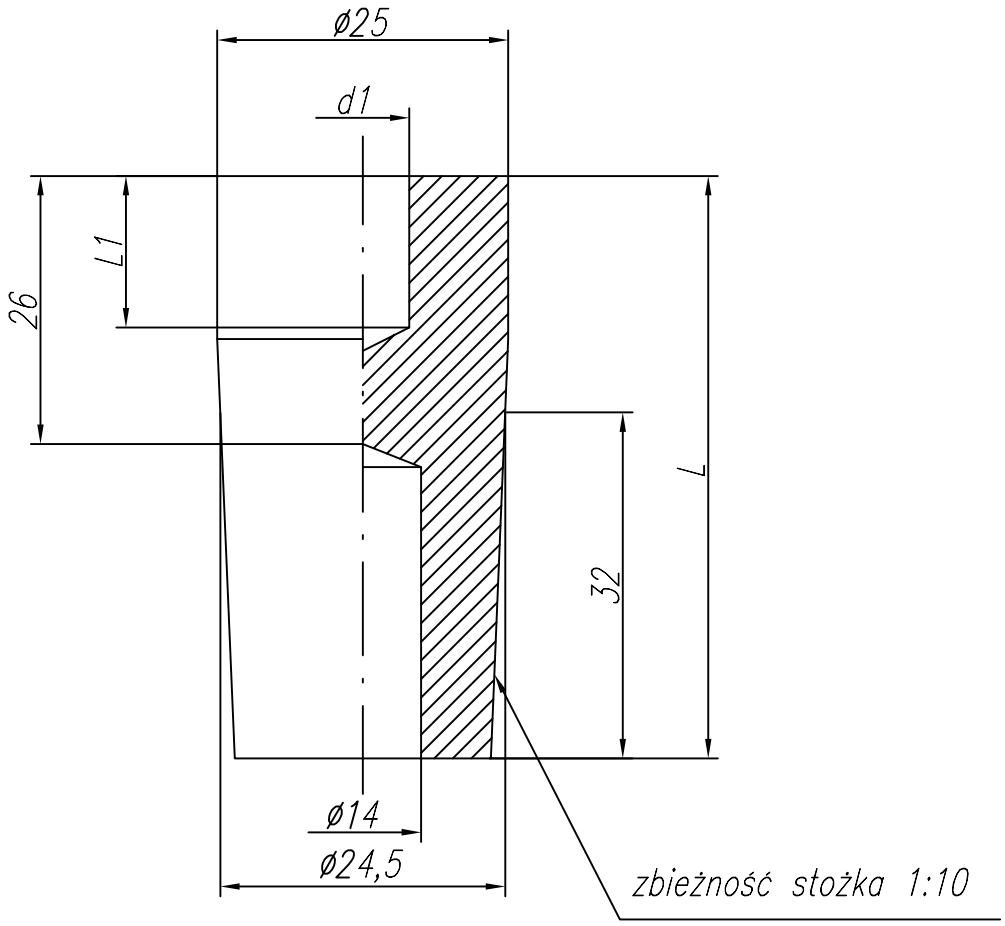
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	h		Cecha	Nr rysunku
1	65	30	ø8,4	4		A-78-0	2-7-1197-04-0
2	65	20	ø9,9	4		A-78-1	2-7-1197-04-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

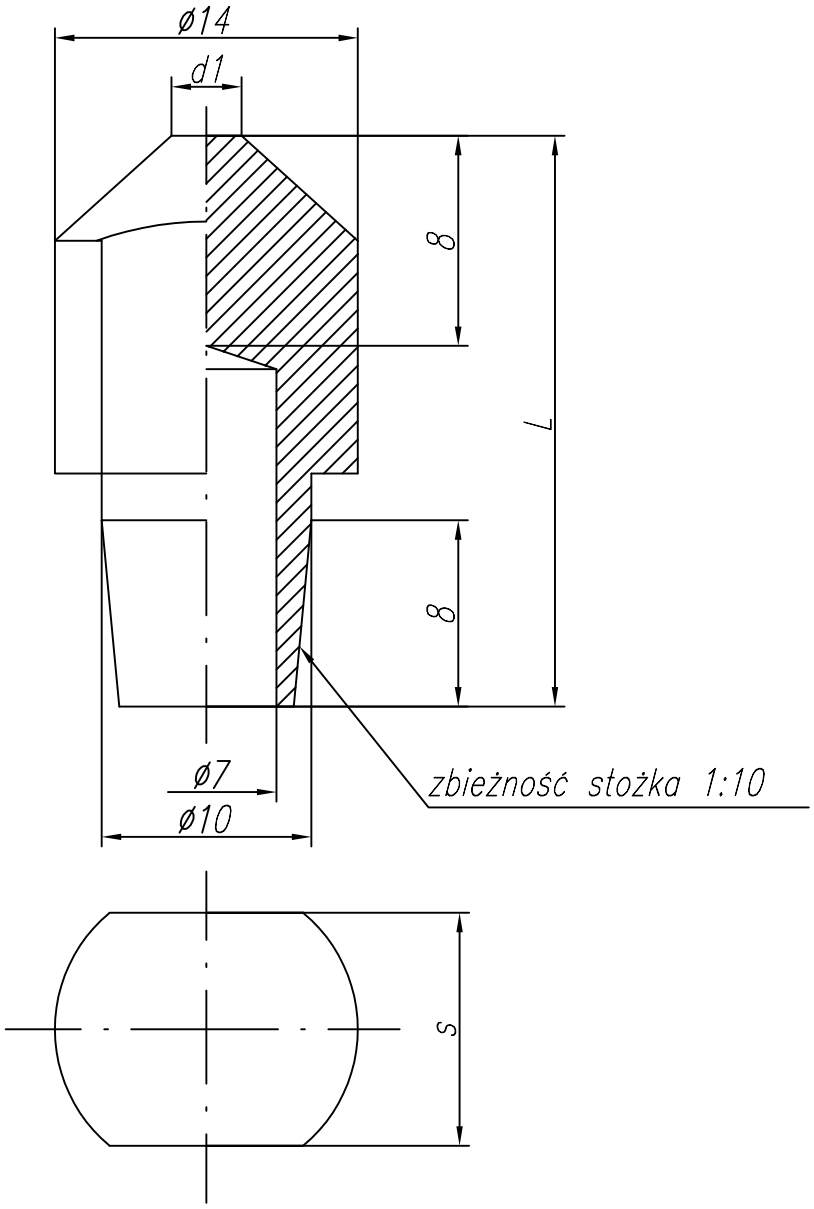


Lp	L	L1	d1		Cecha	Nr rysunku
1	50	12	ø8		A-79-0	2-9-1622-46-0

Elektrody nasadkowe z zewnętrznym chwytem stożkowym

Aspa
ZGRZEWANIE

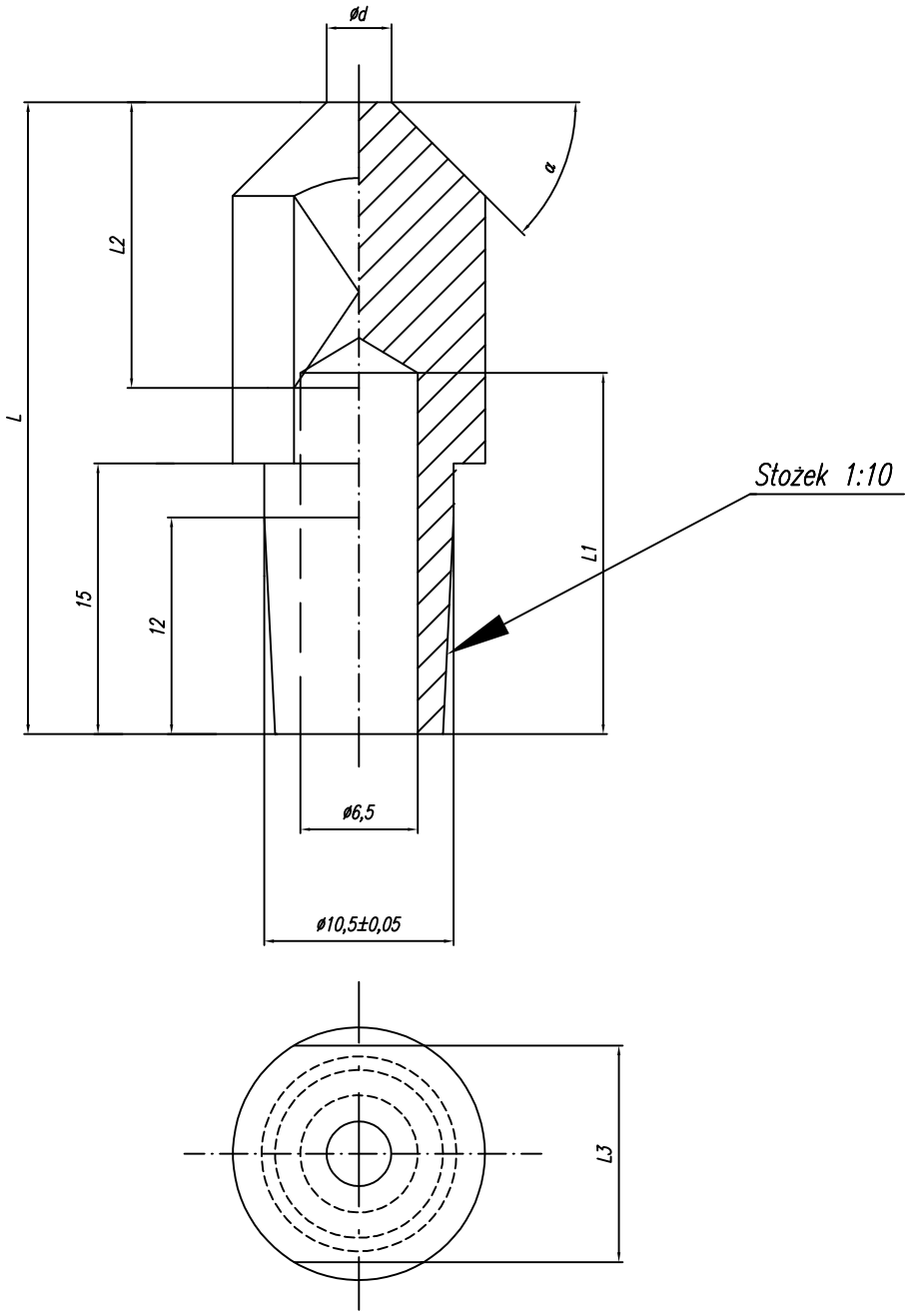
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	s		Cecha	Nr rysunku
1	25	ø4	10		C-01-0	2-9-1622-97-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

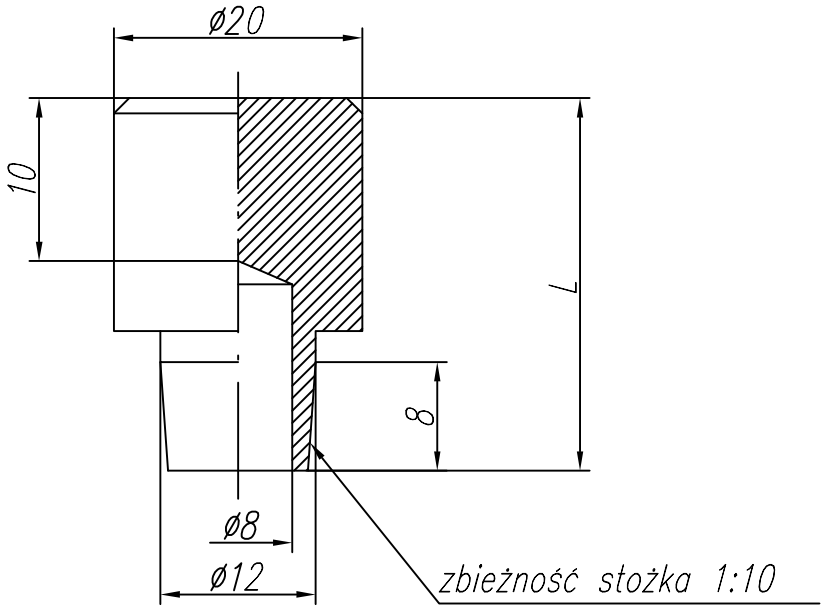


Lp	L	L1	α	ød	L3	L2	Cecha	Nr rysunku
1	35	20	45°	3,6	12	15	C-02-0	2-9-1622-41-0
2	50	20	--	14	12	15	C-02-1	2-9-1622-41-1
3	25	15	45°	2,5	12	10	C-02-2	2-9-1622-41-2
4	35	20	--	14	12	15	C-02-3	2-9-1622-41-3
5	25	15	45°	3,6	12	10	C-02-4	2-9-1622-41-4
6	55	20	45°	3,6	--	--	C-02-5	2-9-1622-41-5
7	23,35	19	45°	3,2	4,35	11	C-02-6	2-9-1622-41-6

Aspa
ZGRZEWANIE

KATALOG

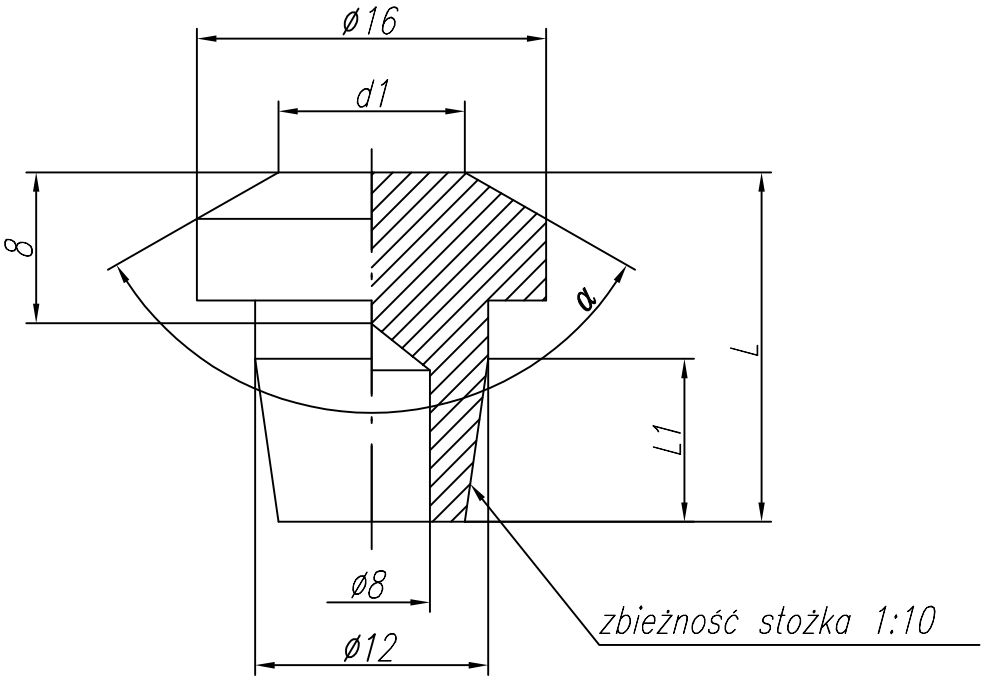
elektrod do zgrzewania oporowego



Lp	L			Cecha	Nr rysunku
1	30			C-03-0	2-9-1622-45-0

Aspa
ZGRZEWANIE

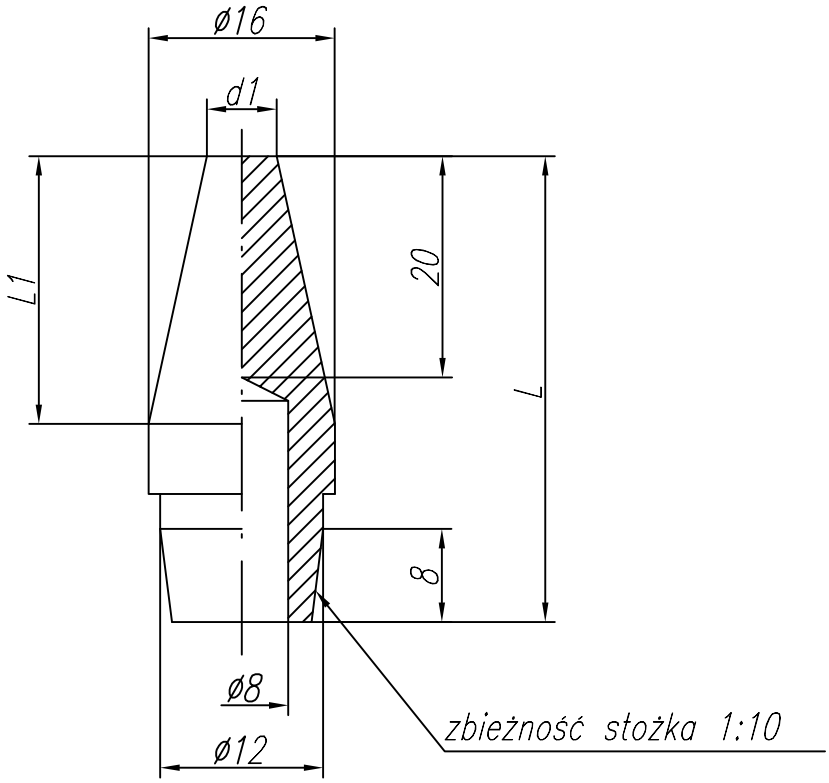
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	α		Cecha	Nr rysunku
1	15	6	ø8	120°		C-04-0	2-9-1622-31-1
2	20	8	ø5	90°		C-04-1	2-9-1622-31-2

Aspa
ZGRZEWANIE

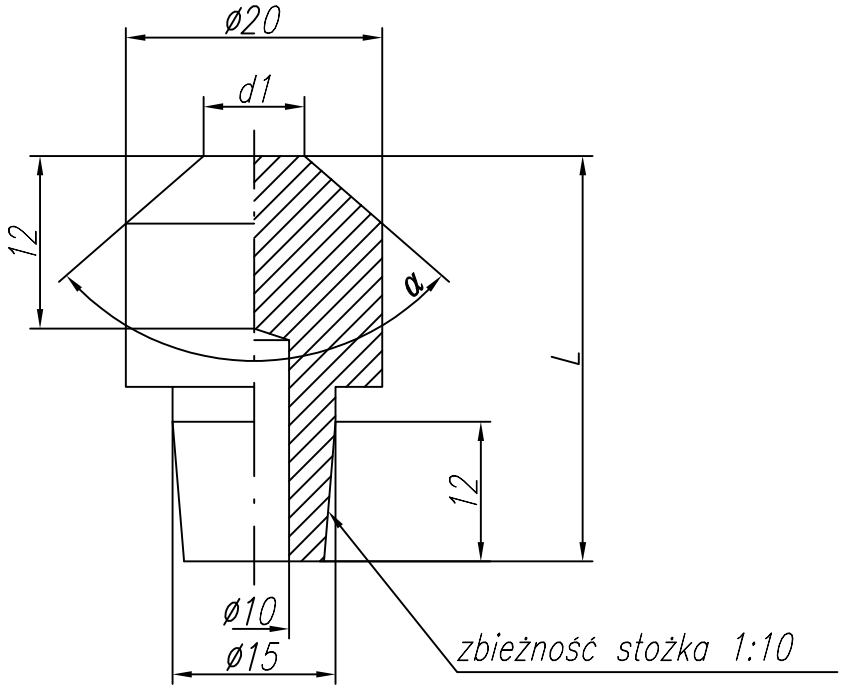
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	L1		Cecha	Nr rysunku
1	40	ø6	25		C-05-0	2-9-1622-44-0

Aspa
ZGRZEWANIE

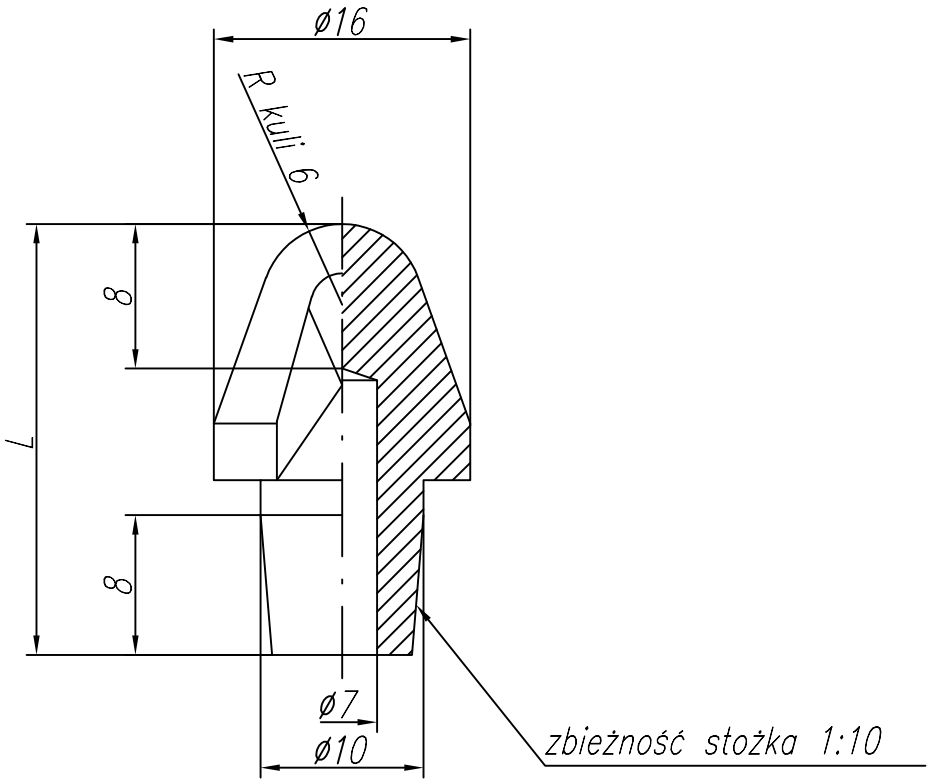
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	α		Cecha	Nr rysunku
1	30	ø5	90°		C-07-0	2-9-1622-12-0
2	35	ø17	10°		C-07-1	2-9-1622-12-1

Aspa
ZGRZEWANIE

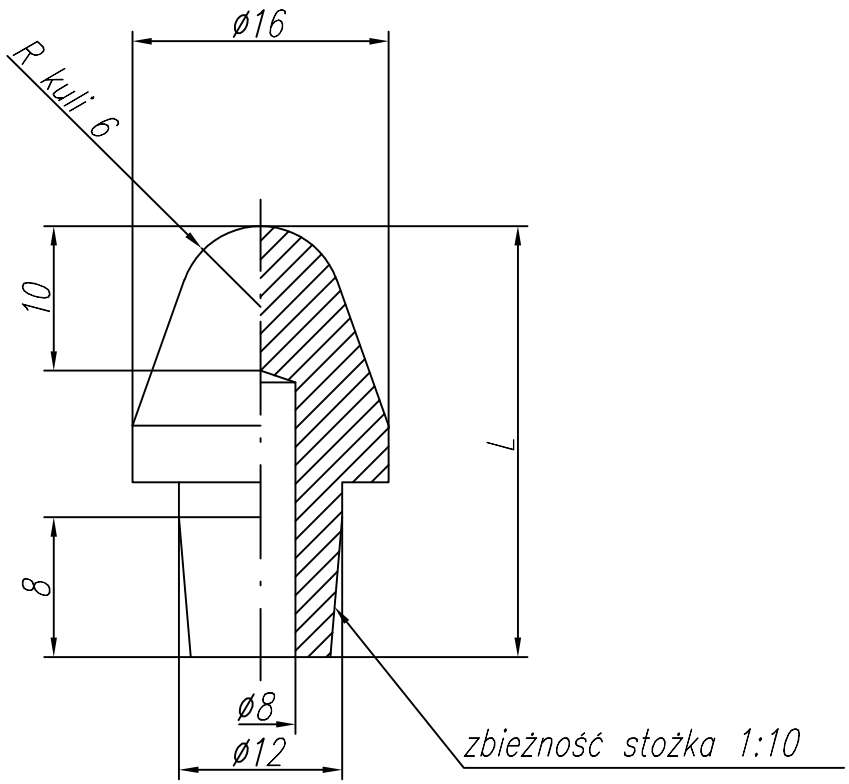
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	25		C-10-0	2-9-1622-19-0

Aspa
ZGRZEWANIE

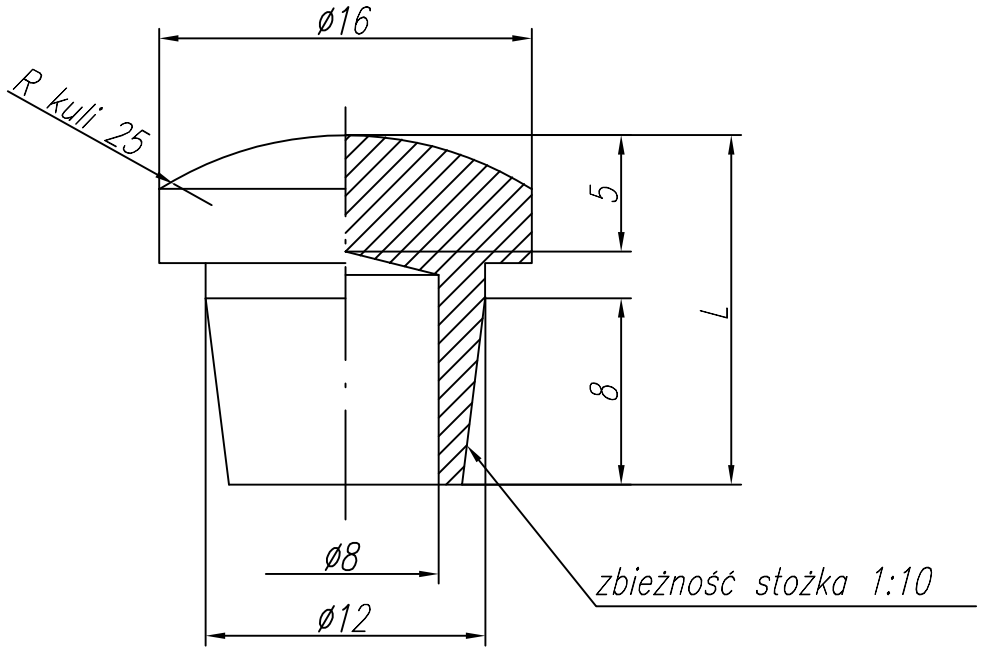
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	25		C-13-0	2-9-1622-01-0
2	30		C-13-1	2-9-1622-01-1
3	20		C-13-2	2-9-1622-01-2

Aspa
ZGRZEWANIE

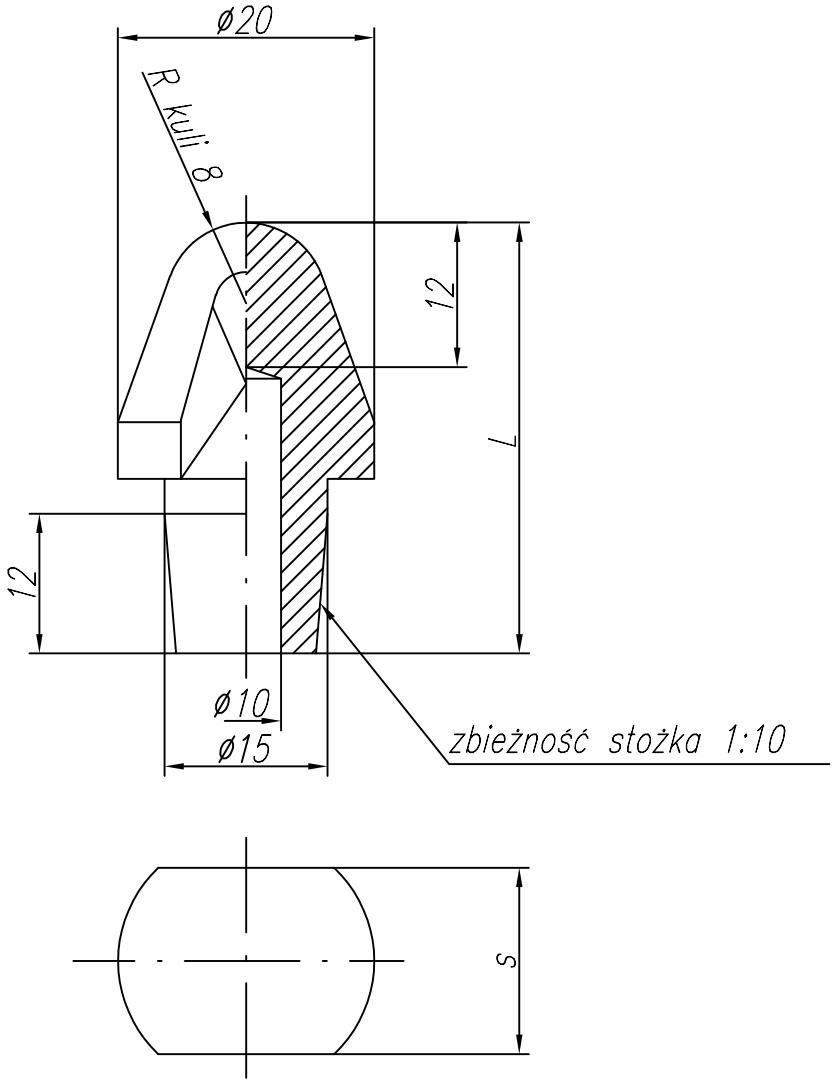
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	15		C-14-0	2-9-1622-96-0

Aspa
ZGRZEWANIE

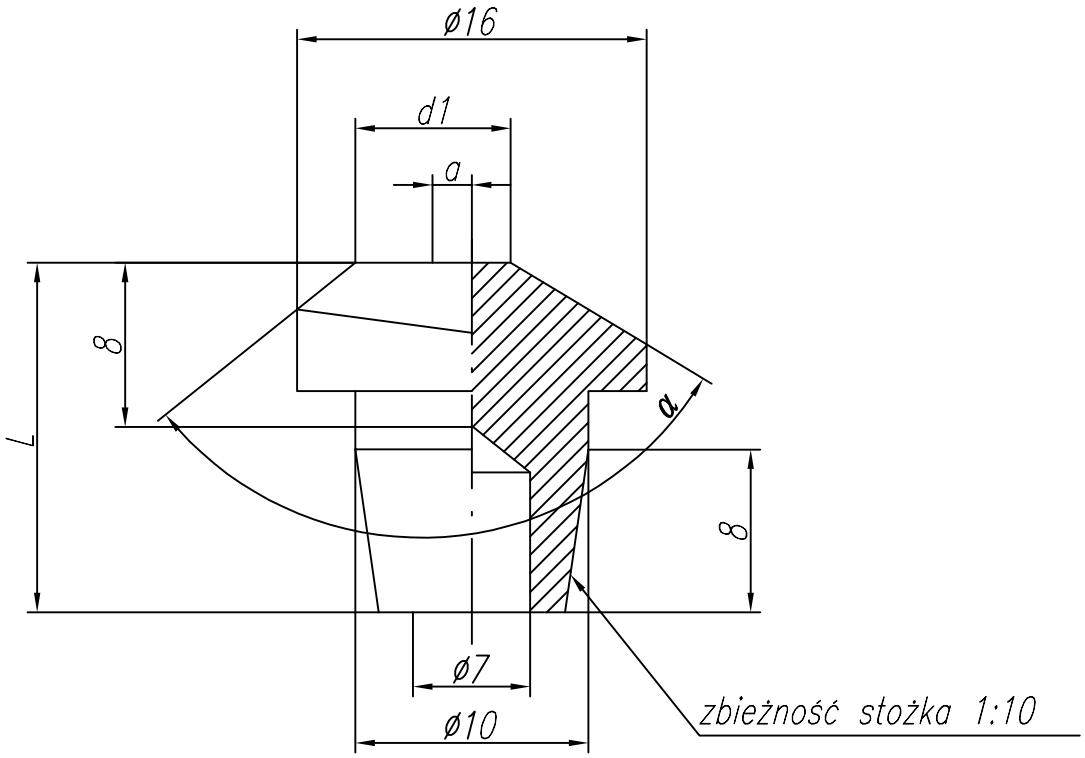
KATALOG
elektrod do zgrzewania oporowego



Lp	L	s		Cecha	Nr rysunku
1	40	17		C-17-0	2-9-1622-27-0

Aspa
ZGRZEWANIE

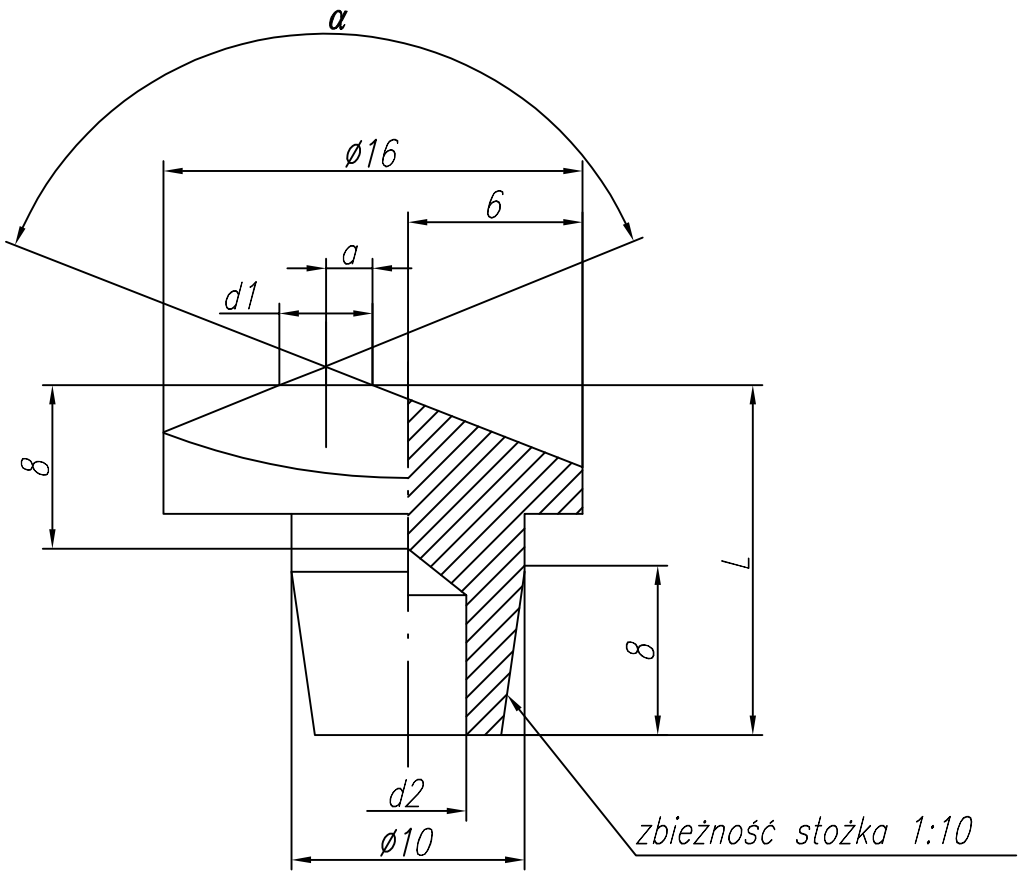
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a	α		Cecha	Nr rysunku
1	17	ø6	4,5	120°		C-30-0	2-9-1622-15-0
2	25	ø6	4,5	90°		C-30-4	2-9-1622-15-4

Aspa
ZGRZEWANIE

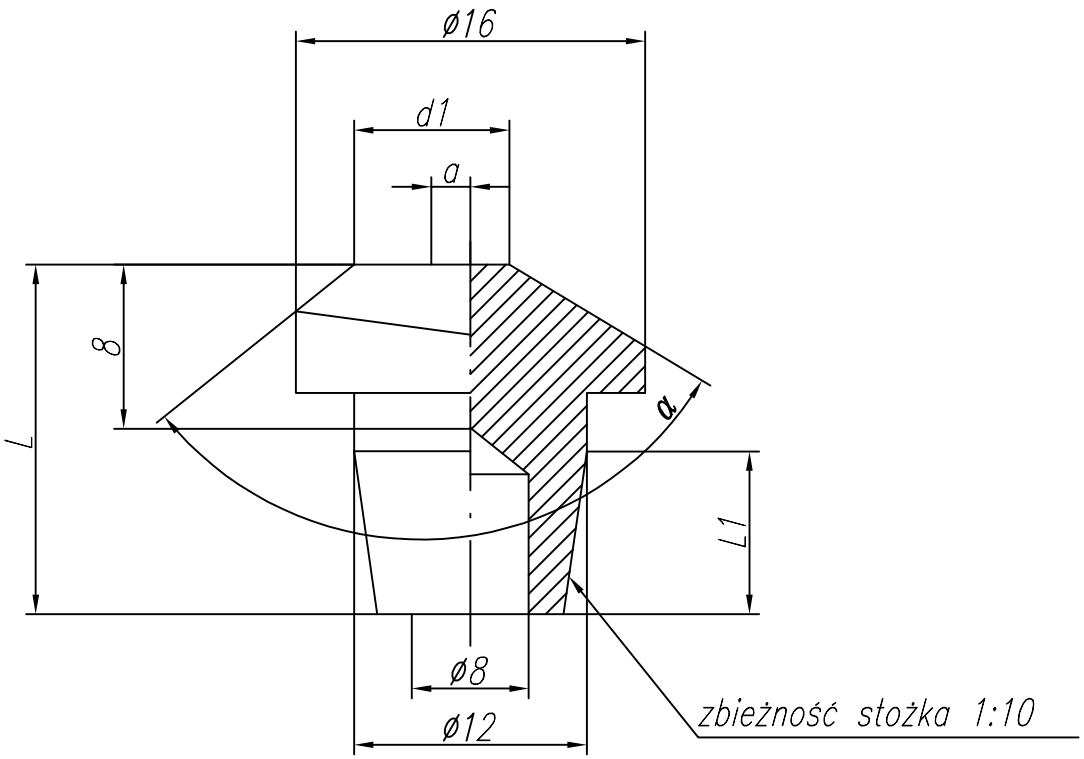
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a	α	d2		Cecha	Nr rysunku
1	15	ø4	5	150°	bez otworu		C-32-0	2-9-1622-43-0

Aspa
ZGRZEWANIE

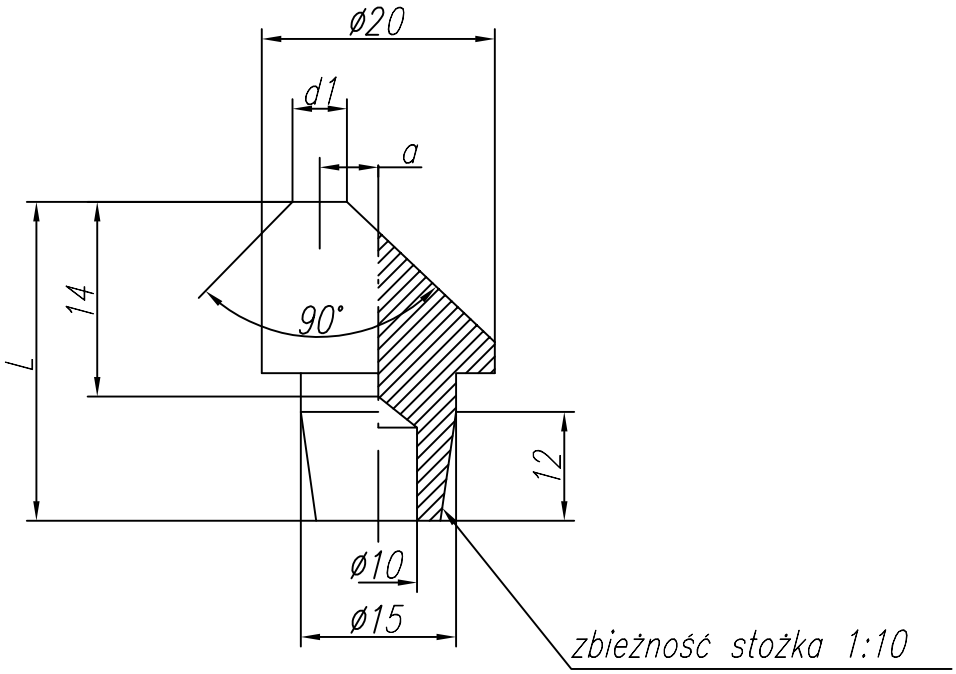
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	a	α		Cecha	Nr rysunku
1	17	8	ø6	4	120°		C-33-0	2-9-1622-15-1
2	25	8	ø4	4	90°		C-33-1	2-9-1622-15-2
3	15	6	ø8	3	120°		C-33-2	2-9-1622-15-3
4	25	8	ø6	4	90°		C-33-3	2-9-1622-15-5

Aspa
ZGRZEWANIE

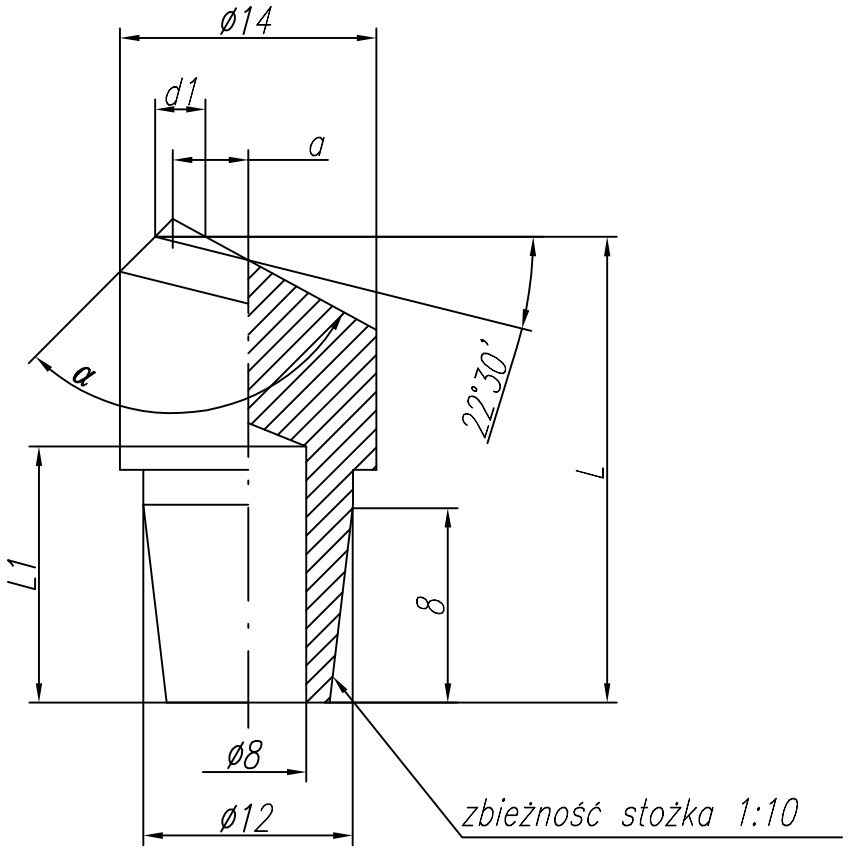
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a		Cecha	Nr rysunku
1	30	ø5	5		C-37-0	2-9-1622-14-0

Aspa
ZGRZEWANIE

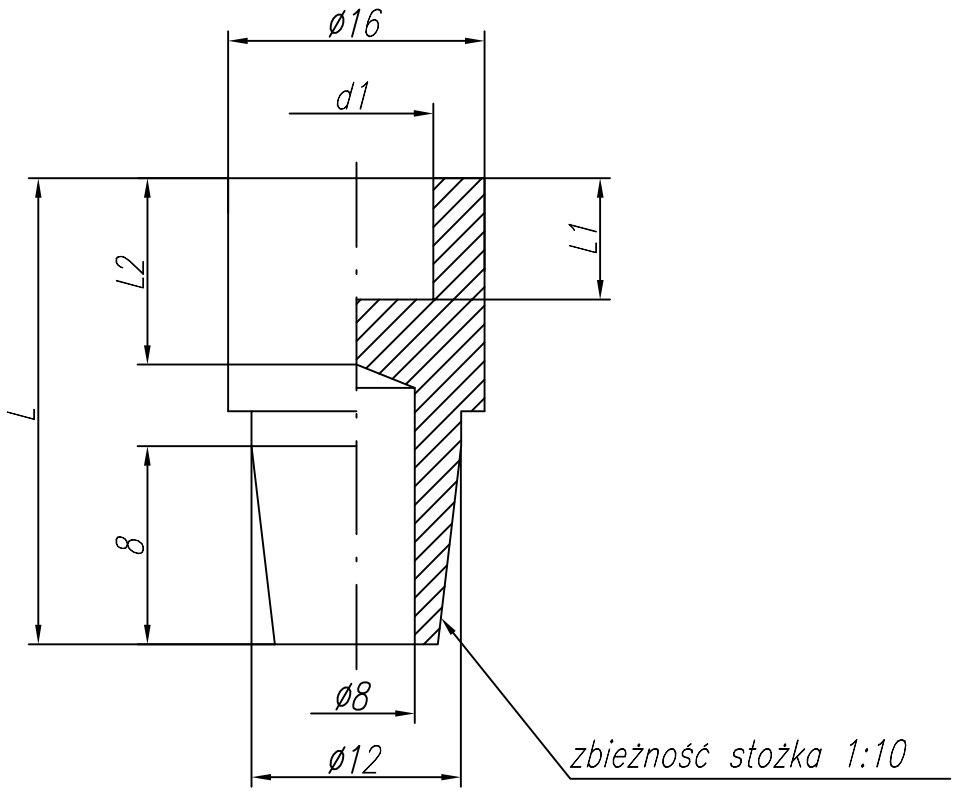
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	a	α	L1		Cecha	Nr rysunku
1	17	ø5	3	120°	9		C-43-0	2-9-1622-21-0
2	24	ø4	3	90°	12		C-43-1	2-9-1622-21-1
3	40	ø4	3	90°	28		C-43-2	2-9-1622-21-2

Aspa
ZGRZEWANIE

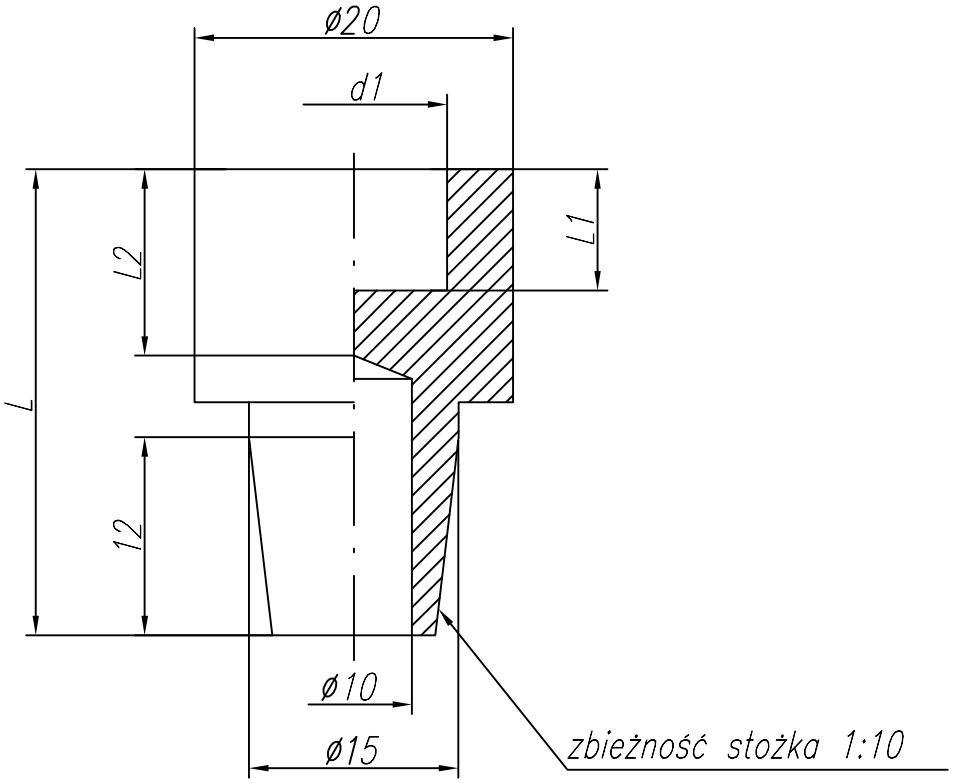
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	L1	L2		Cecha	Nr rysunku
1	25	ø8,5	10	15		C-53-0	2-9-1622-13-0
2	20	–	–	10		C-53-1	2-9-1622-13-1

Aspa
ZGRZEWANIE

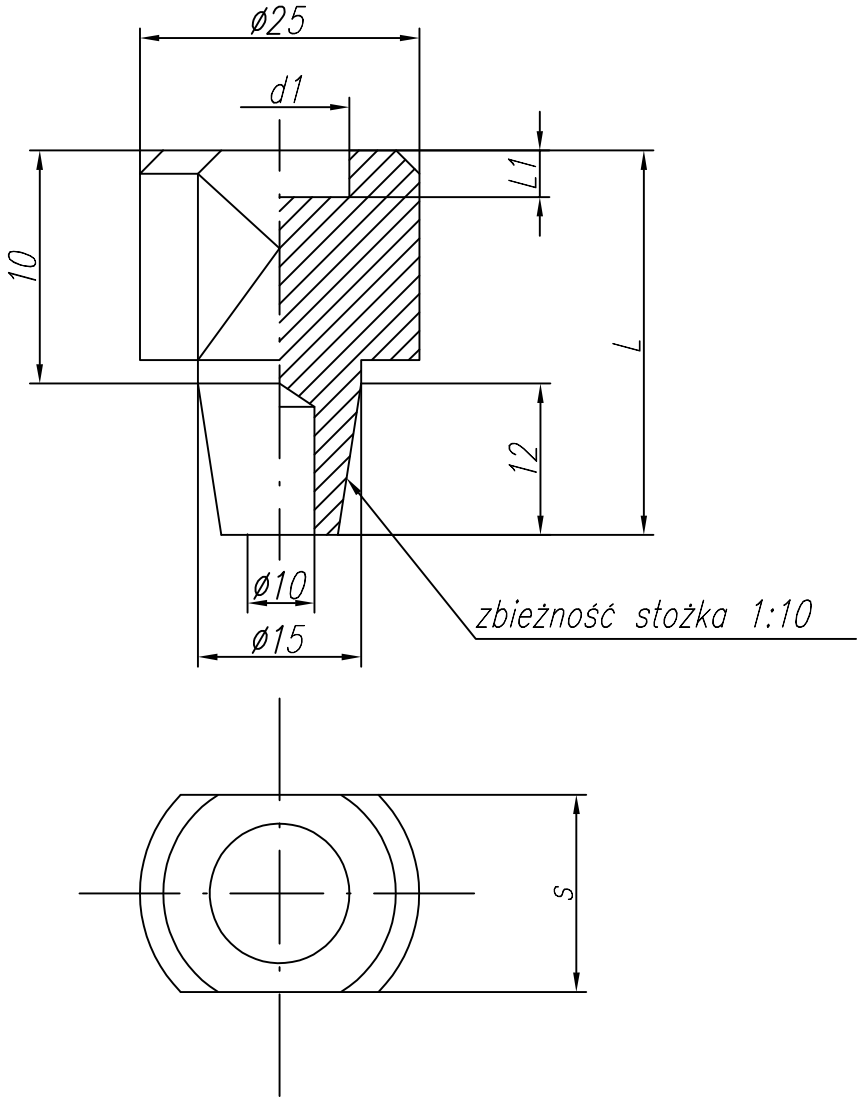
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	L1	L2		Cecha	Nr rysunku
1	30	ø9,5	10	15		C-57-0	2-9-1622-04-0
2	30	ø11,5	10	15		C-57-1	2-9-1622-04-1
3	30	–	–	10		C-57-2	2-9-1622-04-2

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego



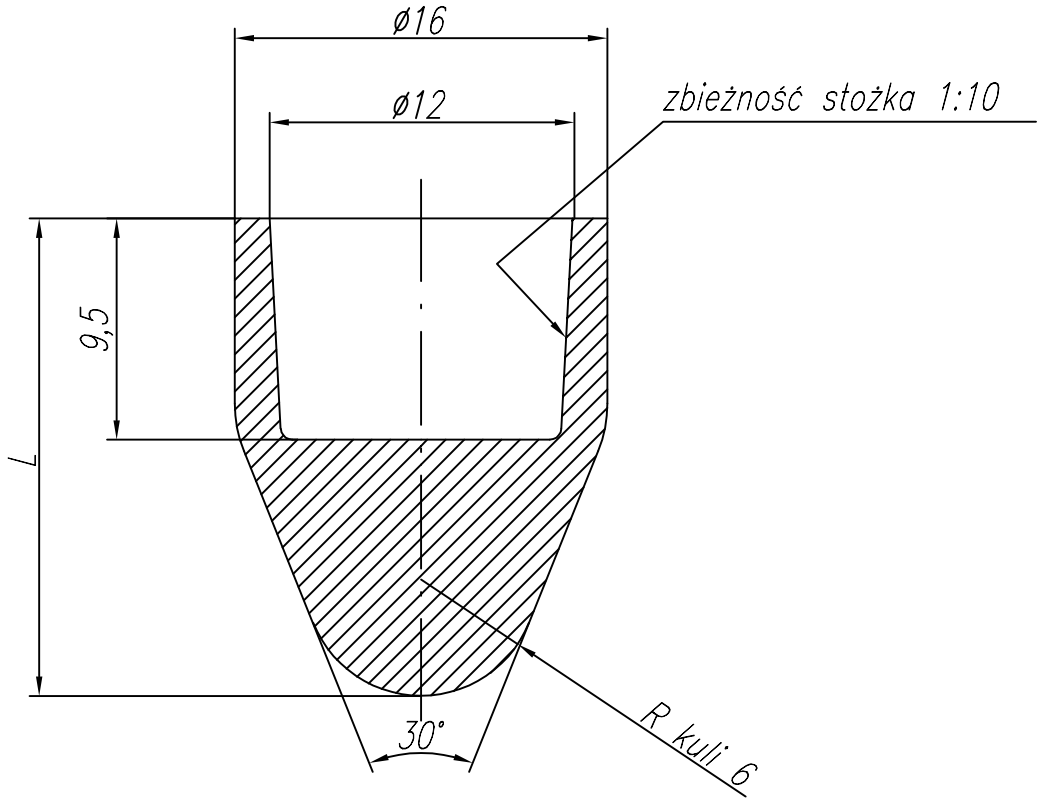
Lp	L	d1	L1	s		Cecha	Nr rysunku
1	30	ø16,5	4	20		C-58-0	2-9-1622-06-0
2	30	ø15,2	4	20		C-58-1	2-9-1622-06-1
3	30	–	–	–		C-58-2	2-9-1622-06-2

Elektrody nasadkowe z wewnętrznym chwytem stożkowym

Aspa
ZGRZEWANIE

KATALOG

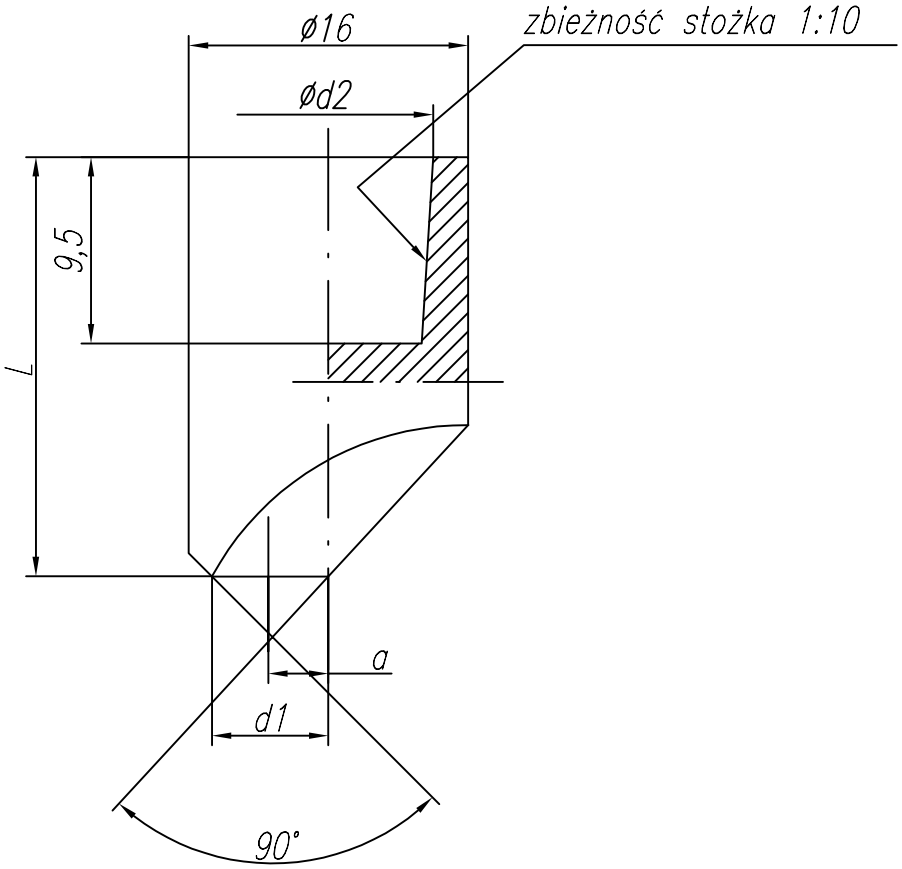
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	20		D-03-0	2-9-3112-04-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

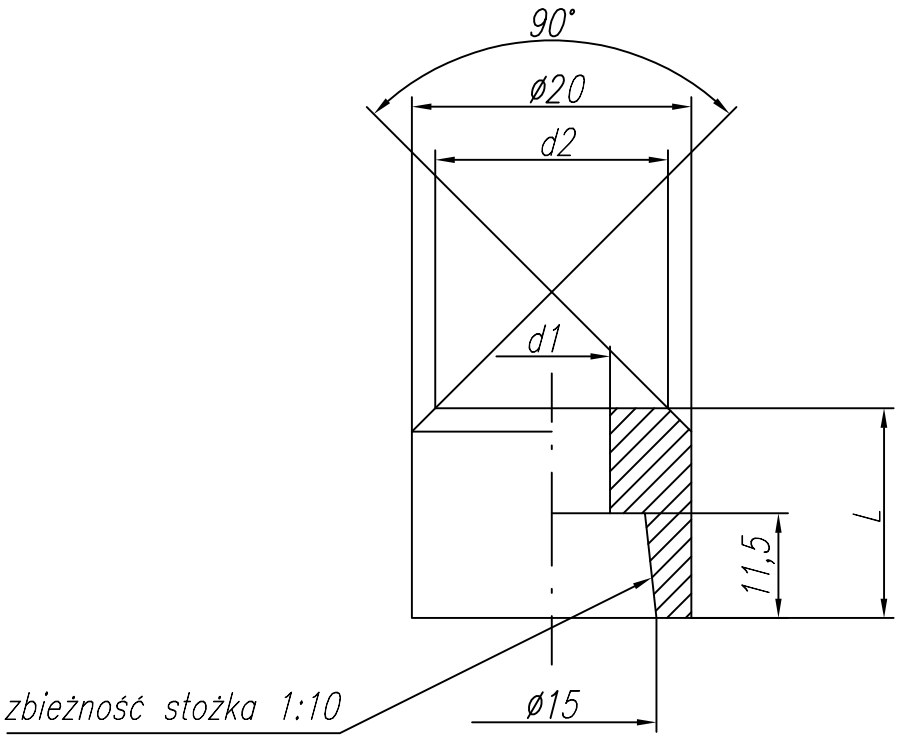


Lp	L	d1	a	d2		Cecha	Nr rysunku
1	20	ø6	4	ø12		D-05-0	2-9-3112-06-0
2	20	ø6	4	ø10,5		D-05-1	2-9-3112-06-1

Aspa
ZGRZEWANIE

KATALOG

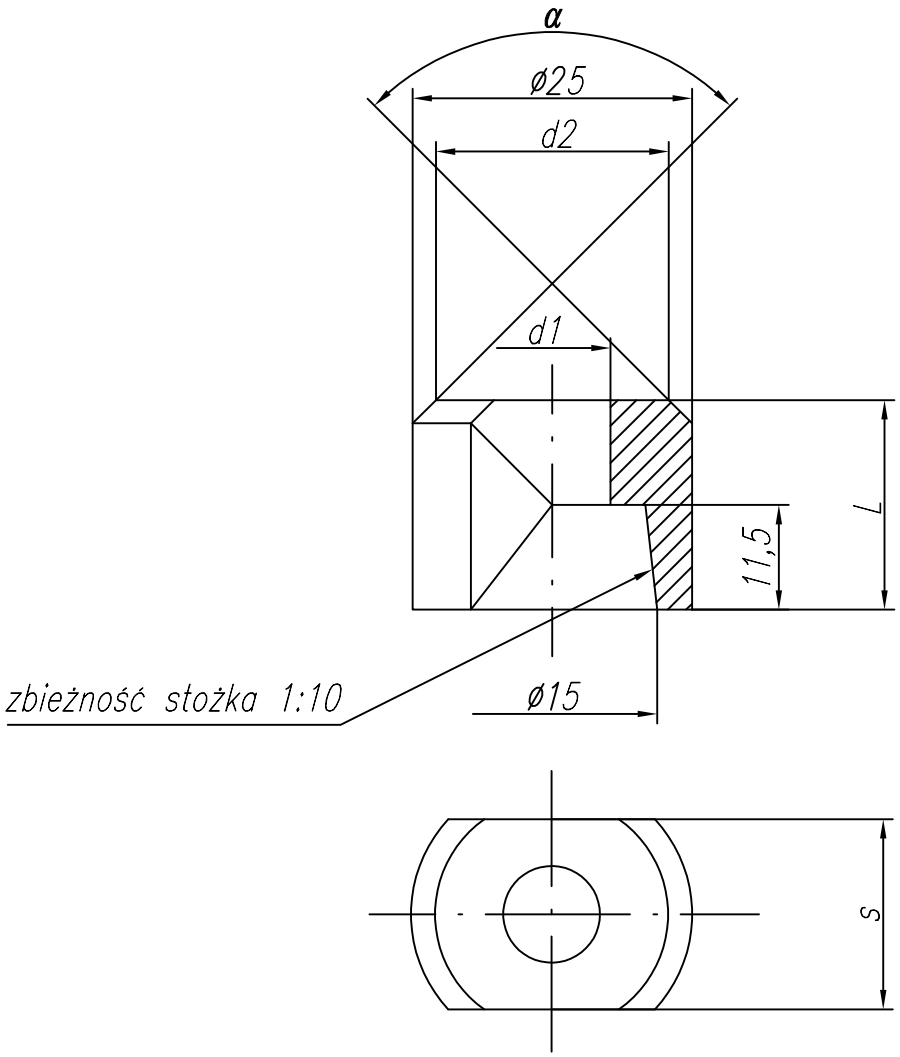
elektrod do zgrzewania oporowego



Lp	L	d1	d2		Cecha	Nr rysunku
1	15	ø6,6	ø19		D-07-0	2-9-3112-02-0
2	15	ø8,5	ø16		D-07-1	2-9-3112-02-1
3	15	ø9,5	ø16		D-07-2	2-9-3112-02-2

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego



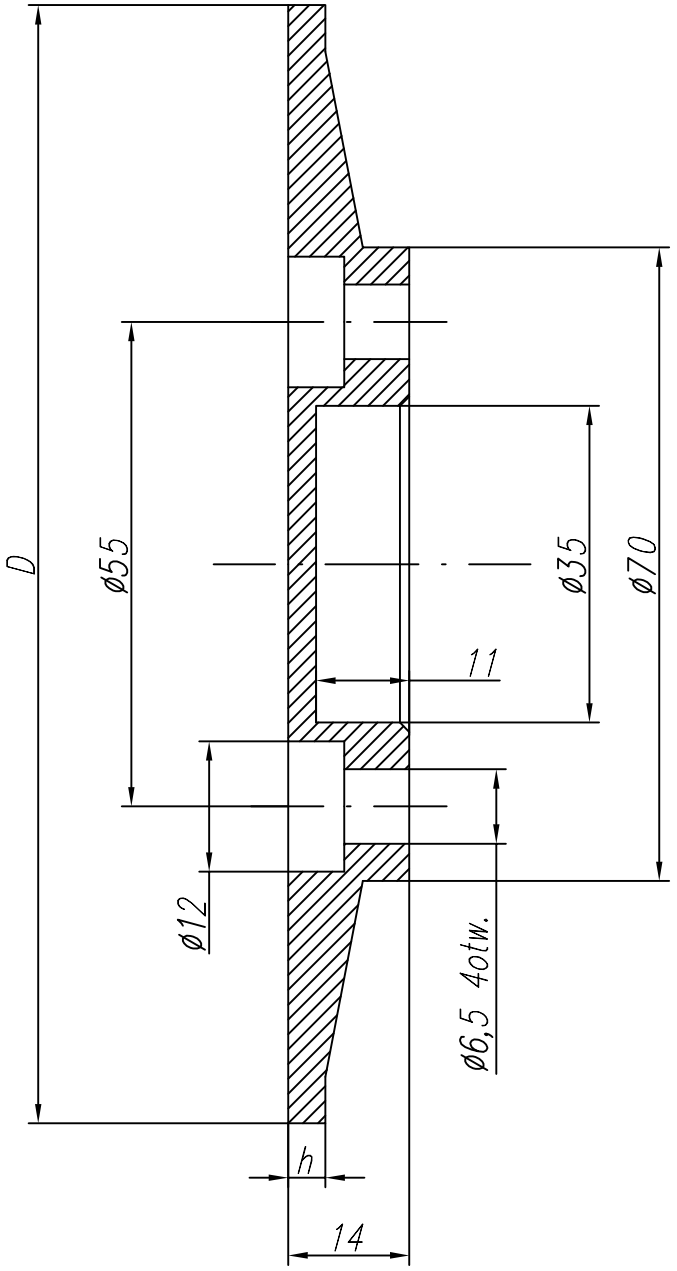
Lp	L	d1	d2	α	s		Cecha	Nr rysunku
1	15	ø6,1	ø15	120°	20		D-08-0	2-9-3112-01-0
2	15	ø10,5	ø21	90°	20		D-08-1	2-9-3112-01-1

Elektrody krążkowe

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego

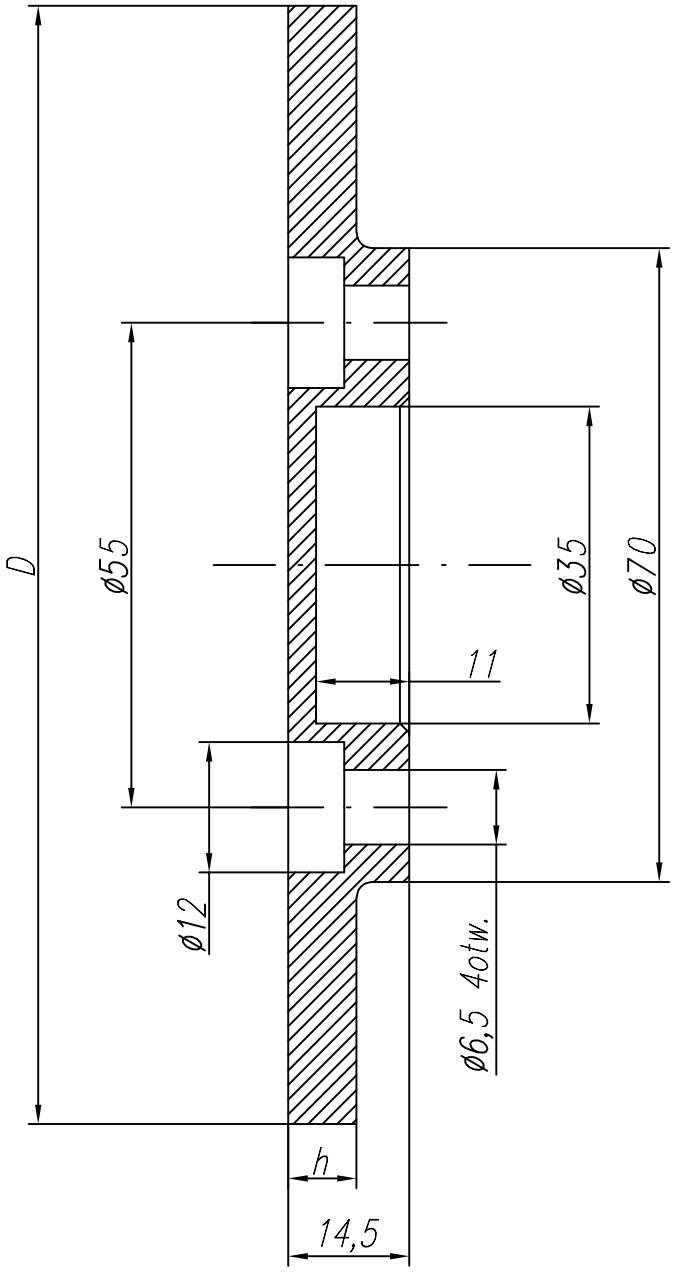


Lp	D	h		Cecha	Nr rysunku
1	ø125	4		L-01-0	2-9-3222-01-0

Aspa
ZGRZEWANIE

KATALOG

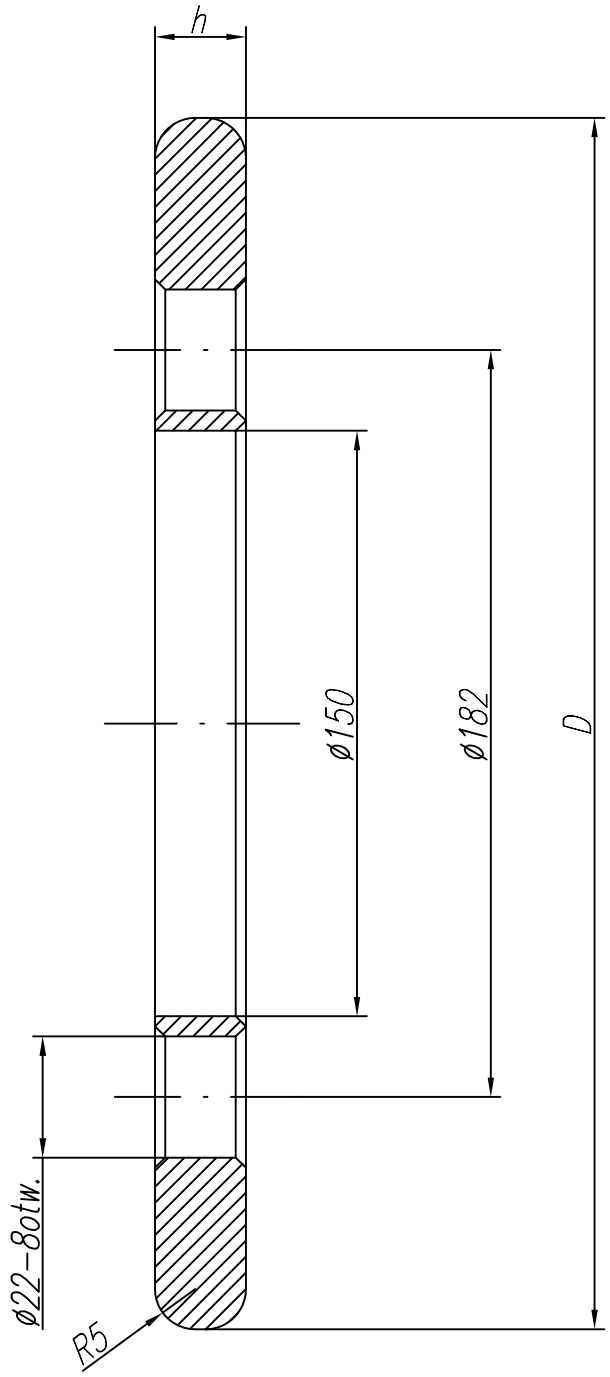
elektrod do zgrzewania oporowego



Lp	D	h		Cecha	Nr rysunku
1	ø115	7		L-02-0	2-9-3222-03-0

Aspa
ZGRZEWANIE

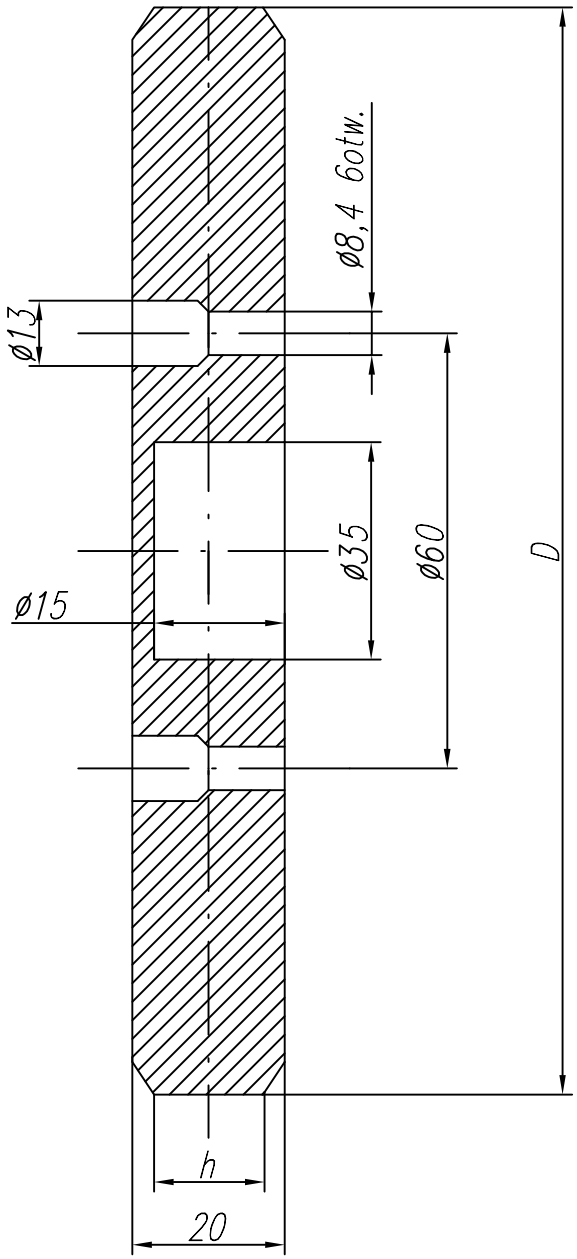
KATALOG
elektrod do zgrzewania oporowego



Lp	D	h		Cecha	Nr rysunku
1	ø300	6		L-03-0	2-9-3222-02-0

Aspa
ZGRZEWANIE

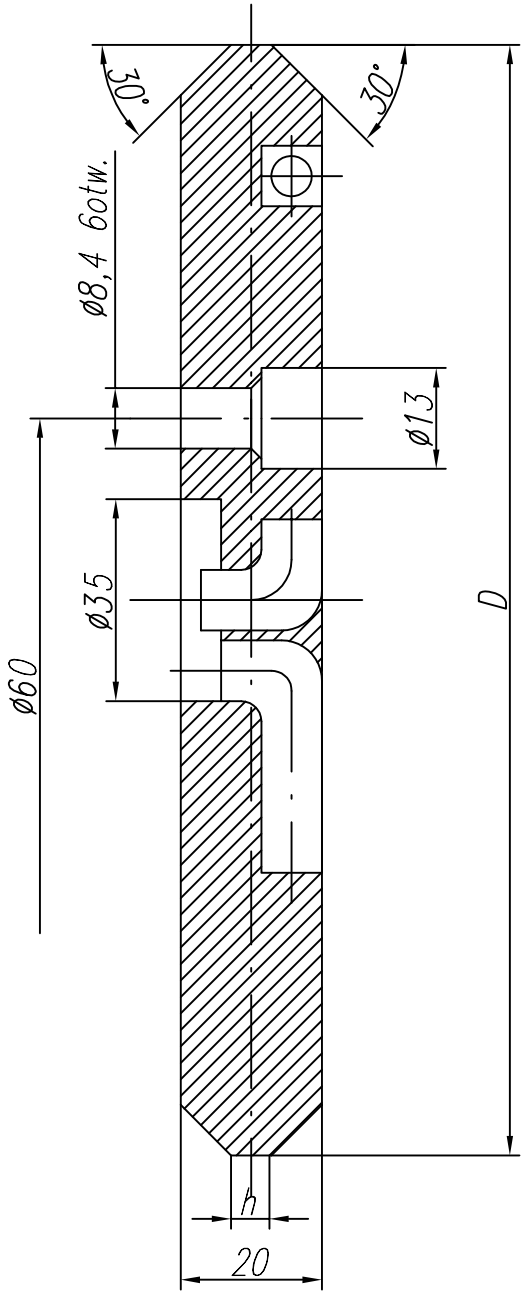
KATALOG
elektrod do zgrzewania oporowego



Lp	D	h		Cecha	Nr rysunku
1	ø210	7		L-04-0	2-9-3002-01-0
2	ø180	7		L-04-1	2-9-3002-01-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

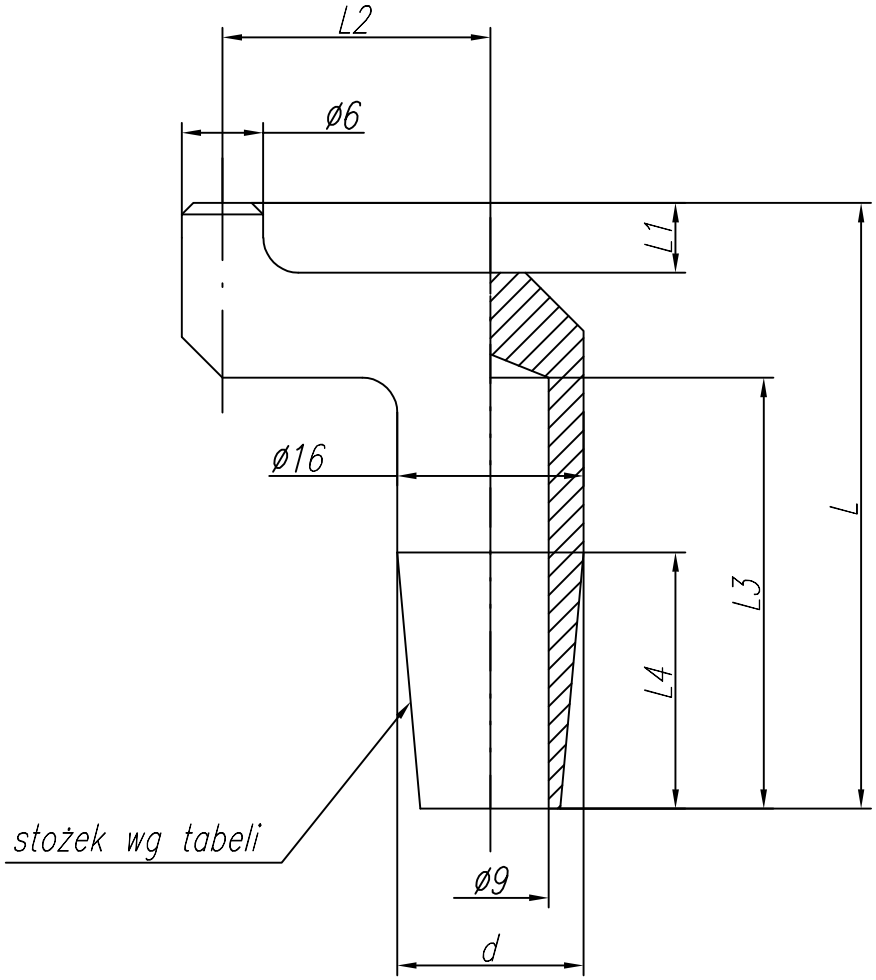


Lp	D	h	α		Cecha	Nr rysunku
1	ø210	4	30°		L-07-0	2-7-1495-01-0
2	ø300	4	30°		L-07-1	2-7-1495-01-1
4	ø210	20	--		L-07-3	2-7-1495-01-3

Elektrody kształtowe

Aspa
ZGRZEWANIE

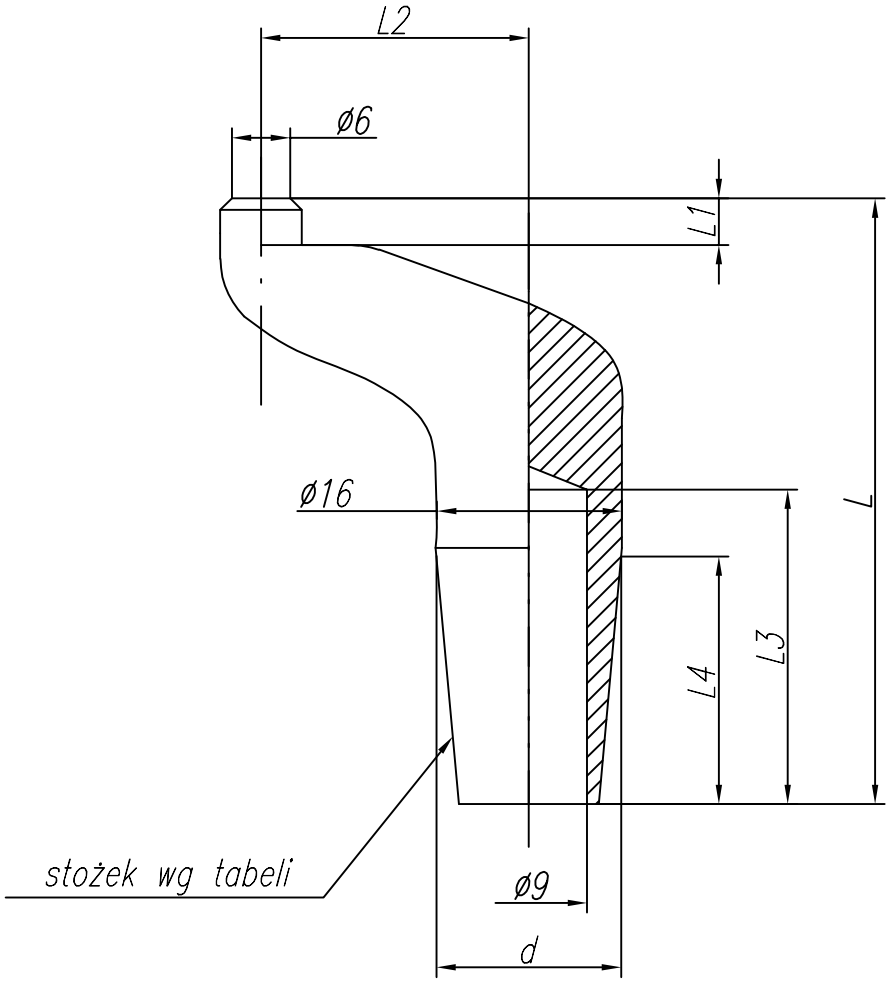
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L4	L1	L2	d	L3	Stożek	Cecha	Nr rysunku
1	55	25	7	25	ø16	40	Morse'a Nr2	F-01-0	2-9-2902-02-0
2*	65	32	7	25	ø15,5	50	1:10	F-01-1	2-9-2902-02-1
3	55	23	7	25	ø15,5	40	1:10	F-01-2	2-9-2902-02-2

Aspa
ZGRZEWANIE

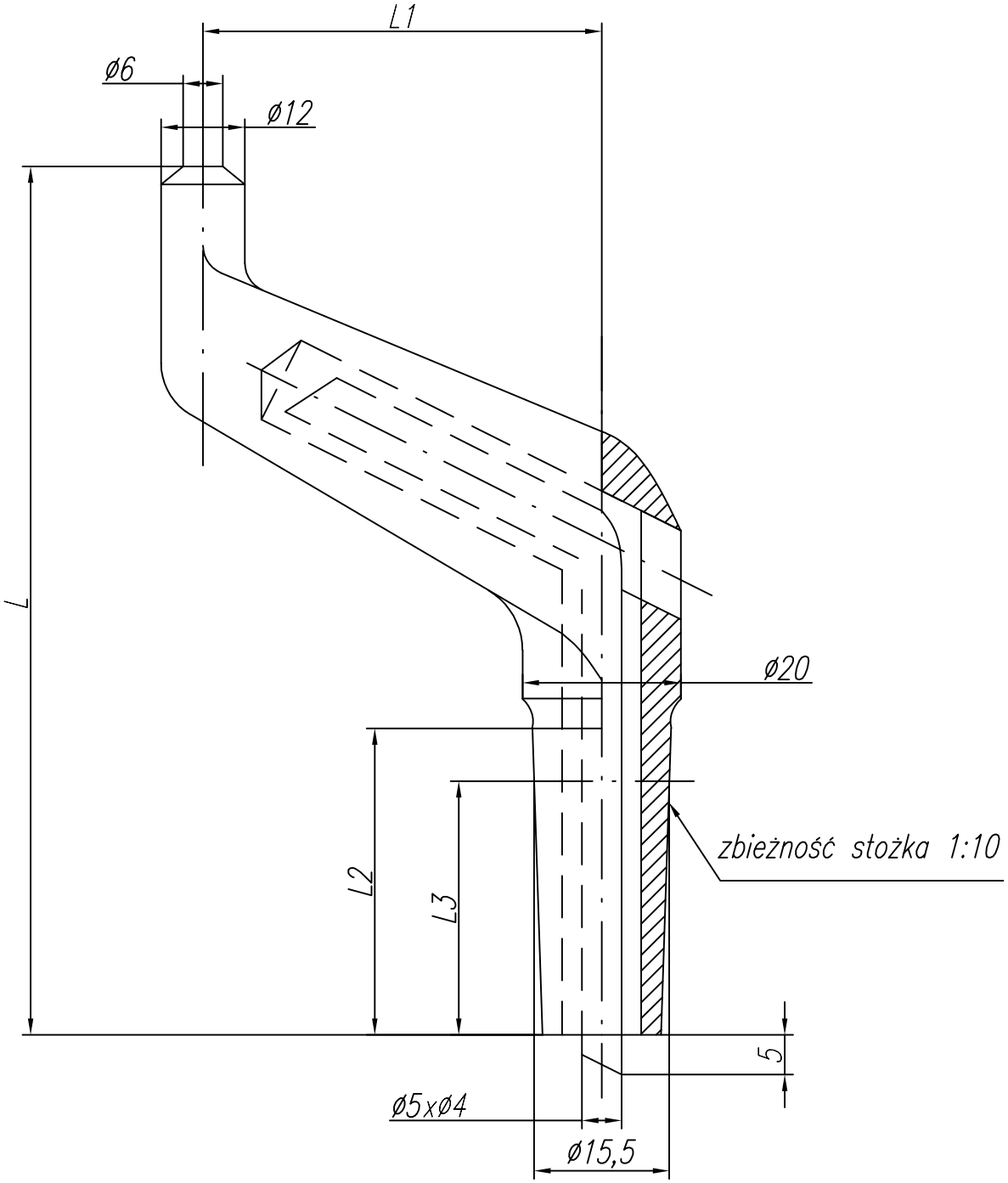
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L4	L1	L2	d	L3	Stożek	Cecha	Nr rysunku
1	60	25	5	25	ø16	40	Morse'a Nr2	F-02-0	2-9-2902-03-0
2*	67	32	5	25	ø15,5	48	1:10	F-02-1	2-9-2902-03-1
3	60	23	5	25	ø15,5	40	1:10	F-02-2	2-9-2902-03-2

Aspa
ZGRZEWANIE

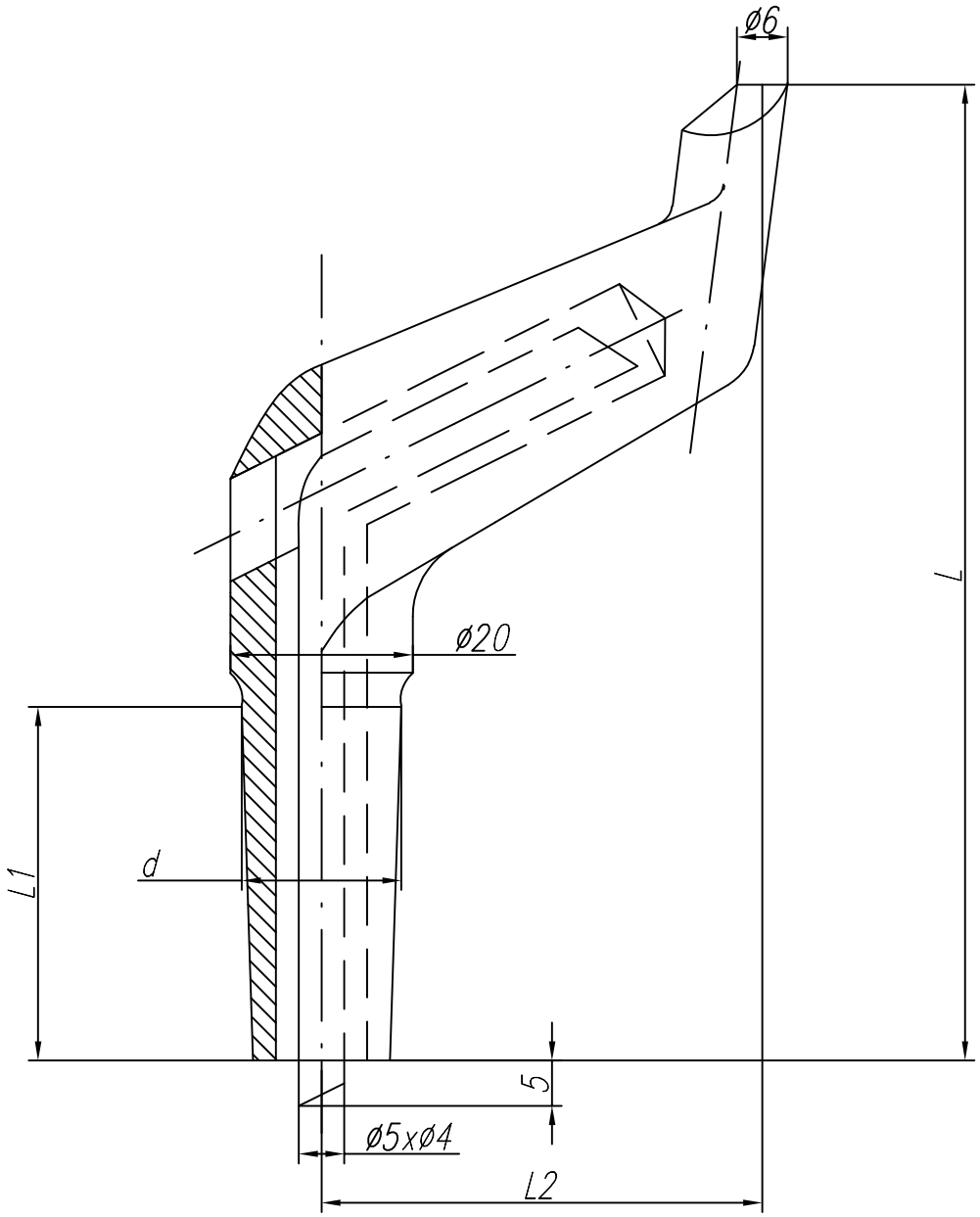
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L2	L1	L3		Cecha	Nr rysunku
1	90	32	40	30		F-03-0	2-7-1197-16-0
2	90	28	40	23		F-03-1	2-7-1197-16-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

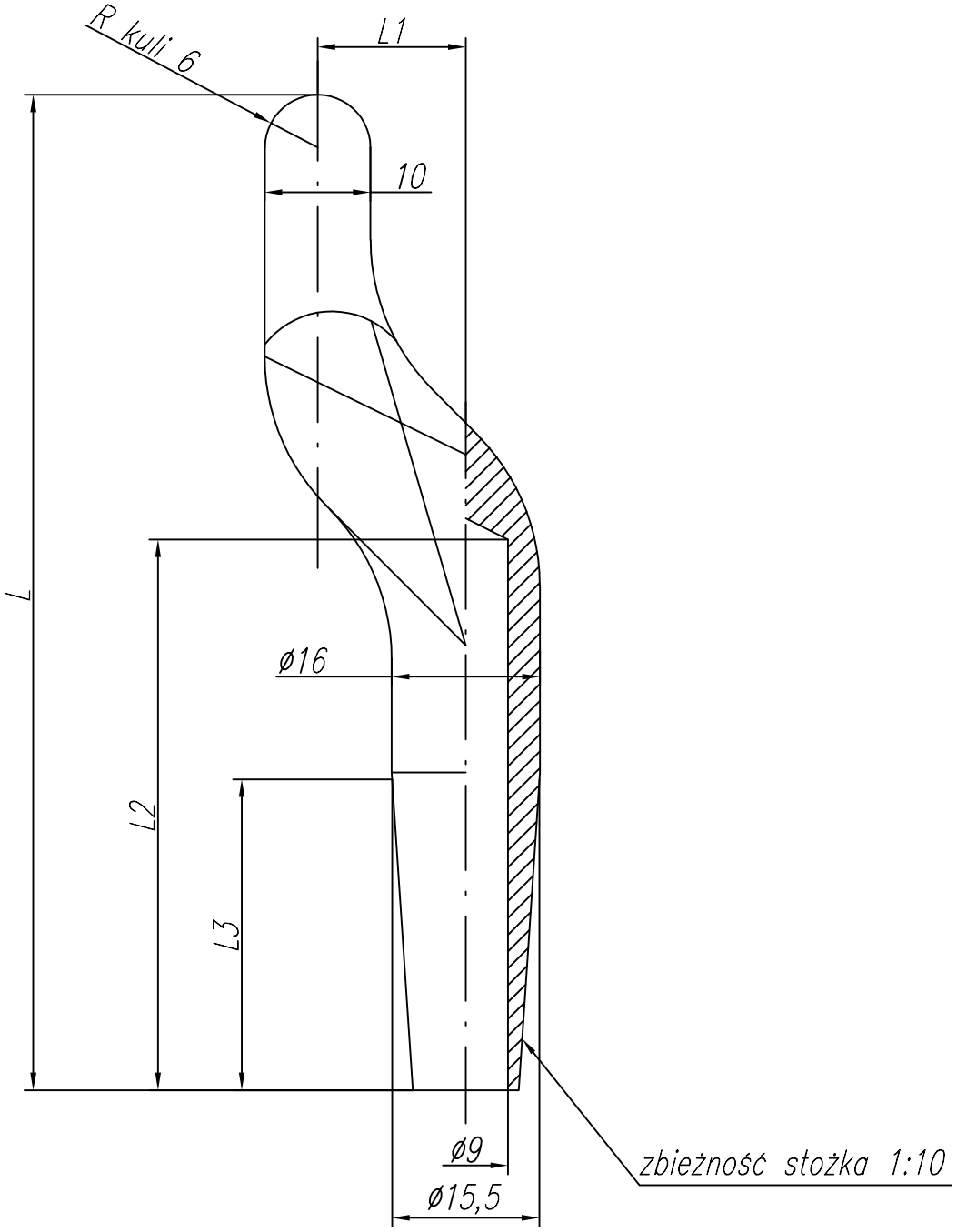


Lp	L	L1	L2	d	Stożek		Cecha	Nr rysunku
1	95	25	25	ø16	Morse'a Nr2		F-04-0	2-7-1197-14-0
2	100	32	25	ø15,5	1:10		F-04-1	2-7-1197-14-1

Aspa
ZGRZEWANIE

KATALOG

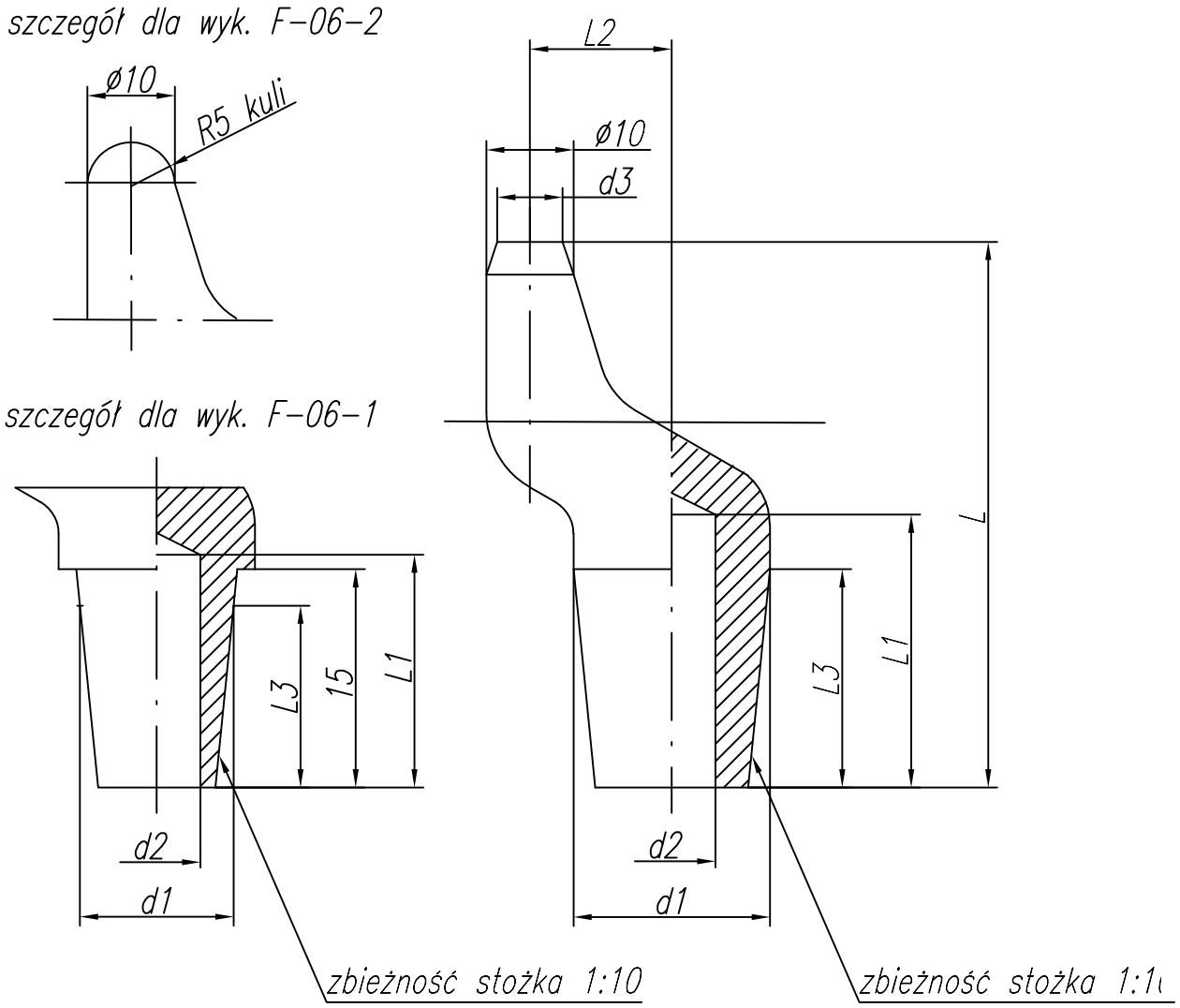
elektrod do zgrzewania oporowego



Lp	L	L3	L1	L2		Cecha	Nr rysunku
1	102	32	15	58		F-05-0	2-9-2902-10-0

Aspa
ZGRZEWANIE

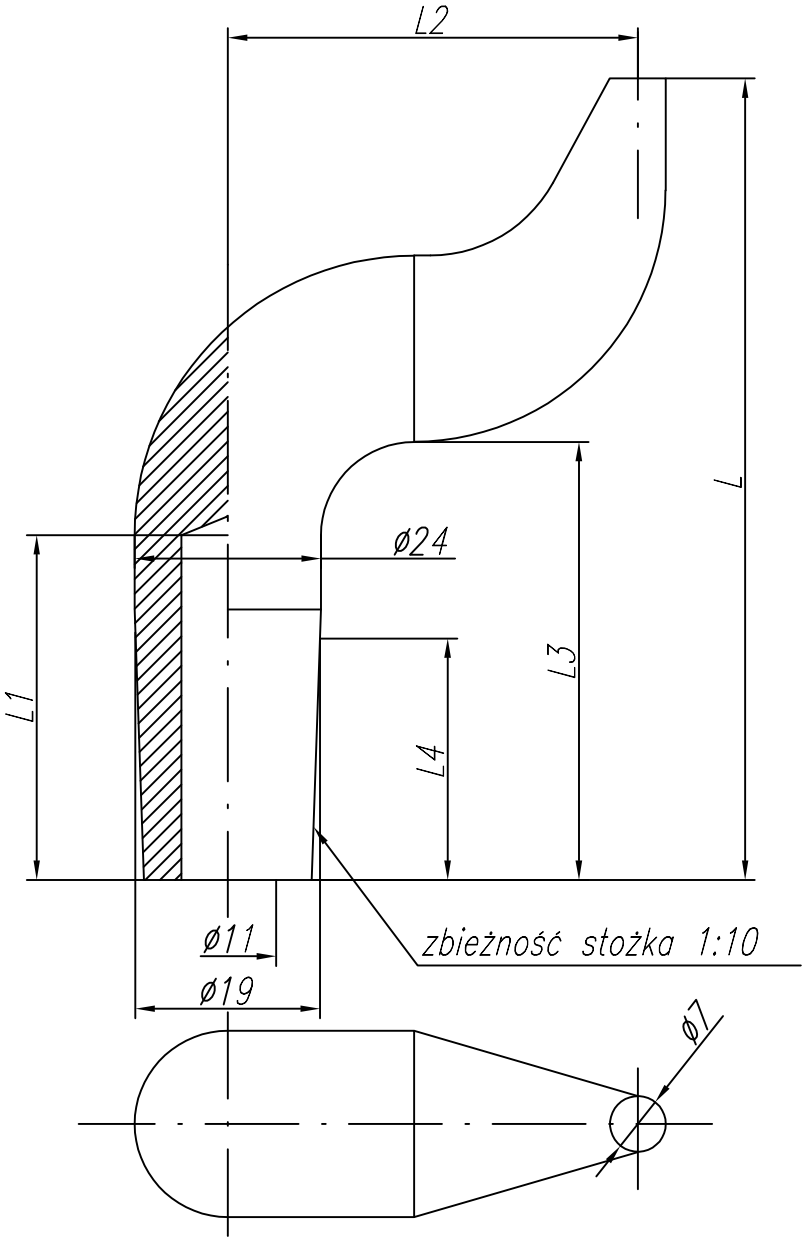
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L3	L1	L2	d1	d2	d3	Cecha	Nr rysunku
1	50	20	25	17	15,5	9	6	F-06-0	2-9-2902-16-0
2	45	12	20	17	10,5	6,5	4	F-06-1	2-9-2902-16-1
3	50	20	25	17	15,5	9	--	F-06-2	2-9-2902-16-2

Aspa
ZGRZEWANIE

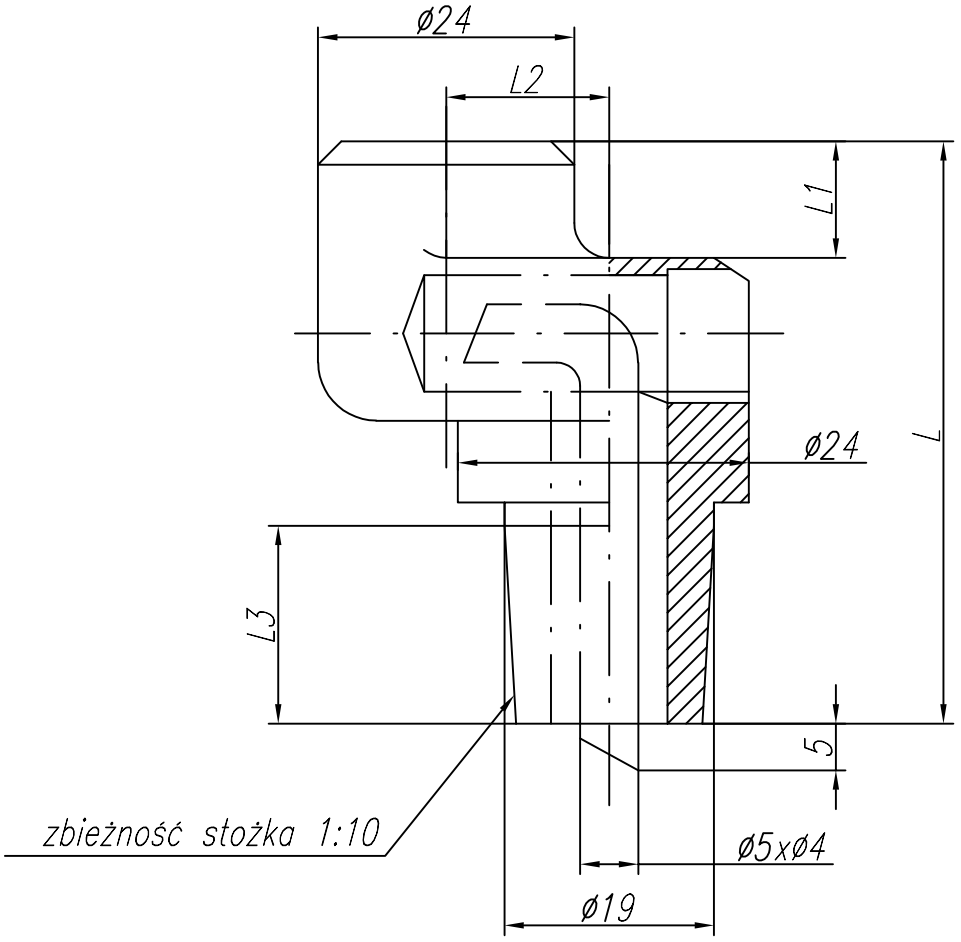
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L4	L1	L2	L3		Cecha	Nr rysunku
1	70	30	32	45	40		F-07-0	2-9-2902-15-0
2	105	30	32	45	40		F-07-1	2-9-2902-15-1

Aspa
ZGRZEWANIE

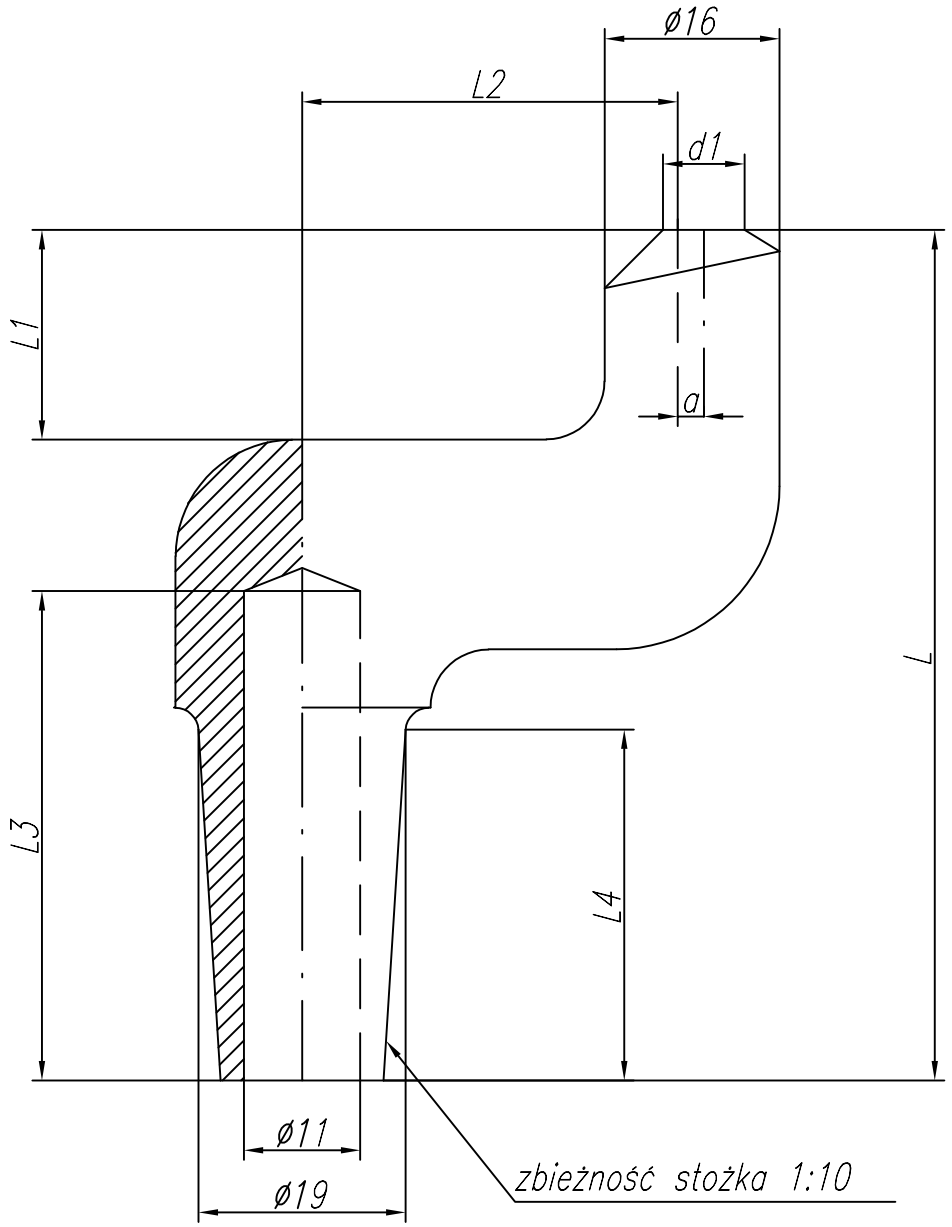
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L3	L1	L2		Cecha	Nr rysunku
1*	55	20	10	15		F-10-0	2-7-1197-19-0

Aspa
ZGRZEWANIE

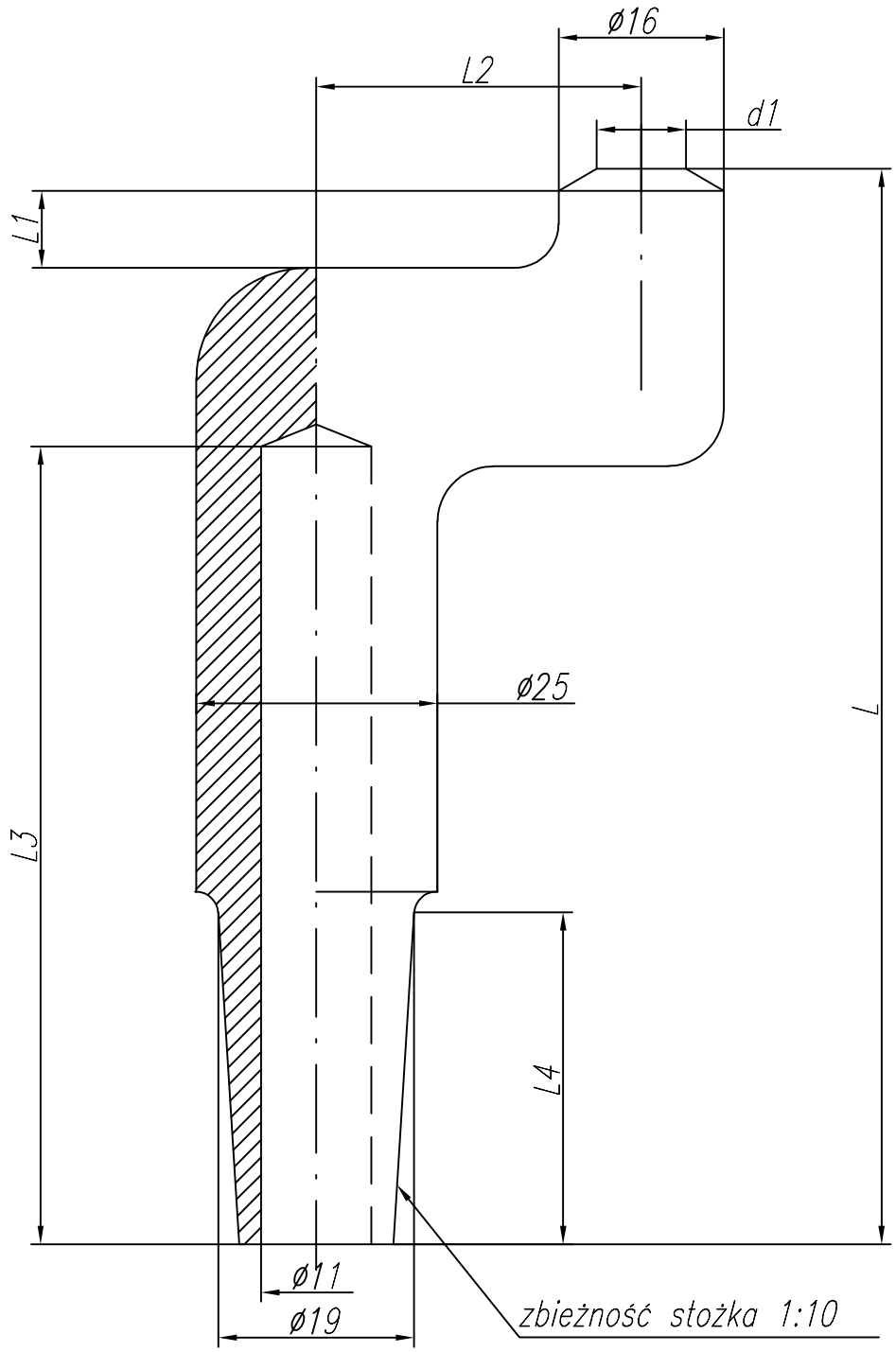
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L4	L1	L2	d1	a	L3	Cecha	Nr rysunku
1	82	30	22	38	ø8	2	46	F-11-0	2-9-2902-01-0
2	72	30	12	38	ø8	2	40	F-11-1	2-9-2902-01-1

Aspa
ZGRZEWANIE

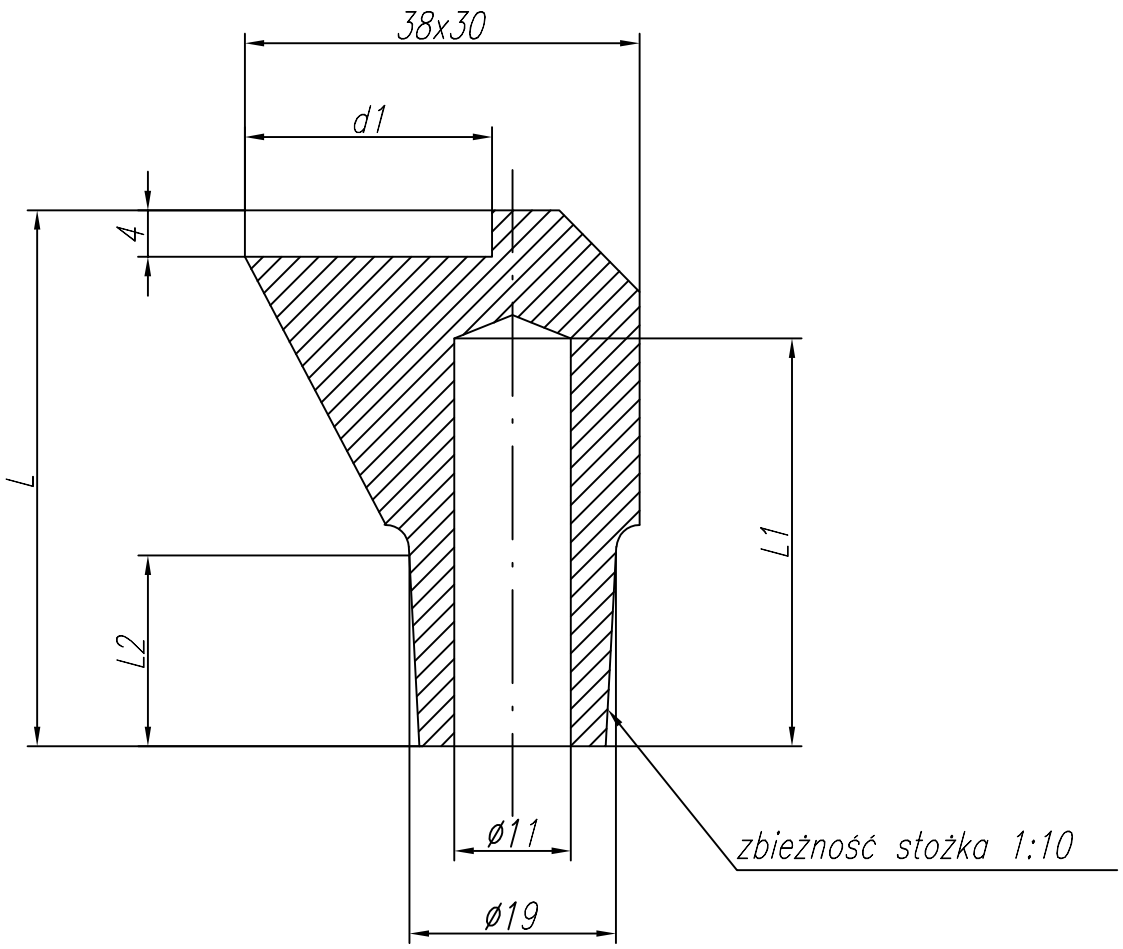
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L4	L1	L2	d1	L3		Cecha	Nr rysunku
1*	105	40	8	30	ø8	85		F-12-0	2-9-2902-13-0

Aspa
ZGRZEWANIE

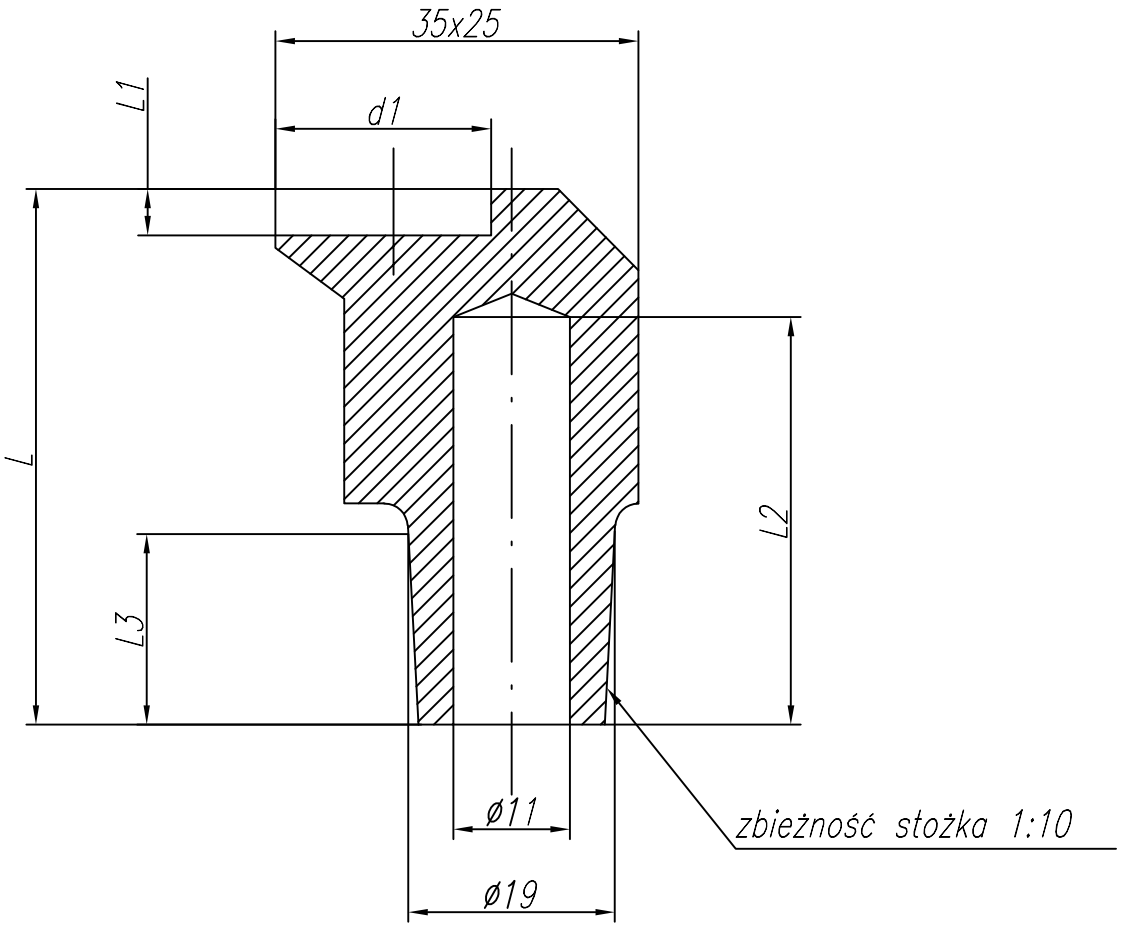
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L2	d1	L1		Cecha	Nr rysunku
1	55	20	ø22,5	43		F-13-0	2-9-2902-04-0
2	55	20	ø25,5	43		F-13-1	2-9-2902-04-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

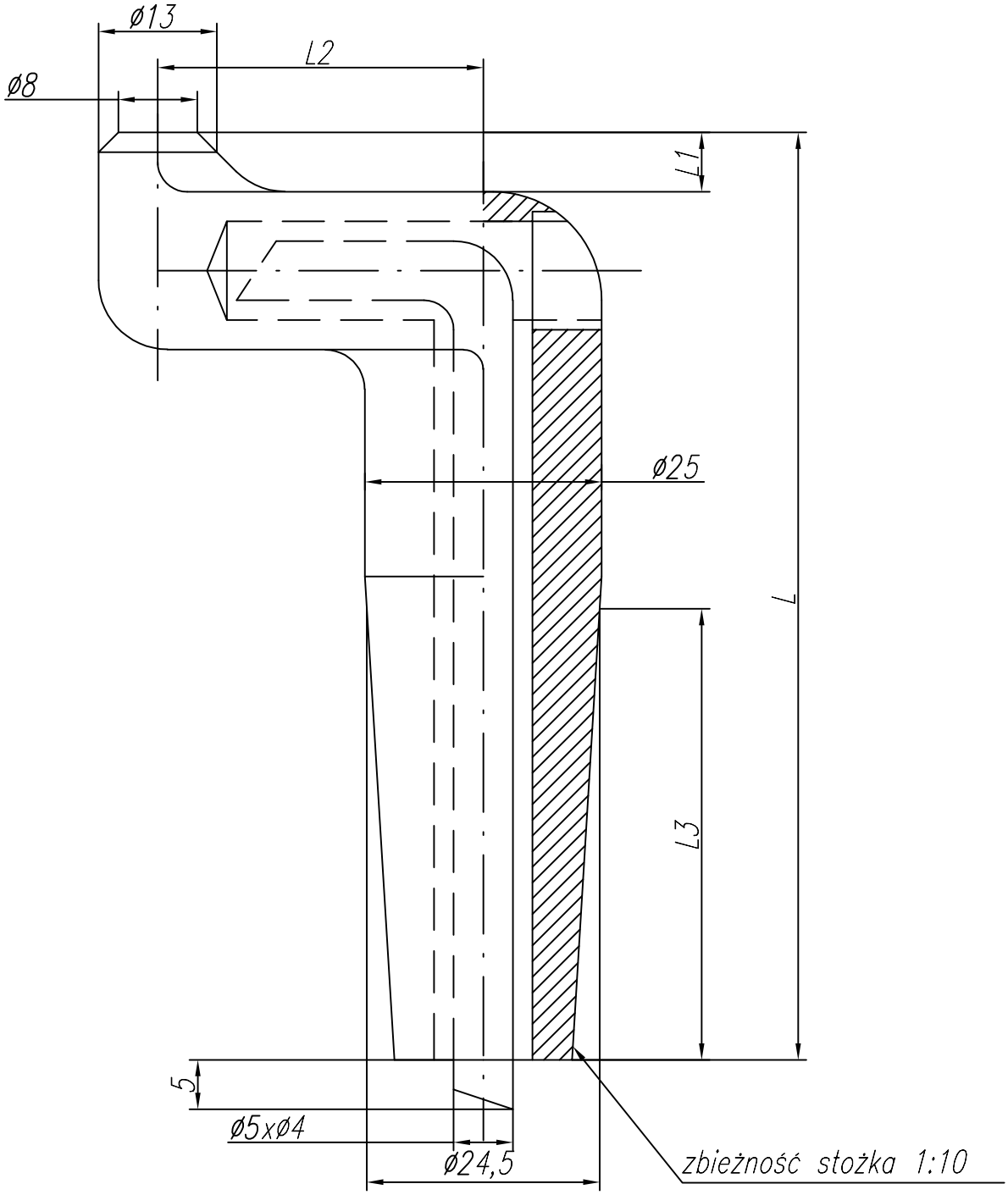


Lp	L	L3	L1	d1	L2		Cecha	Nr rysunku
1	65	30	3	ø15,2	53		F-14-0	2-9-2902-09-0
2	55	20	4	ø19,5	43		F-14-1	2-9-2902-09-1

Aspa
ZGRZEWANIE

KATALOG

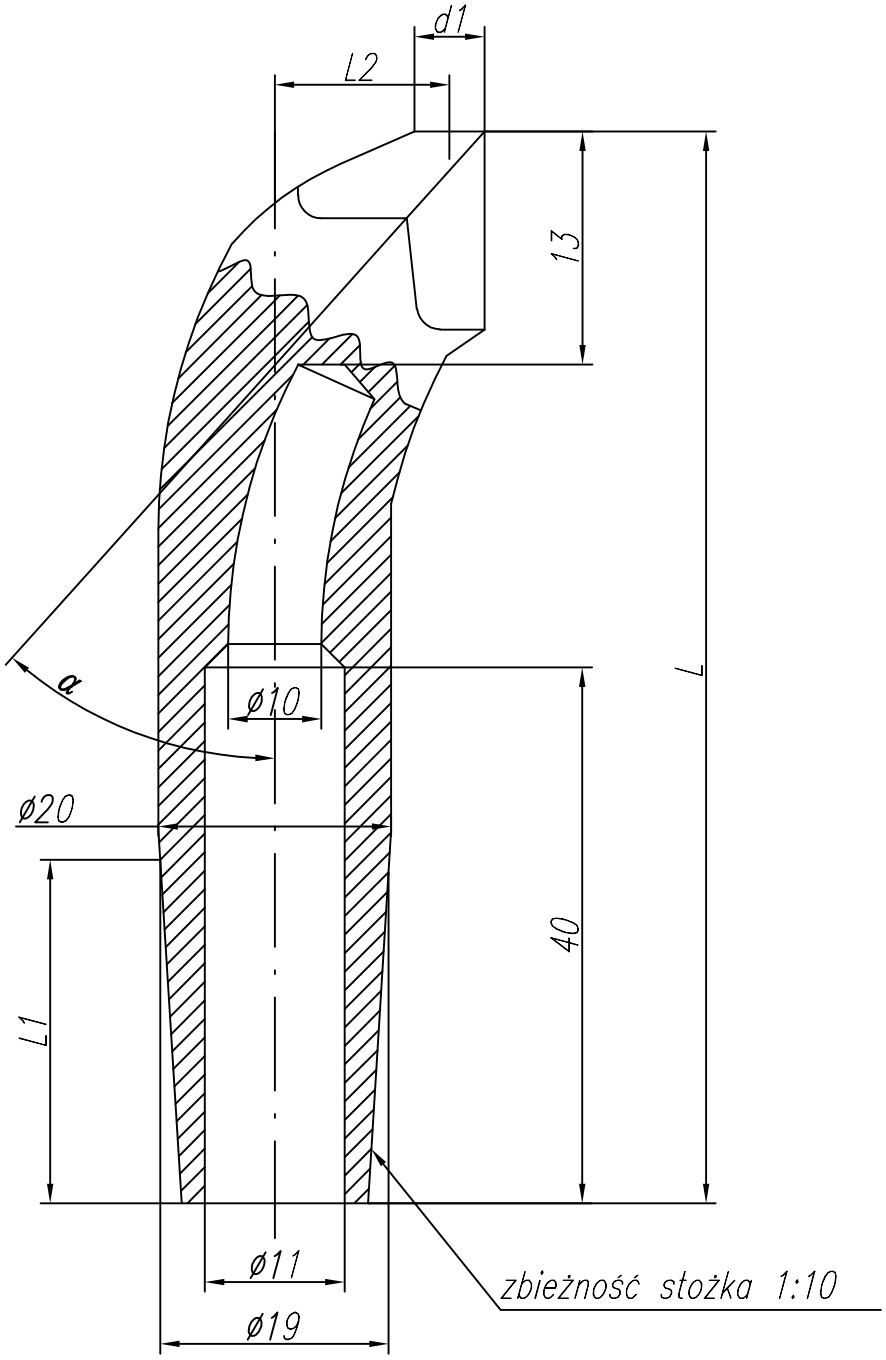
elektrod do zgrzewania oporowego



Lp	L	L3	L1	L2		Cecha	Nr rysunku
1*	100	50	5	35		F-17-0	2-7-1197-15-0

Aspa
ZGRZEWANIE

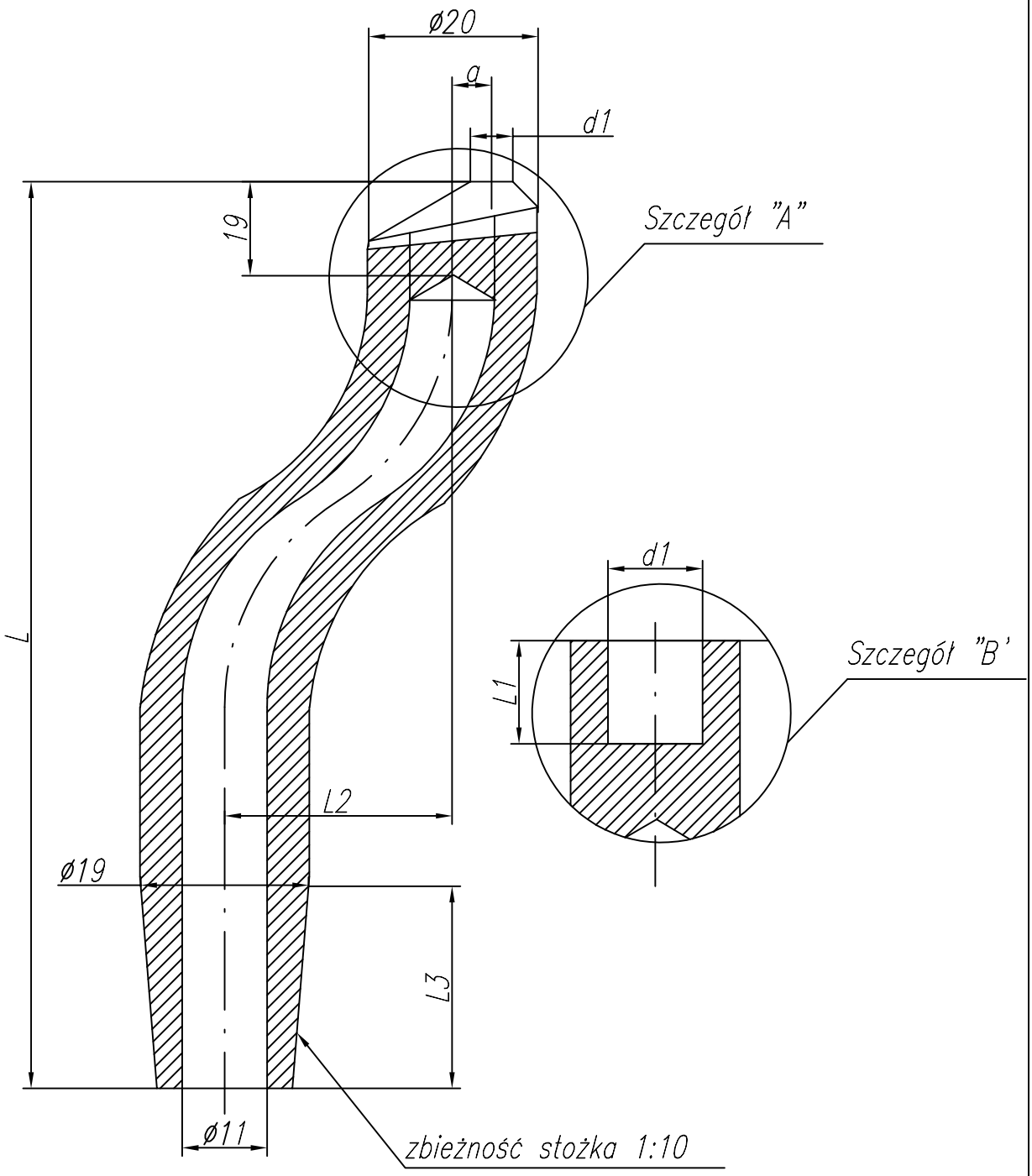
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	d1	α		Cecha	Nr rysunku
1	98	30	22	ø6	45°		F-20-0	2-9-7012-03-0

Aspa
ZGRZEWANIE

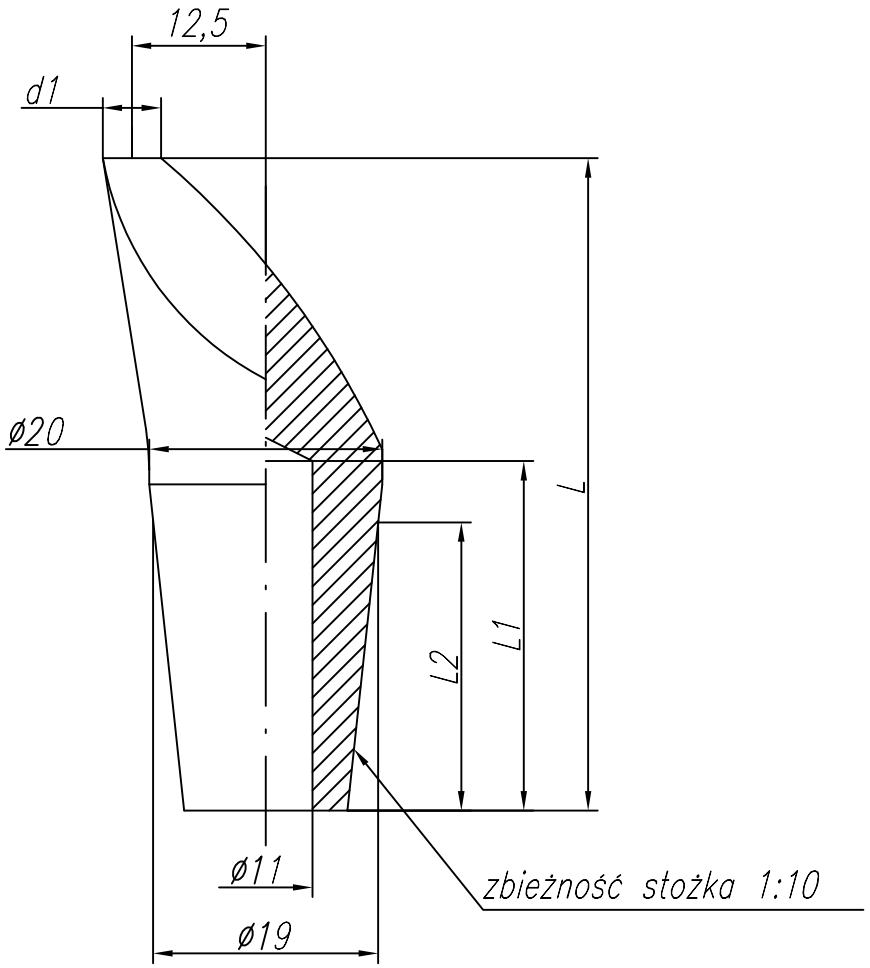
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L3	L1	L2	d1	a	Szczeg.	Cecha	Nr rysunku
1	113	30	–	25	ø5	6	"A"	F-21-0	2-9-7012-05-0
2	113	30	10	25	ø11,3	–	"B"	F-21-1	2-9-7012-05-1
3	113	30	–	25	–	–	"B"	F-21-2	2-9-7012-05-2
4	100	30	–	25	ø5	6	"A"	F-21-3	2-9-7012-05-3

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

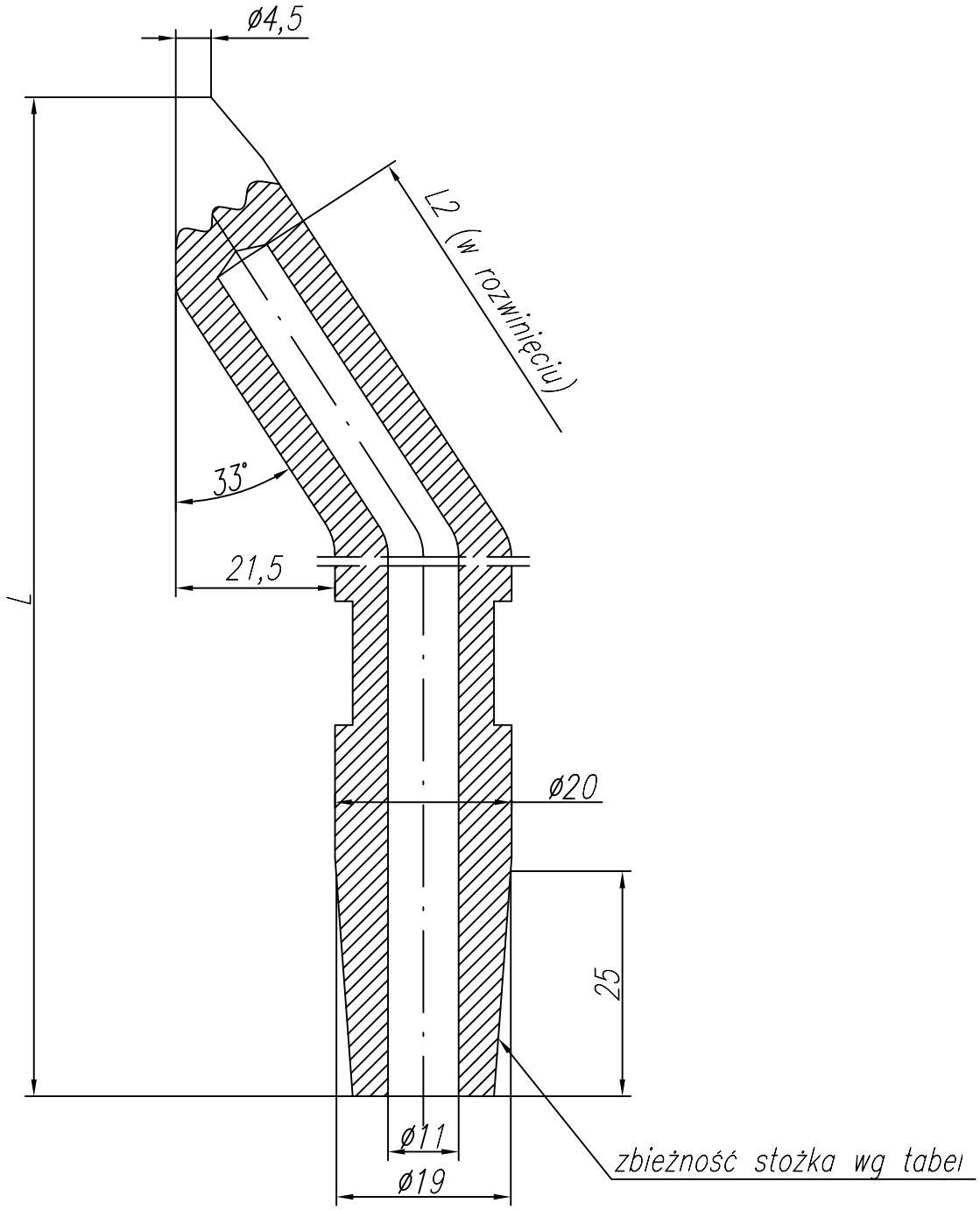


Lp	L	L2	d1	L1		Cecha	Nr rysunku
1	60	20	ø7	32		F-22-0	2-9-7012-07-0
2	70	20	ø5	32		F-22-1	2-9-7012-07-1

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego

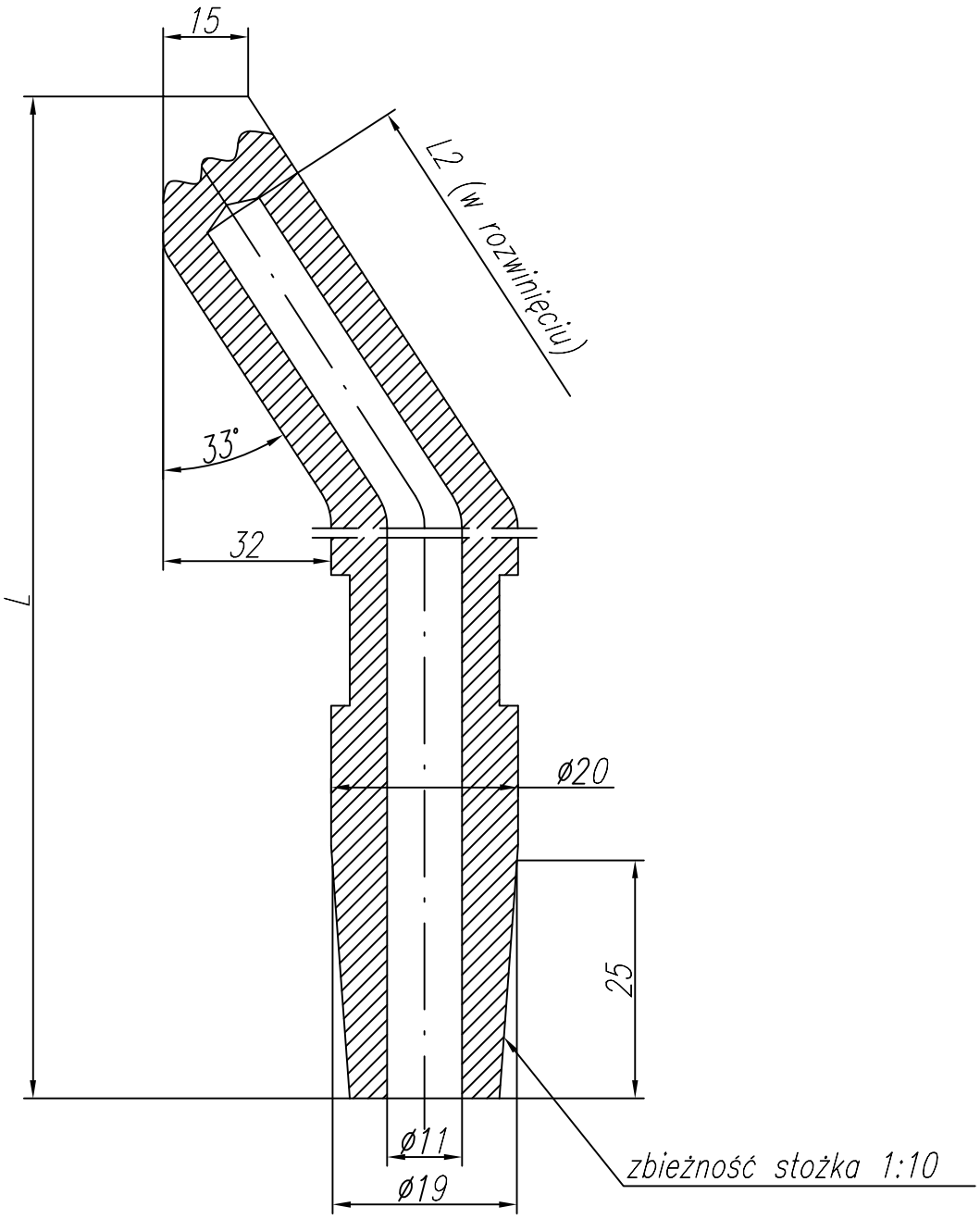


Lp	L	L2	Zbieżność stożka		Cecha	Nr rysunku
1	160	140	1:10		F-23-0	2-9-7012-14-0
2	160	140	1:20		F-23-1	2-9-7012-14-1

Aspa
ZGRZEWANIE

KATALOG

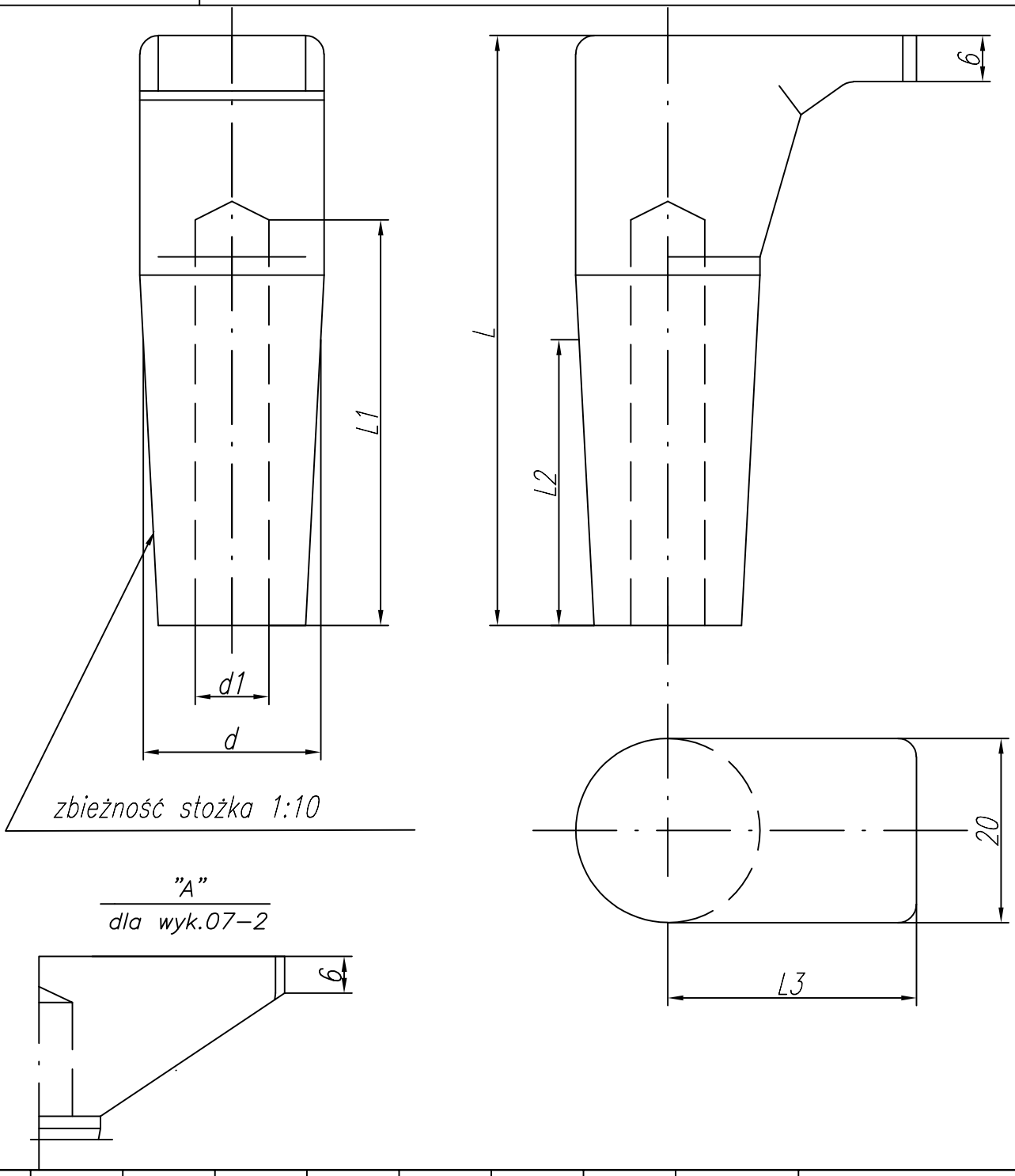
elektrod do zgrzewania oporowego



Lp	L	L2		Cecha	Nr rysunku
1	160	140		F-24-0	2-9-7012-13-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

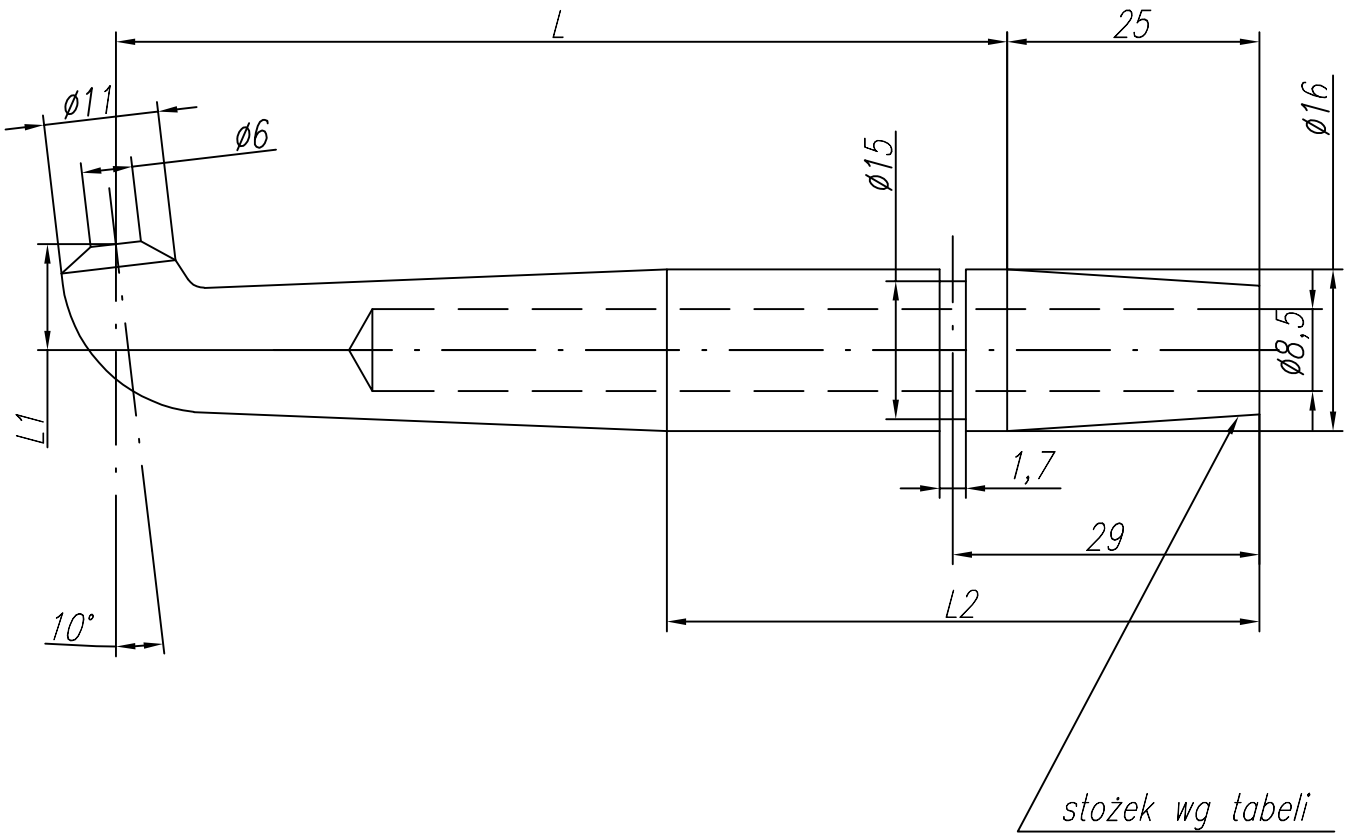


Lp	L	L1	L2	L3	d	d1		Cecha	Nr rysunku
1	68	58	30	30	ø19	ø11		F-30-0	2-9-2902-07-0
2	60	50	23	30	ø15,5	ø8,5		F-30-1	2-9-2902-07-1
3	68	58	30	40	ø19	ø11		F-30-2	2-9-2902-07-2

Elektrody gięte bez kołnierza

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

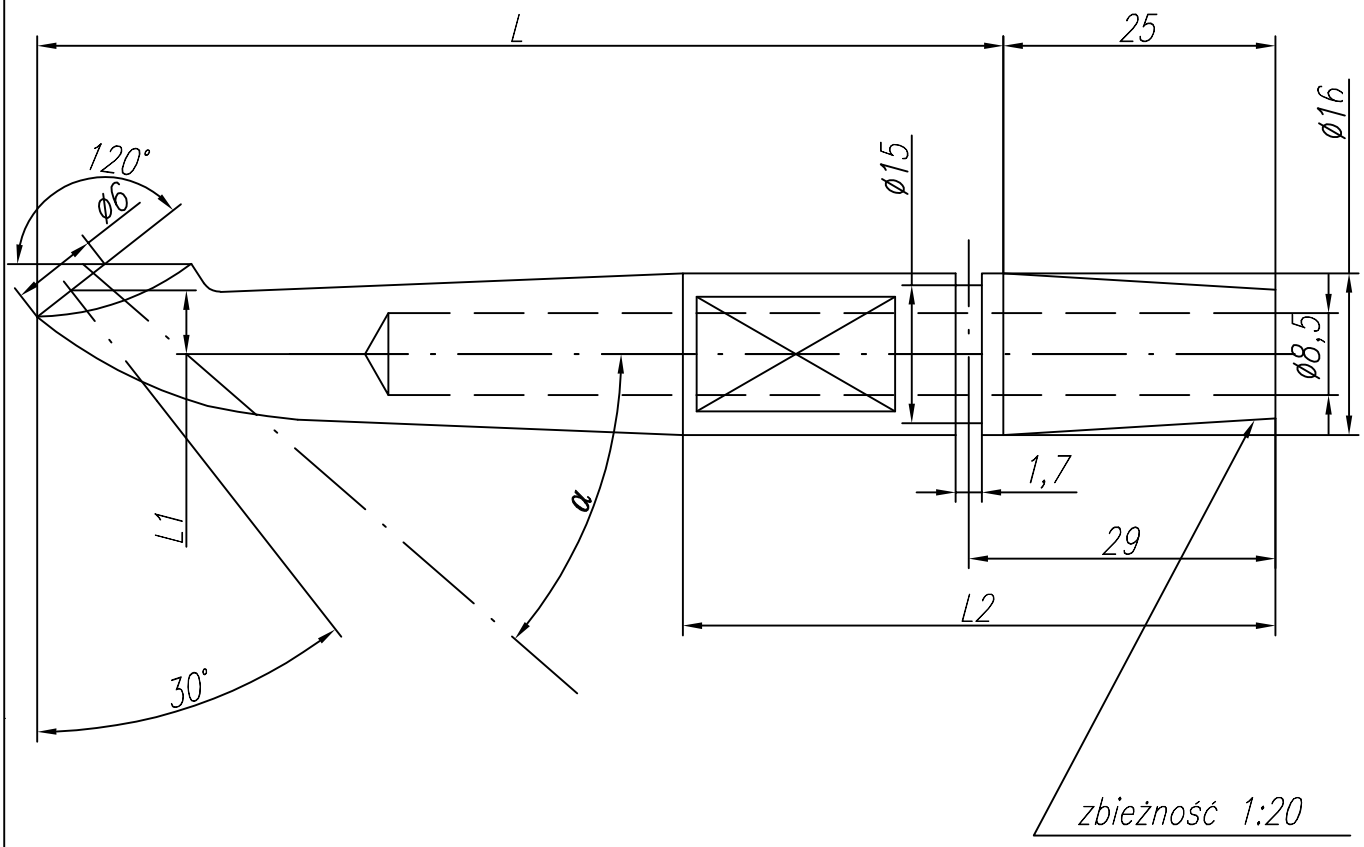


Lp	L	L1	α	Stożek	L2		Cecha	Nr rysunku
1	60	17	0°	Morse'a Nr2	70		G-01-0	2-9-7012-04-0
2	90	17	0°	Morse'a Nr2	100		G-01-1	2-9-7012-04-1
3	90	14	0°	1:20	100		G-01-2	2-9-7012-04-2
4	90	10	10°	1:20	90		G-01-3	2-9-7012-04-3

Aspa
ZGRZEWANIE

KATALOG

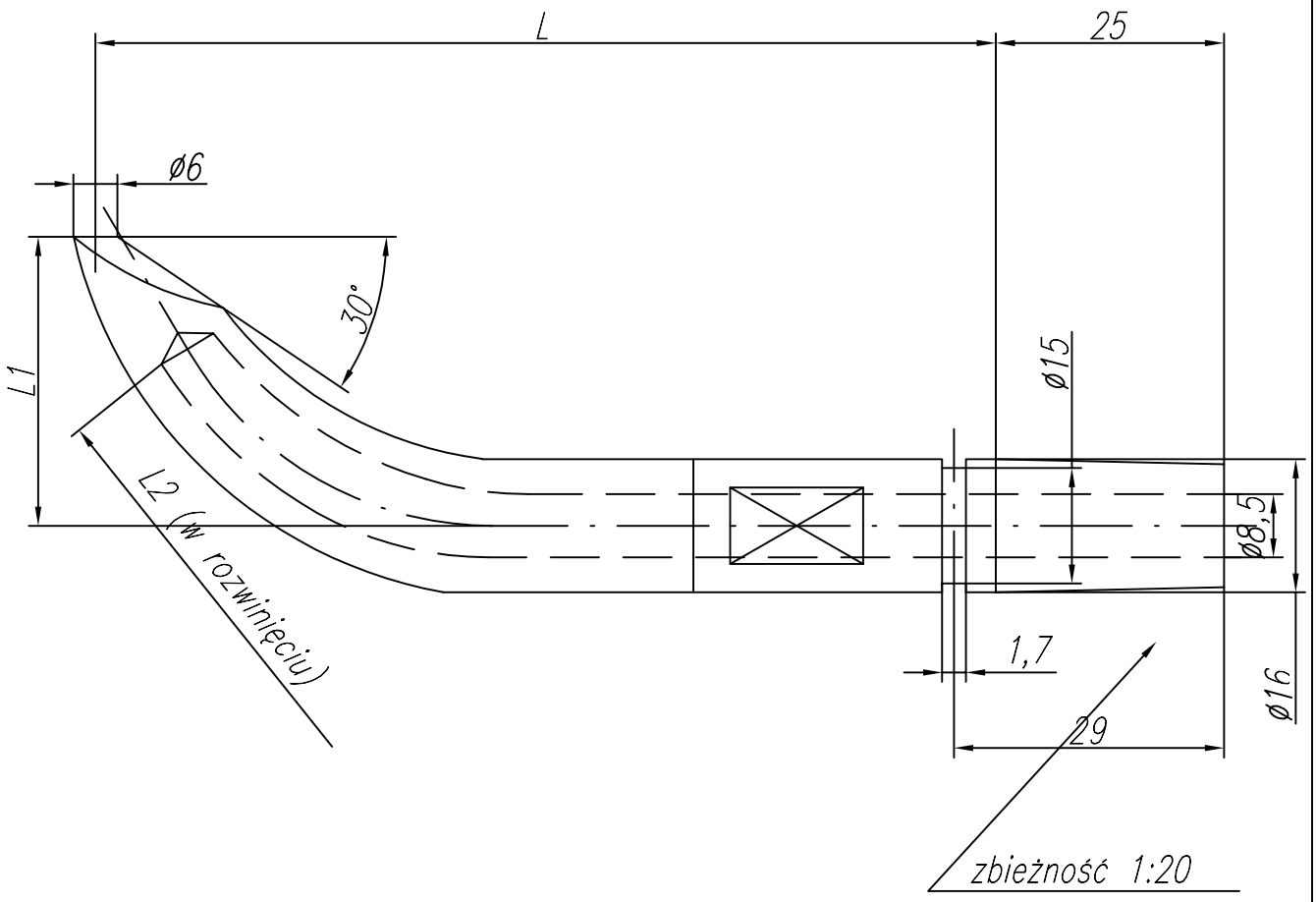
elektrod do zgrzewania oporowego



Lp	L	L1	L2	α		Cecha	Nr rysunku
1	100	8	95	40°		G-02-0	2-9-7012-08-0

Aspa
ZGRZEWANIE

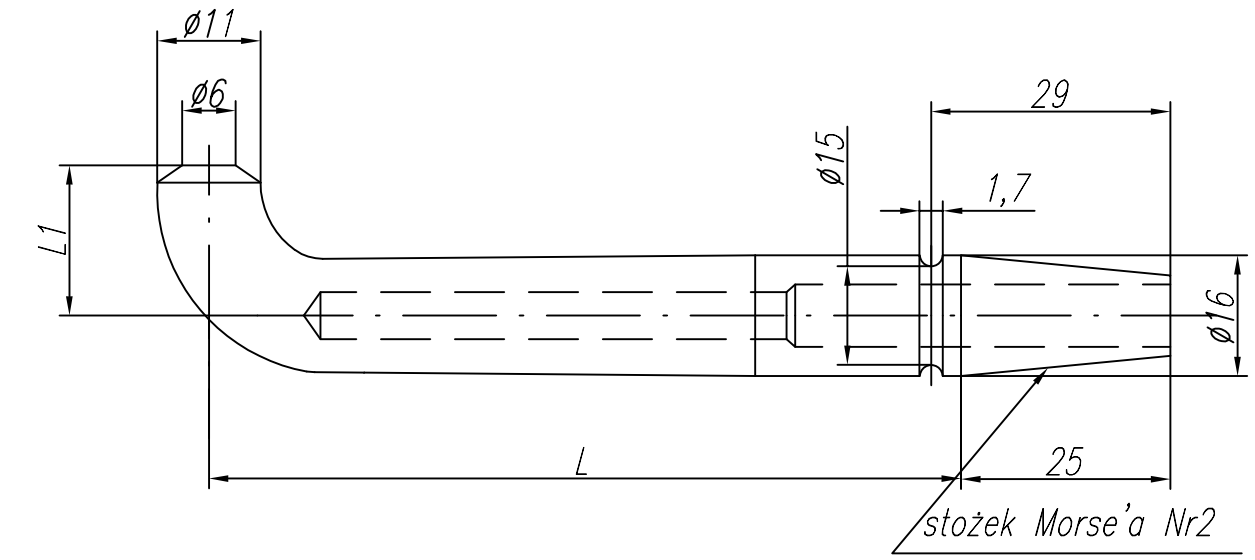
KATALOG
elektrod do zgrzewania oporowego

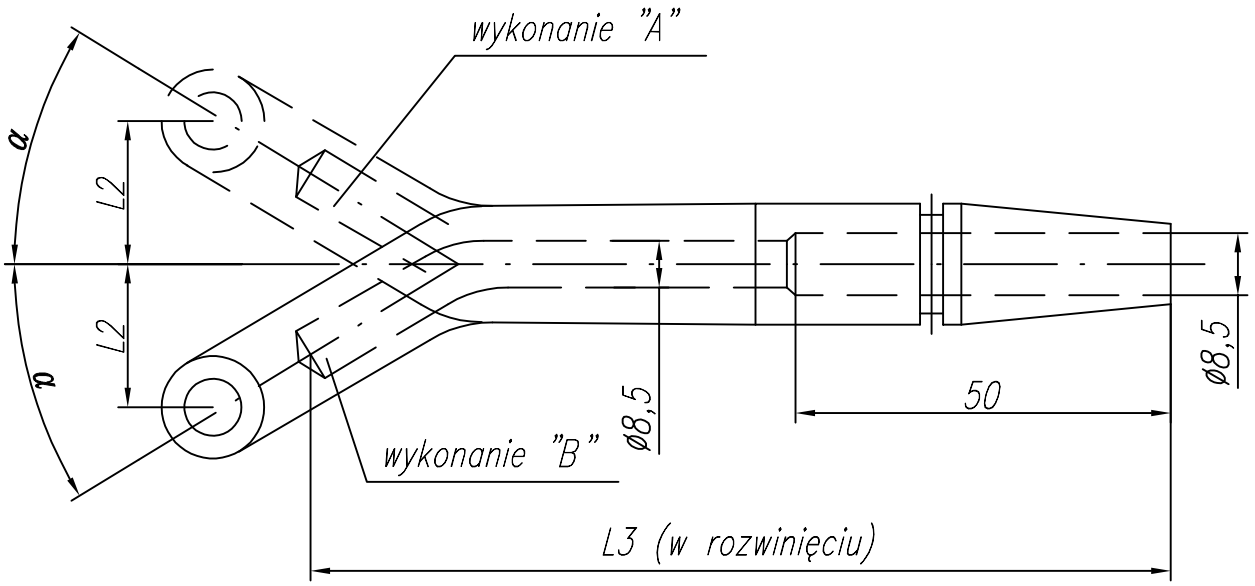


Lp	L	L1	L2		Cecha	Nr rysunku
1	100	32	120		G-03-0	2-9-7012-12-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

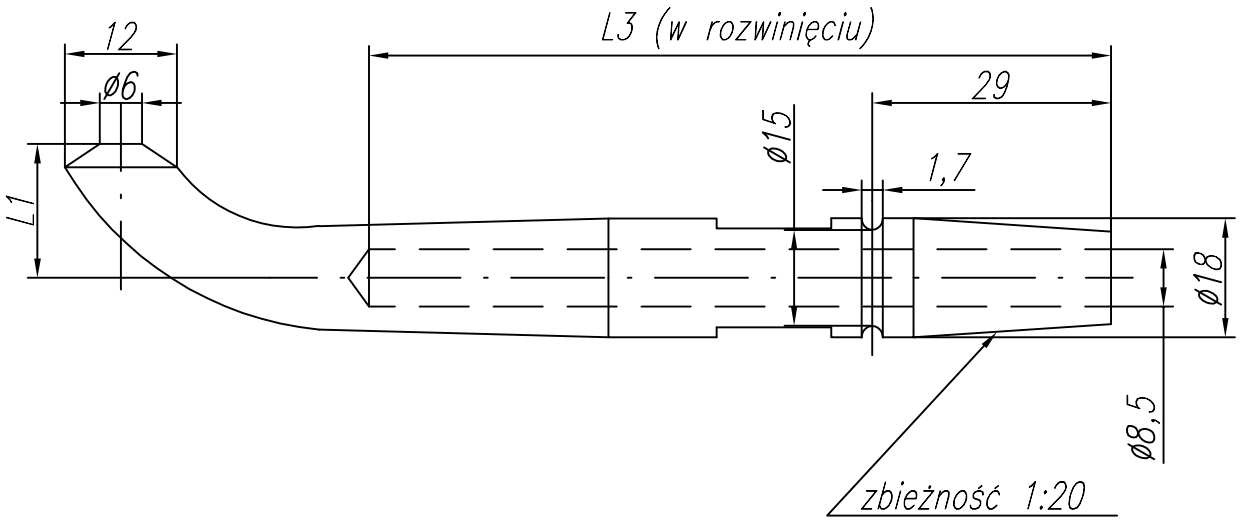


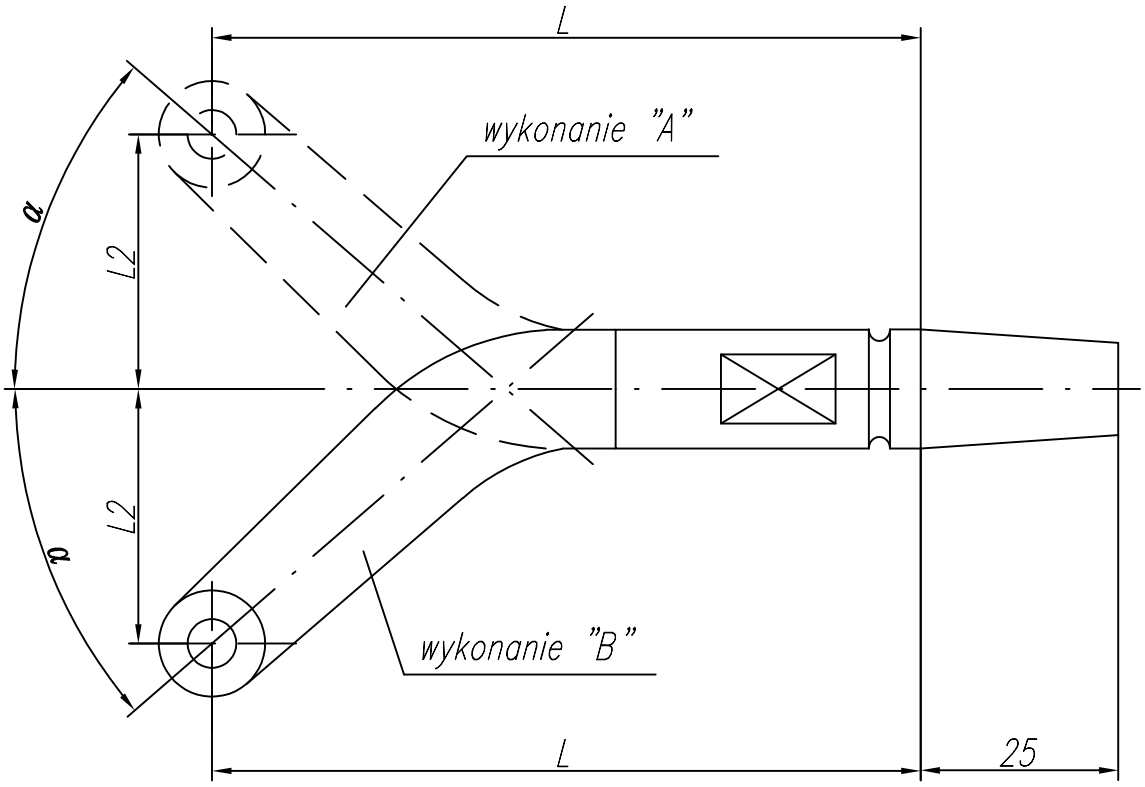


Lp	L	L1	L2	α	wykonanie	L3		Cecha	Nr rysunku
1	87	14	15	30°	"A"	100		G-06-0	2-9-7012-02-0
2	87	14	15	30°	"B"	100		G-06-1	2-9-7012-02-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

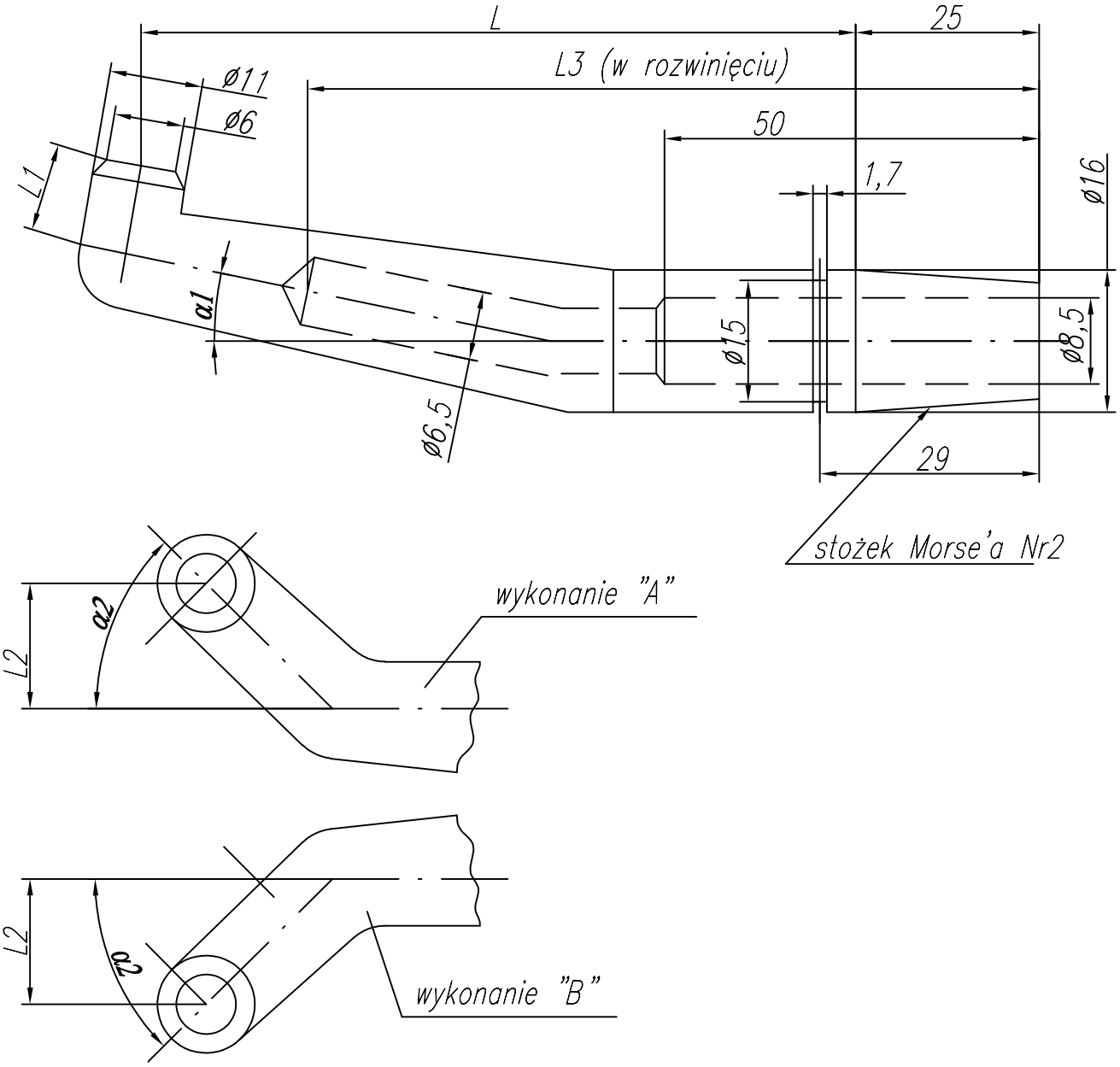




Lp	L	L1	L2	α	Wykonanie	L3		Cecha	Nr rysunku
1	90	15	30	40°	"A"	95		G-07-0	2-9-7012-06-0
2	90	15	30	40°	"B"	95		G-07-1	2-9-7012-06-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

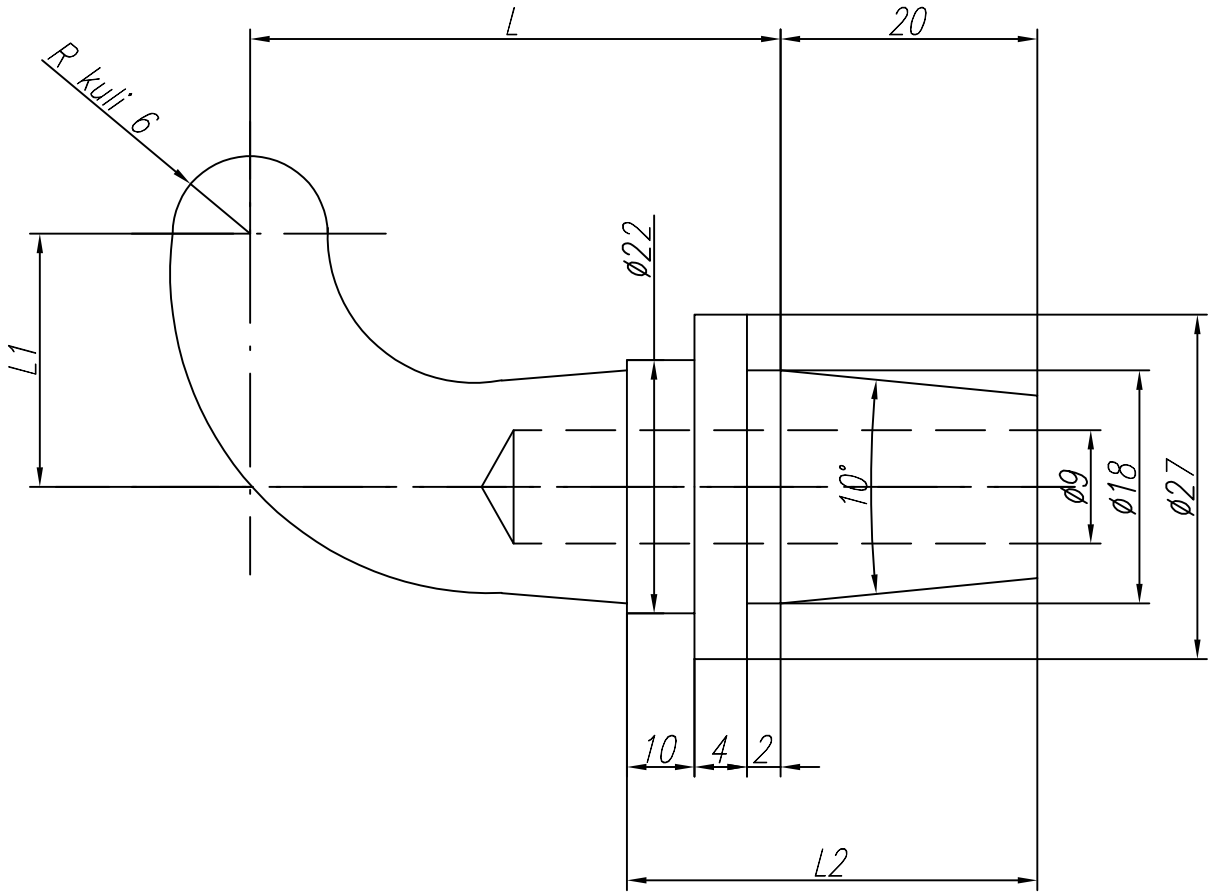


Lp	L	α1	L1	α2	L2	Wykonanie	L3	Cecha	Nr rysunku
1	100	15°	10	45°	15	"A"	105	G-08-0	2-9-7012-01-0
2	100	15°	10	45°	15	"B"	105	G-08-1	2-9-7012-01-1

Elektrody gięte z kołnierzem

Aspa
ZGRZEWANIE

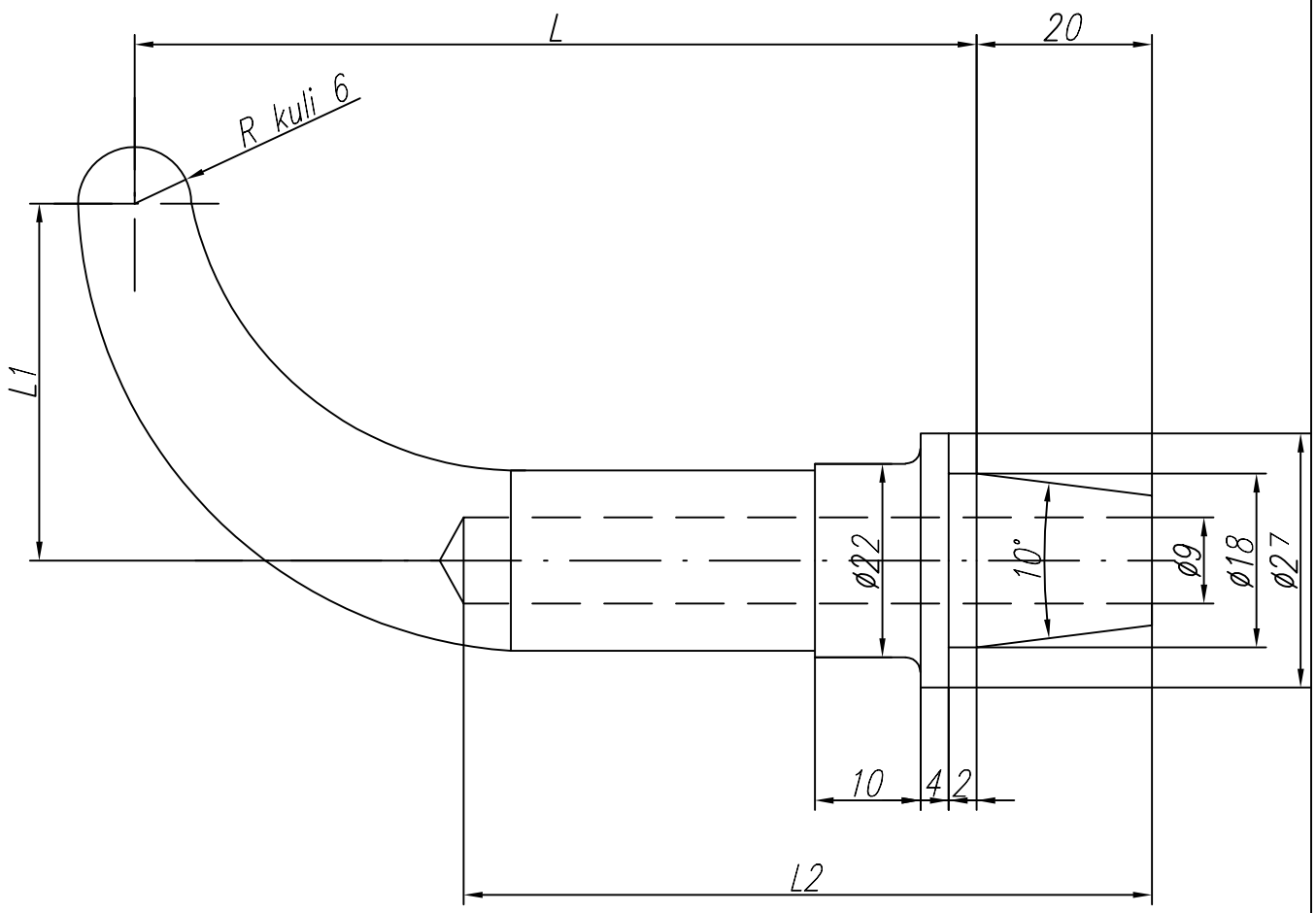
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2		Cecha	Nr rysunku
1	40	19	40		H-01-0	2-9-7022-84-0
2	50	29	42		H-01-1	2-9-7022-84-1
3*	50	19	42		H-01-2	2-9-7022-84-2

Aspa
ZGRZEWANIE

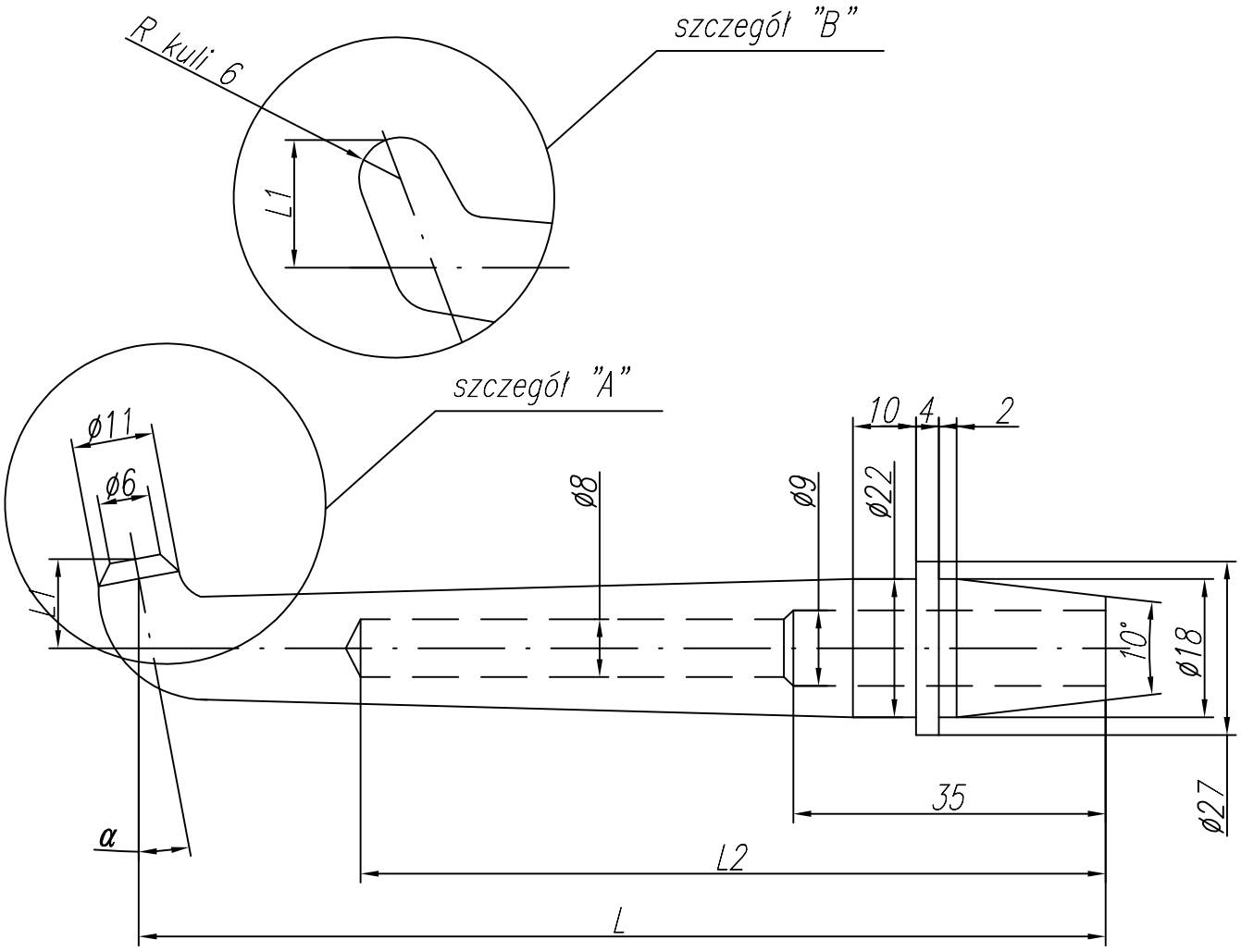
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2		Cecha	Nr rysunku
1	90	35	75		H-02-0	2-9-7022-85-0
2	133	45	107		H-02-1	2-9-7022-85-1

Aspa
ZGRZEWANIE

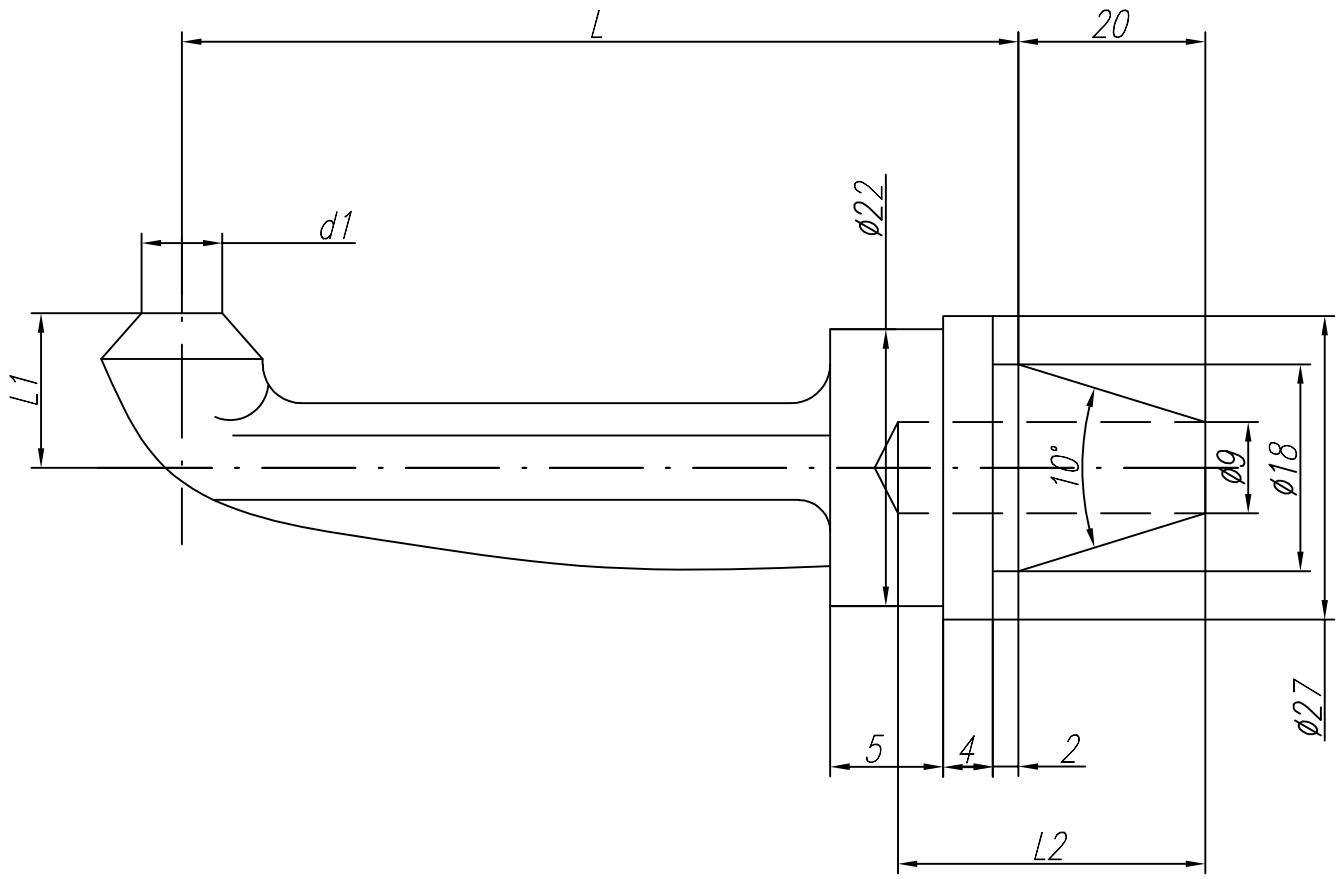
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α	Szczegół	L2		Cecha	Nr rysunku
1	120	15	8°	"A"	75		H-03-0	2-9-7022-89-0
2	130	15	0°	"A"	80		H-03-1	2-9-7022-89-1
3	122,5	19	15°	"B"	80		H-03-2	2-9-7022-89-2
4*	122	25	10°	"B"	80		H-03-3	2-9-7022-89-3
5*	140	30	0°	"A"	100		H-03-4	2-9-7022-89-4
6*	125	25	15°	"A"	85		H-03-5	2-9-7022-89-5
7*	120	15	15°	"A"	80		H-03-6	2-9-7022-89-6
8	93,5	14	10°	"A"	55		H-03-7	2-9-7022-89-7

Aspa
ZGRZEWANIE

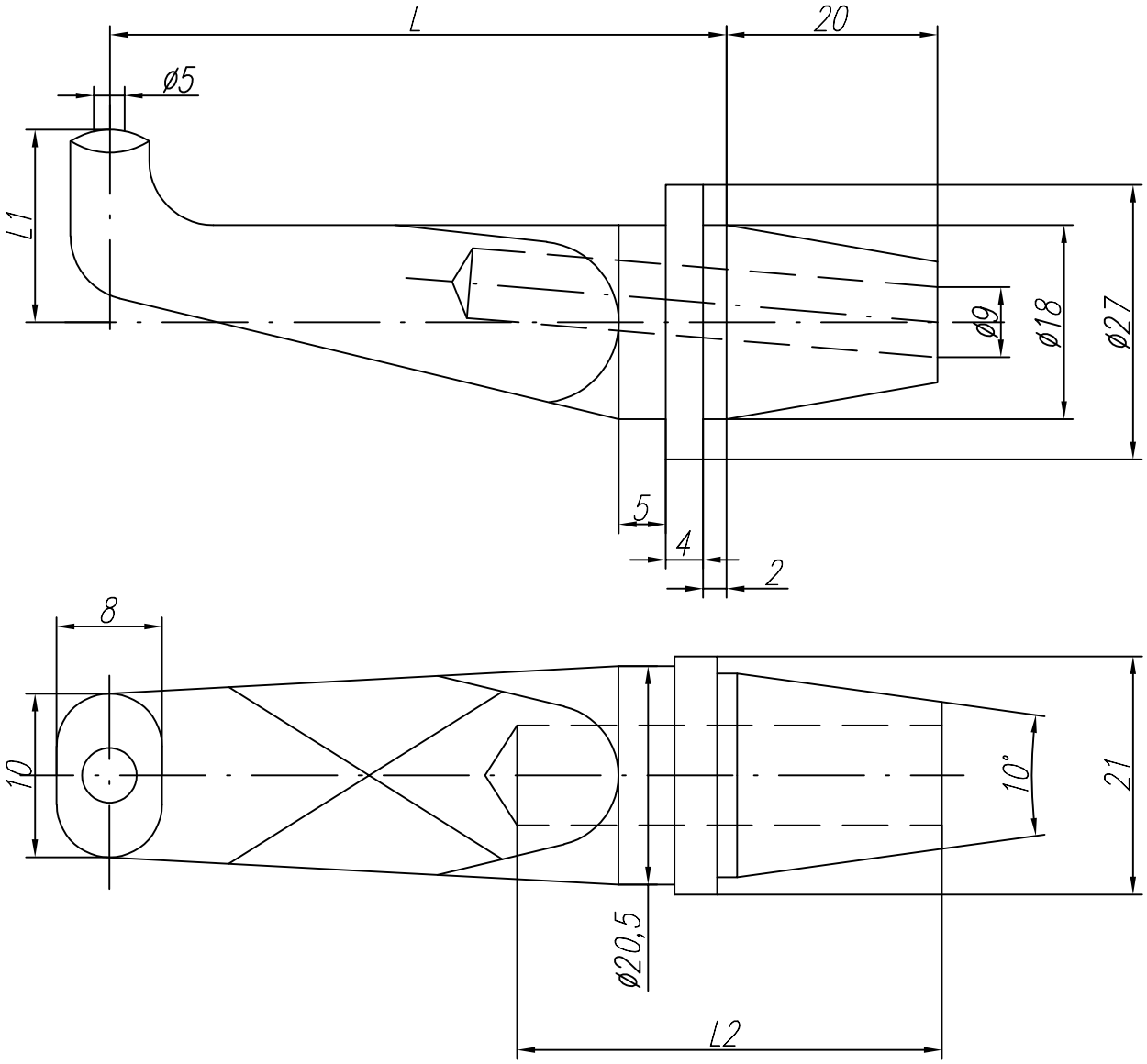
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d1	L2		Cecha	Nr rysunku
1	45	8	ø6	27		H-04-0	2-9-7022-83-0

Aspa
ZGRZEWANIE

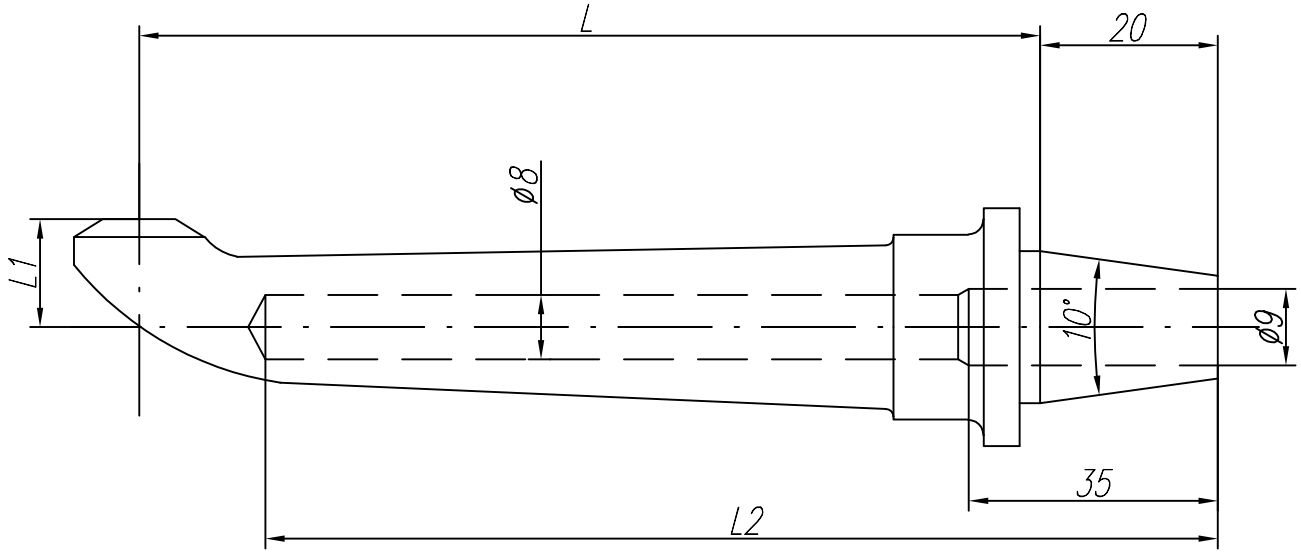
KATALOG
elektrod do zgrzewania oporowego

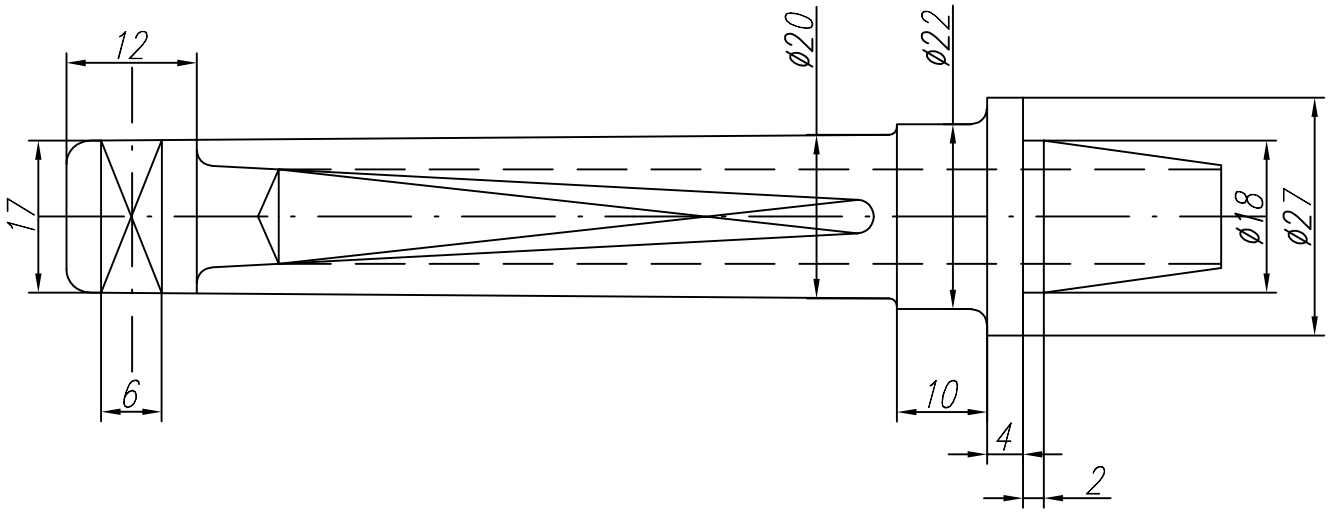


Lp	L	L1	L2		Cecha	Nr rysunku
1*	58	16,5	45		H-05-0	2-9-7022-91-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

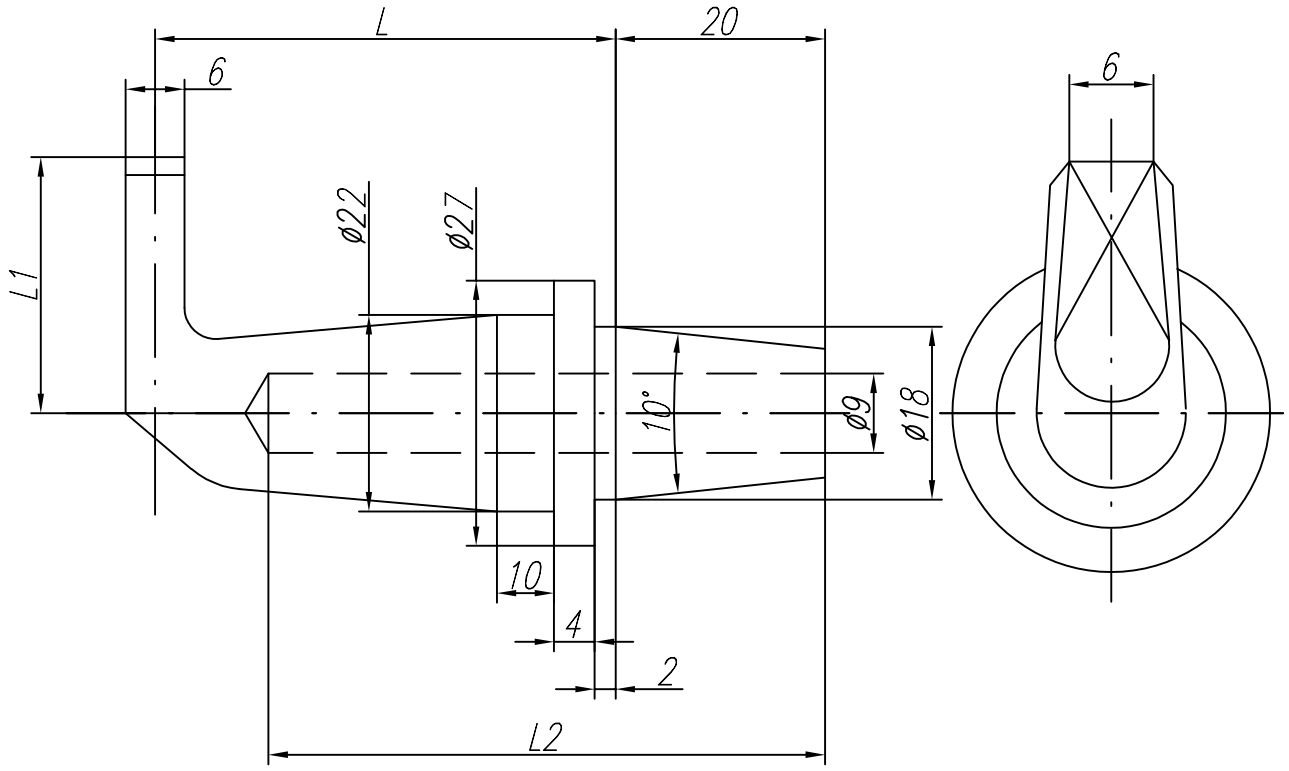




Lp	L	L1	L2		Cecha	Nr rysunku
1*	93	10	104		H-06-0	2-9-7022-02-0

Aspa
ZGRZEWANIE

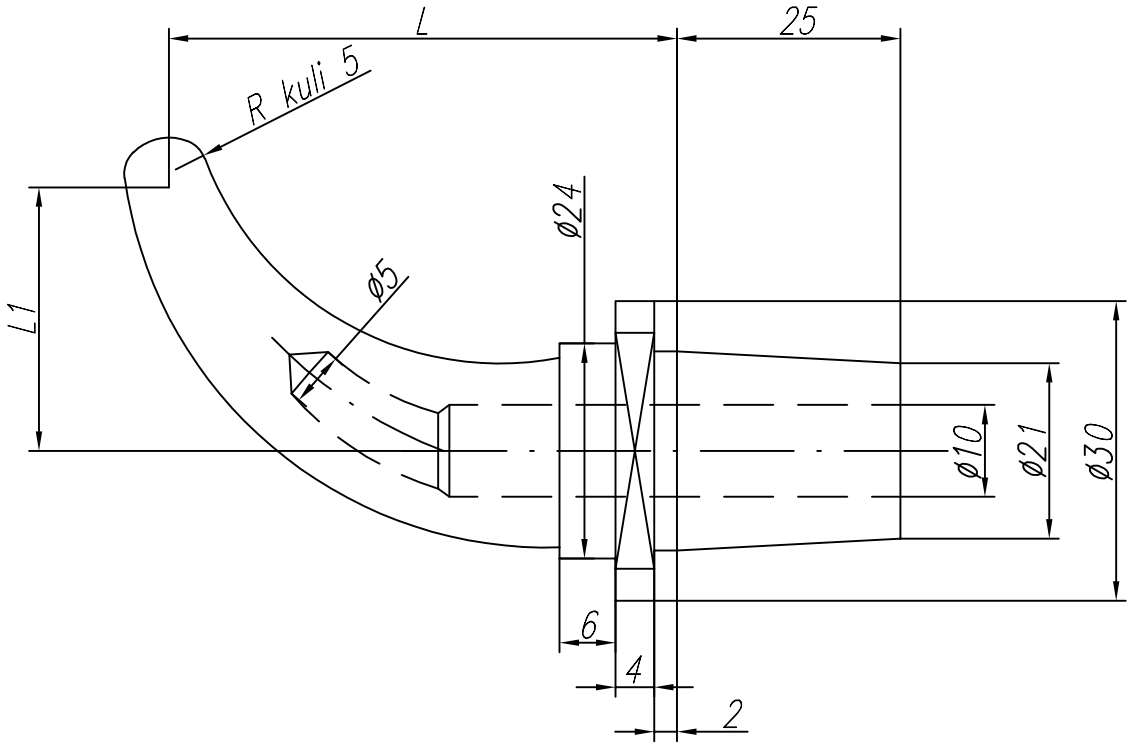
KATALOG
elektrod do zgrzewania oporowego

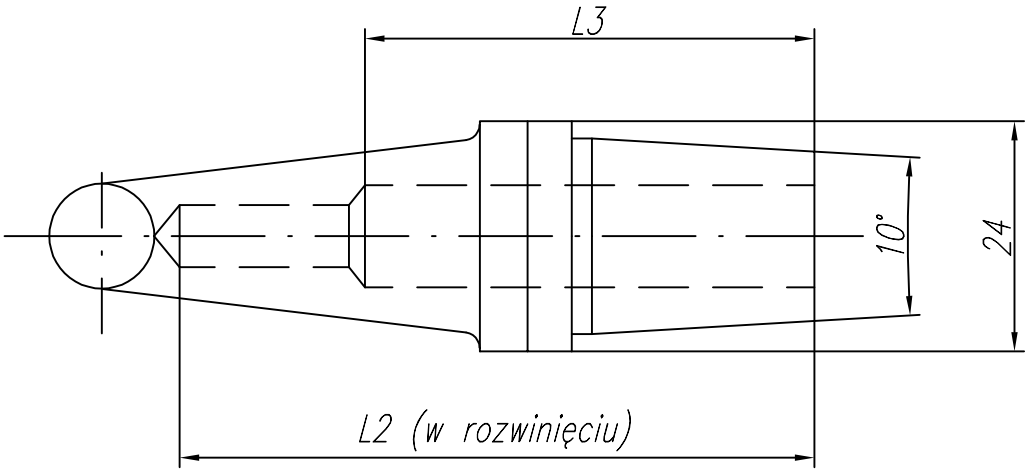


Lp	L	L1	L2		Cecha	Nr rysunku
1	45	25	55		H-07-0	2-9-7022-77-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

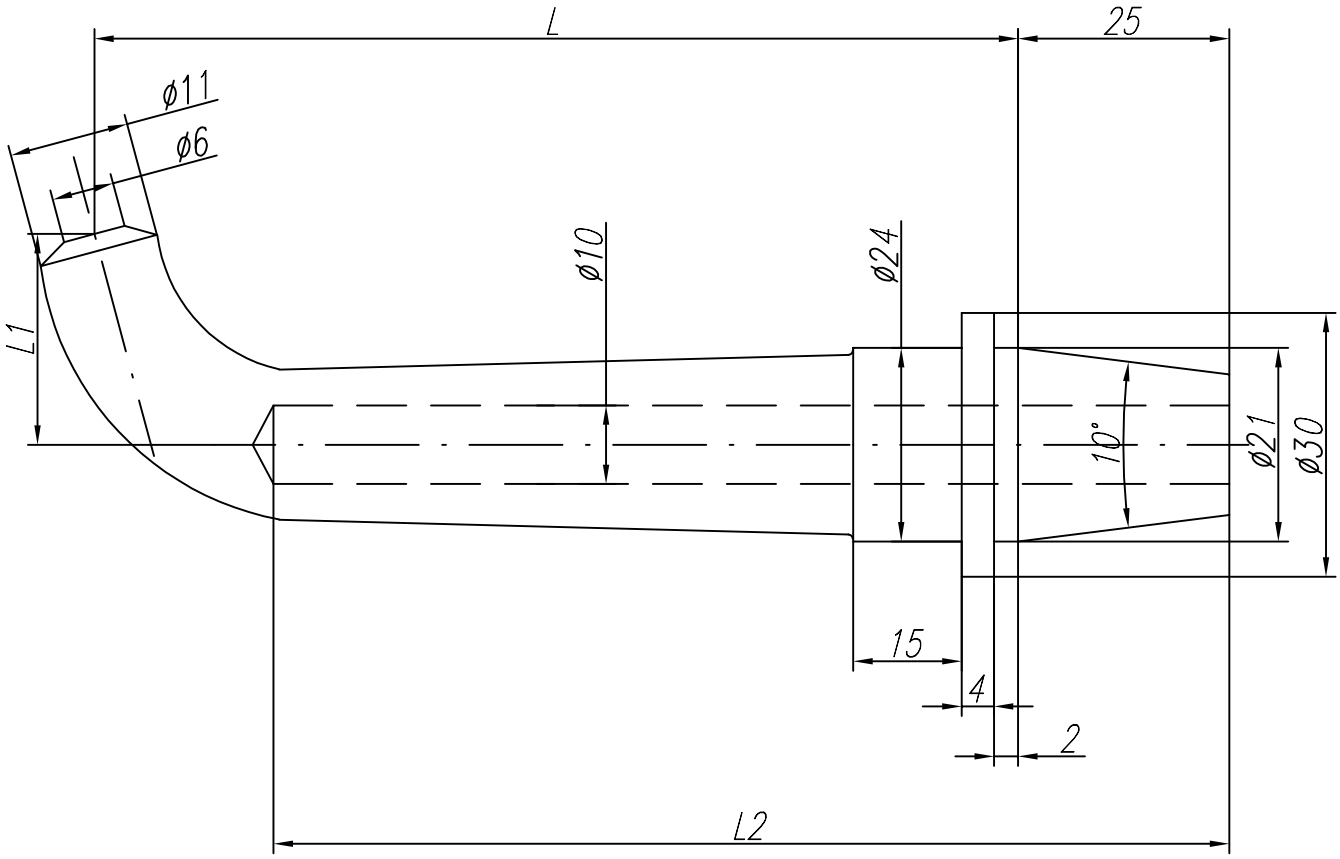




Lp	L	L1	L2	L3		Cecha	Nr rysunku
1	55	32,5	70	50		H-10-0	2-9-7022-72-0
2	60	22	75	55		H-10-1	2-9-7022-72-1
3	60	40	75	55		H-10-2	2-9-7022-72-2

Aspa
ZGRZEWANIE

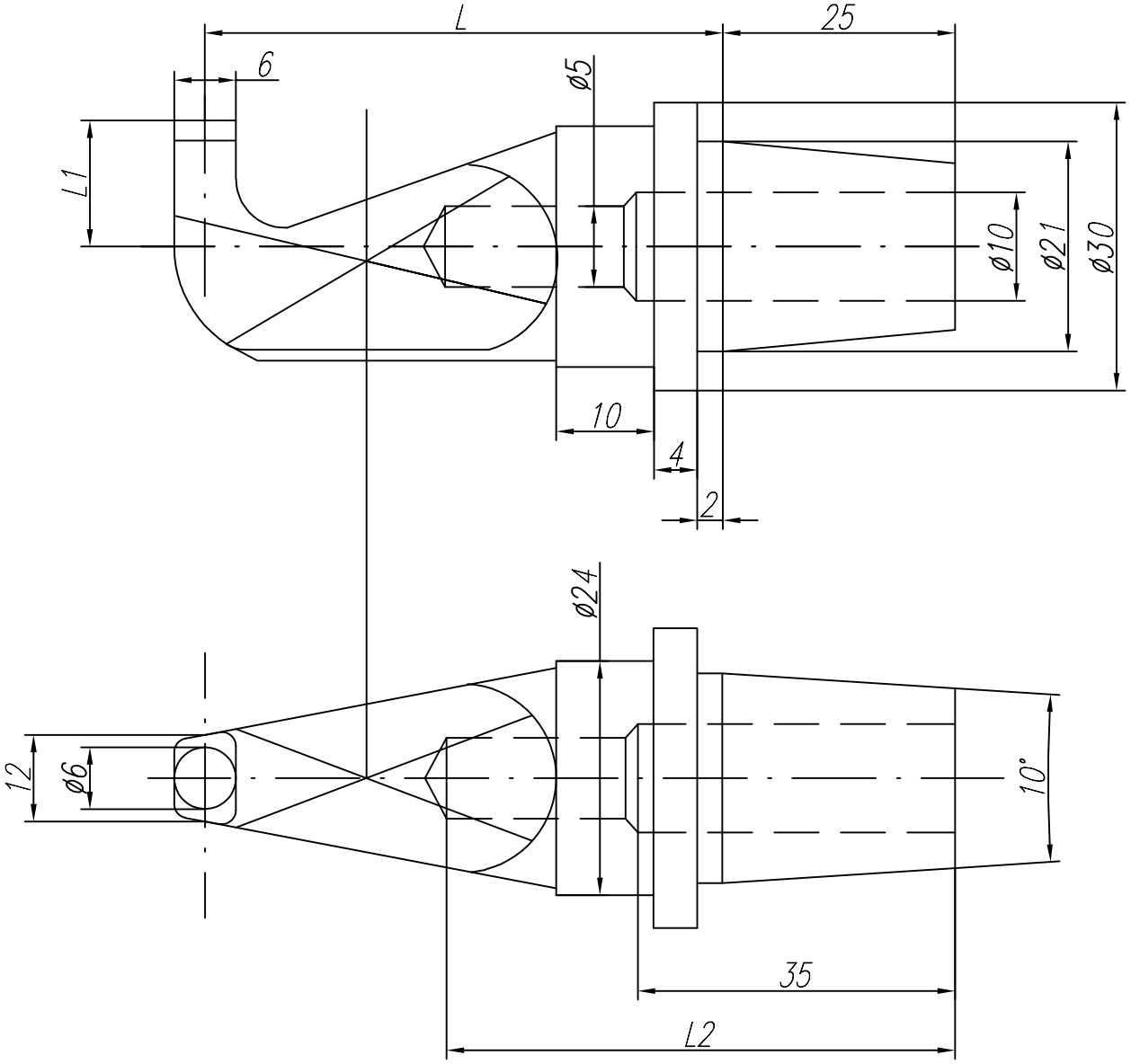
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α	L2		Cecha	Nr rysunku
1*	100	22	15°	105		H-11-0	2-9-7022-71-0
2	100	30	0°	105		H-11-1	2-9-7022-71-1
3*	100	15	0°	105		H-11-2	2-9-7022-71-2

Aspa
ZGRZEWANIE

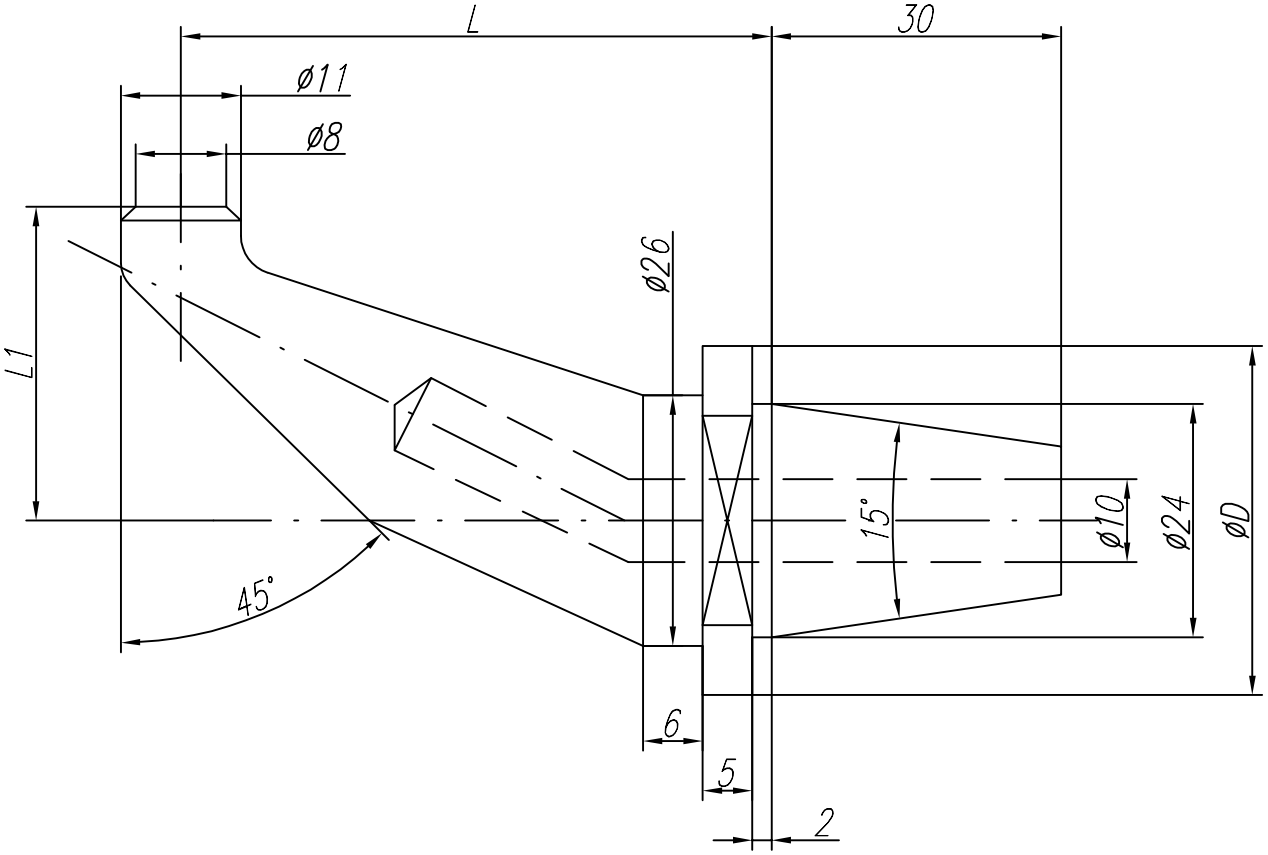
KATALOG
elektrod do zgrzewania oporowego

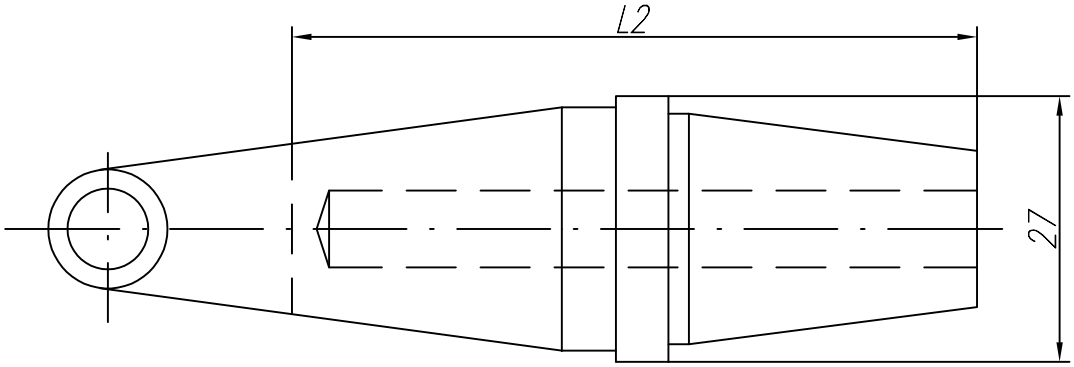


Lp	L	L1	L2		Cecha	Nr rysunku
1*	50	12	53		H-12-0	2-9-7022-74-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

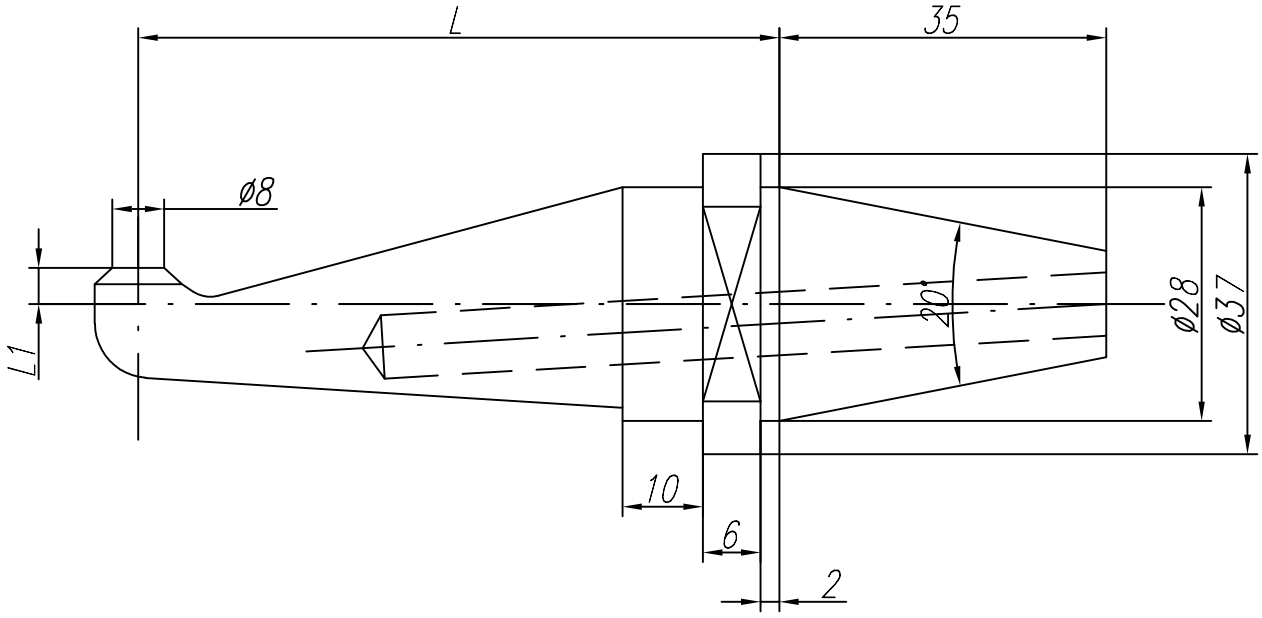


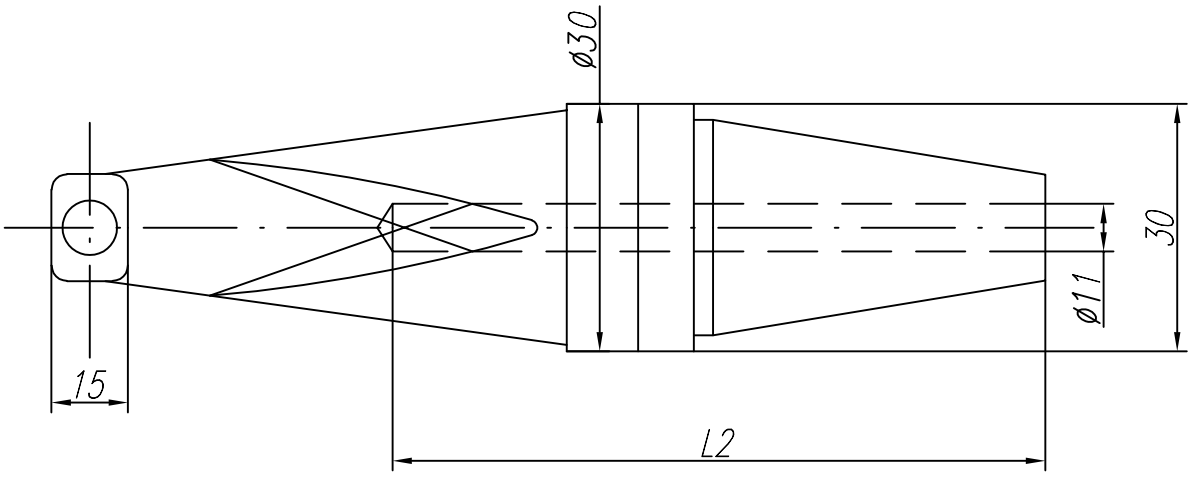


Lp	L	L1	L2	øD		Cecha	Nr rysunku
1	59	31,5	70	36		H-20-0	2-9-7022-65-0
2	59	31,5	70	33,5		H-20-1	2-9-7022-65-1

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

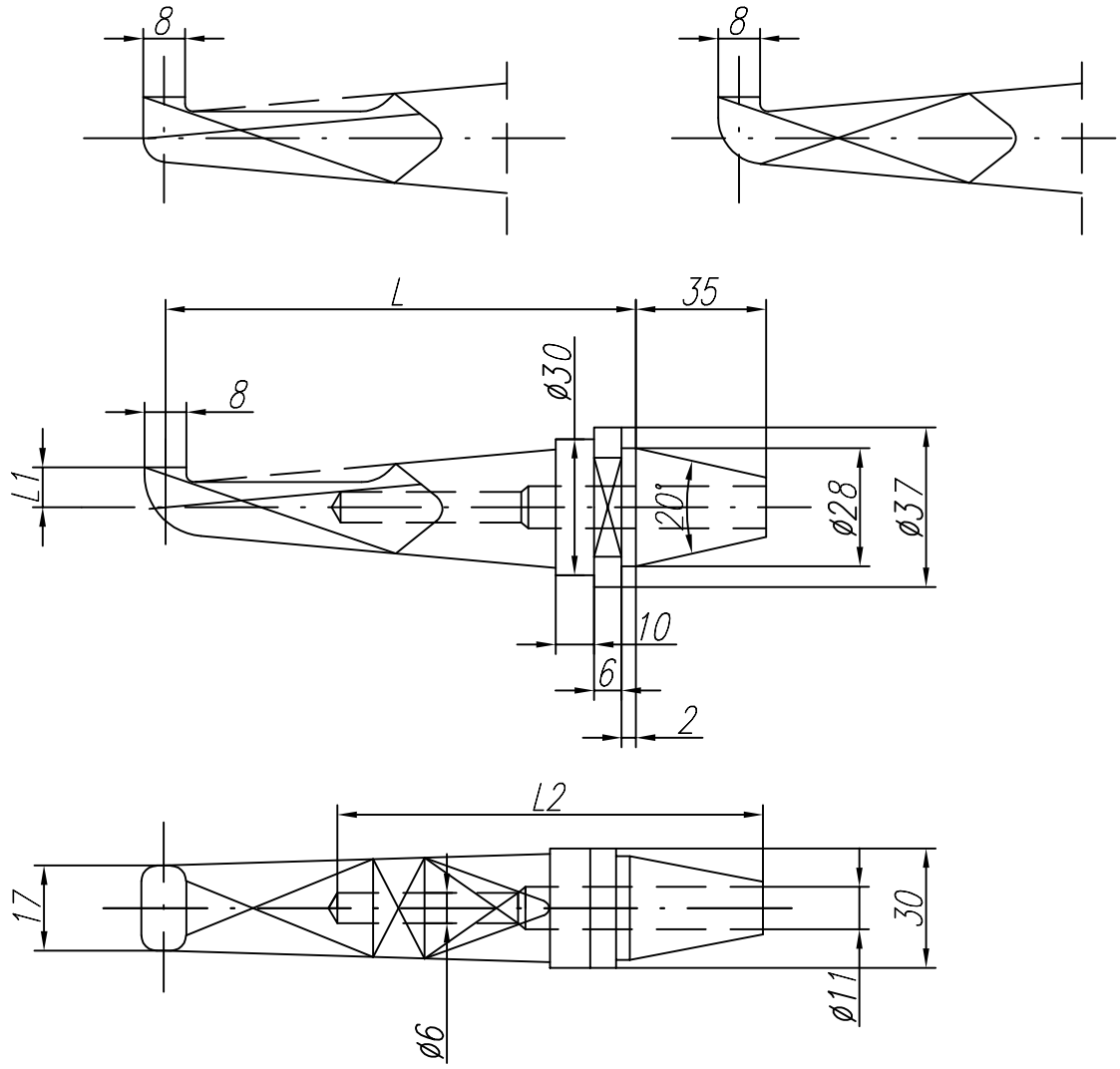




Lp	L	L1	L2		Cecha	Nr rysunku
1*	65	6	80		H-25-0	2-9-7022-70-0

Aspa
ZGRZEWANIE

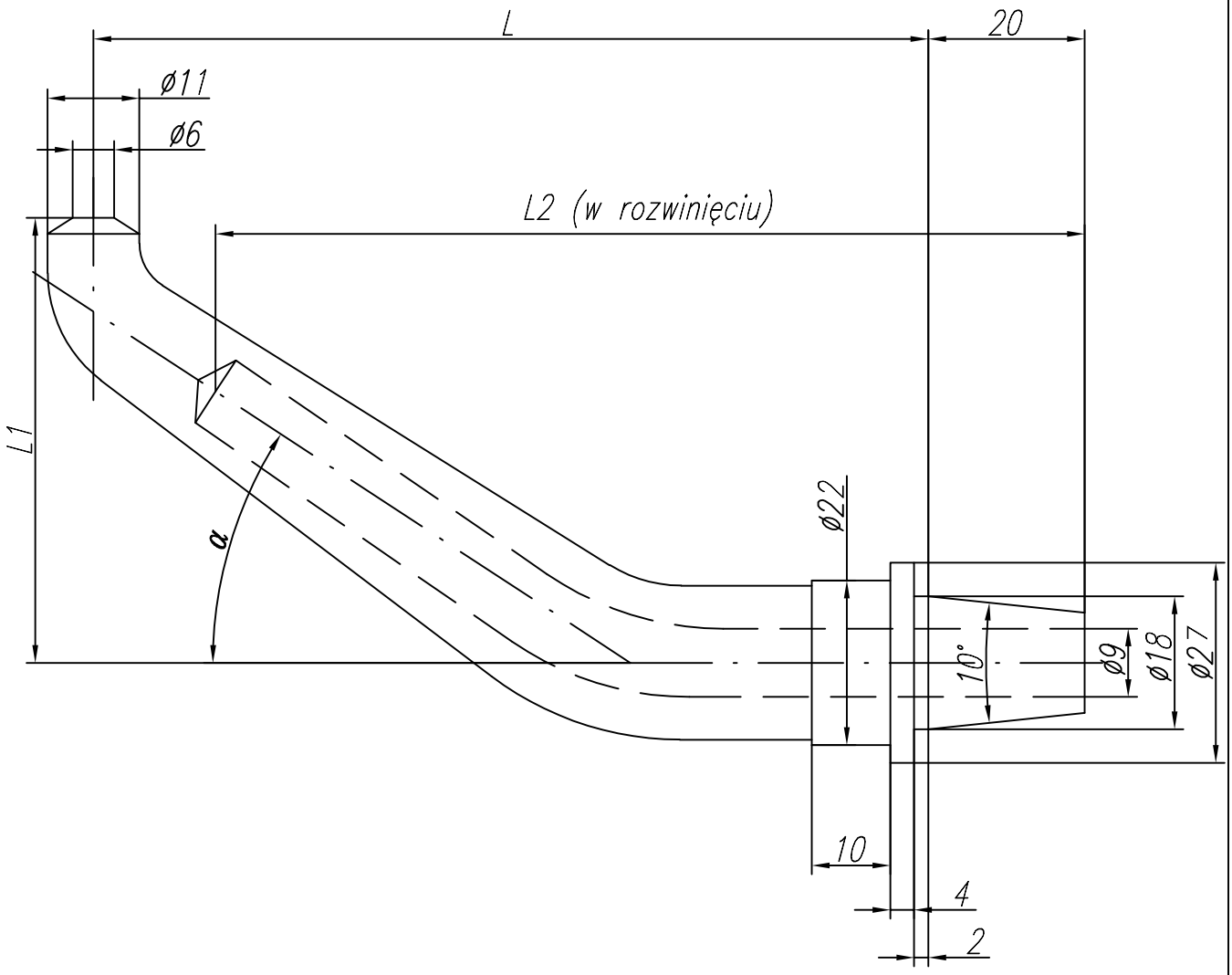
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	Wykonanie	L2		Cecha	Nr rysunku
1	105	12	A	120		H-26-0	2-9-7022-79-0
2	105	12	B	--		H-26-1	2-9-7022-79-1
3	105	12	B	125		H-26-2	2-9-7022-79-2

Aspa
ZGRZEWANIE

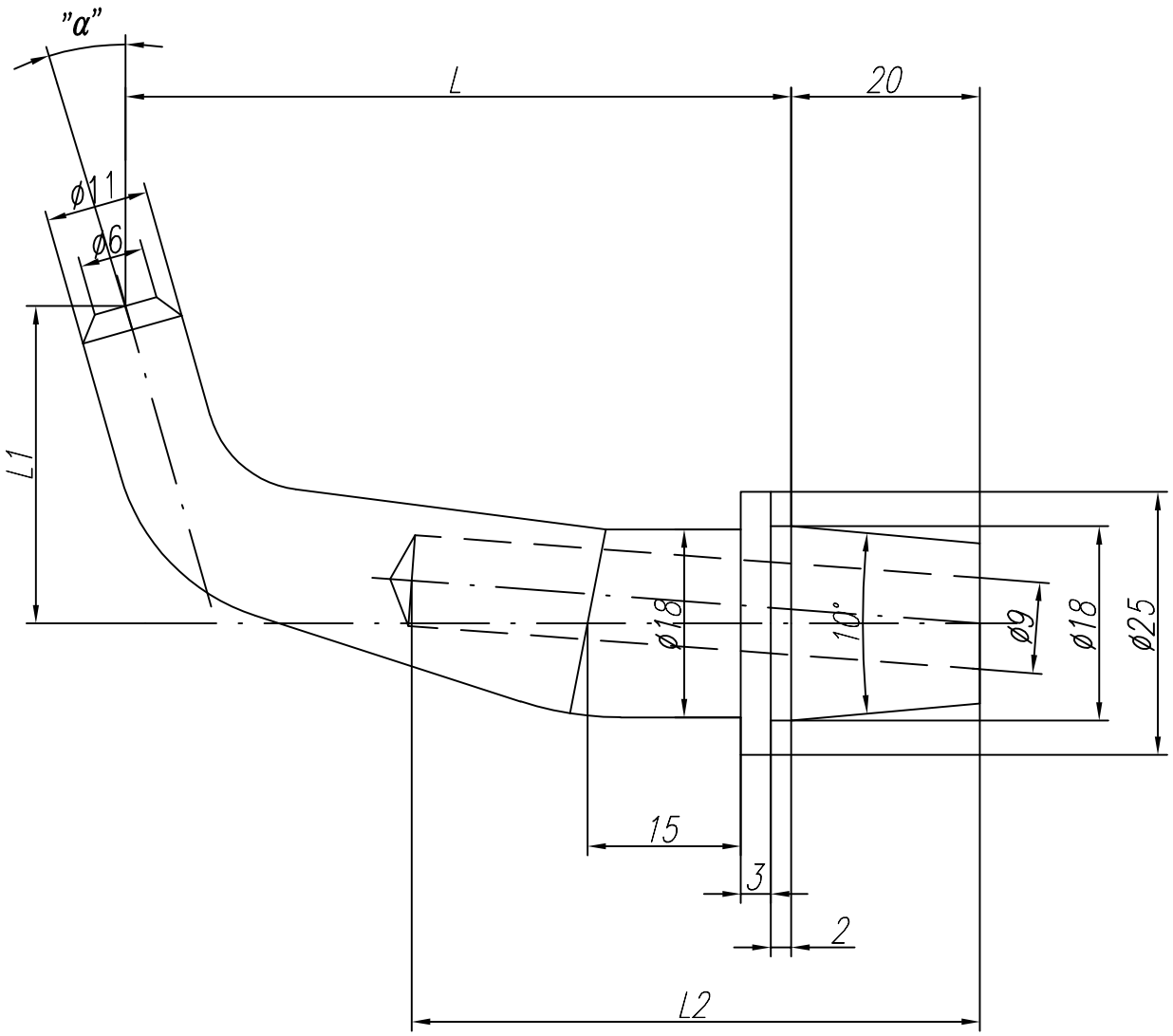
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α	L1		Cecha	Nr rysunku
1	105	58,6	35°	120		H-30-0	2-9-7022-80-0
2	75	35	30°	85		H-30-1	2-9-7022-80-1
3	120	45	35°	85		H-30-2	2-9-7022-80-2

Aspa
ZGRZEWANIE

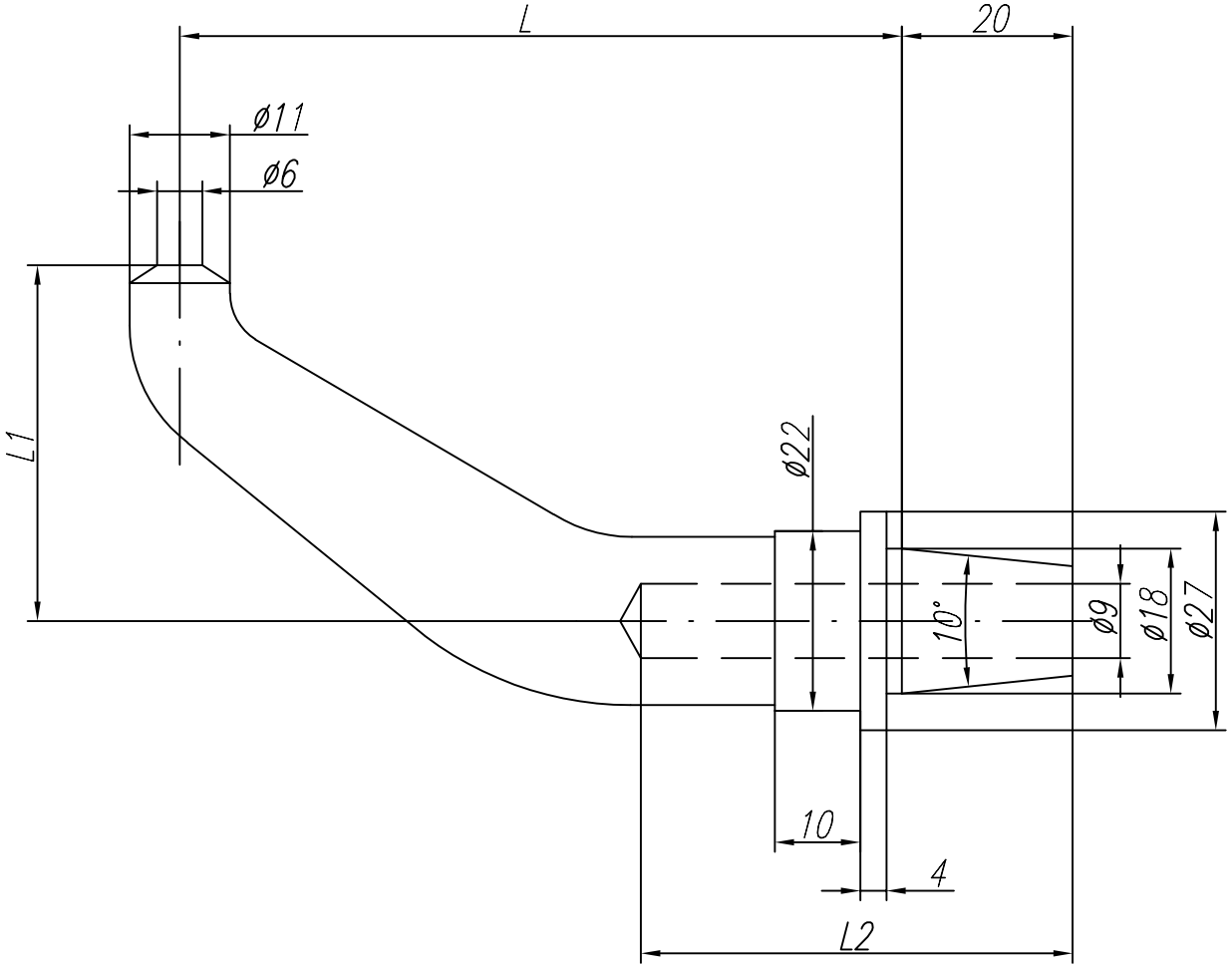
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α	L2		Cecha	Nr rysunku
1	64	31	15°	60		H-34-0	2-9-7022-87-0

Aspa
ZGRZEWANIE

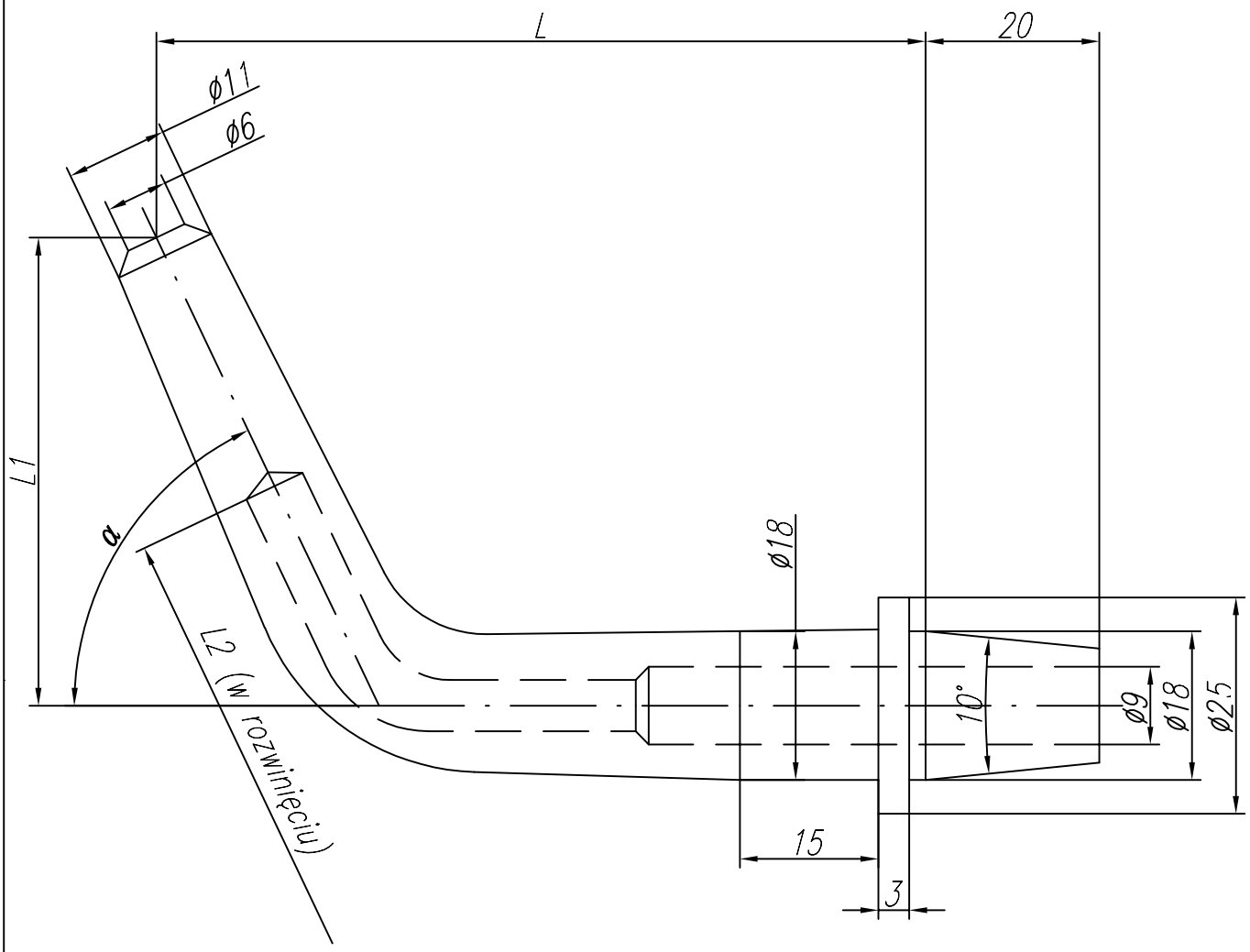
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2		Cecha	Nr rysunku
1	60	35	43		H-35-0	2-9-7022-88-0

Aspa
ZGRZEWANIE

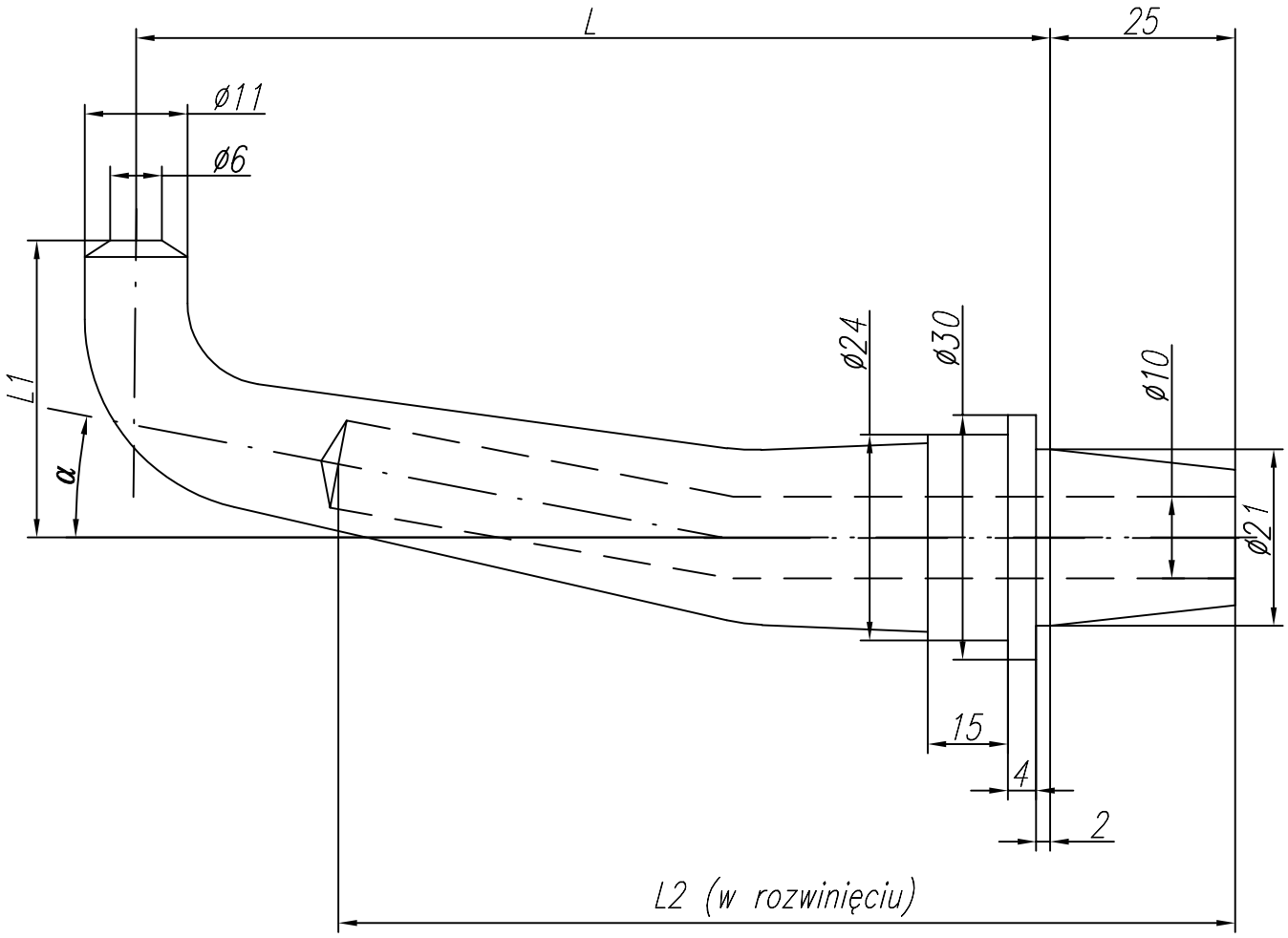
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	α		Cecha	Nr rysunku
1	82	50	110	65°		H-36-0	2-9-7022-12-0

Aspa
ZGRZEWANIE

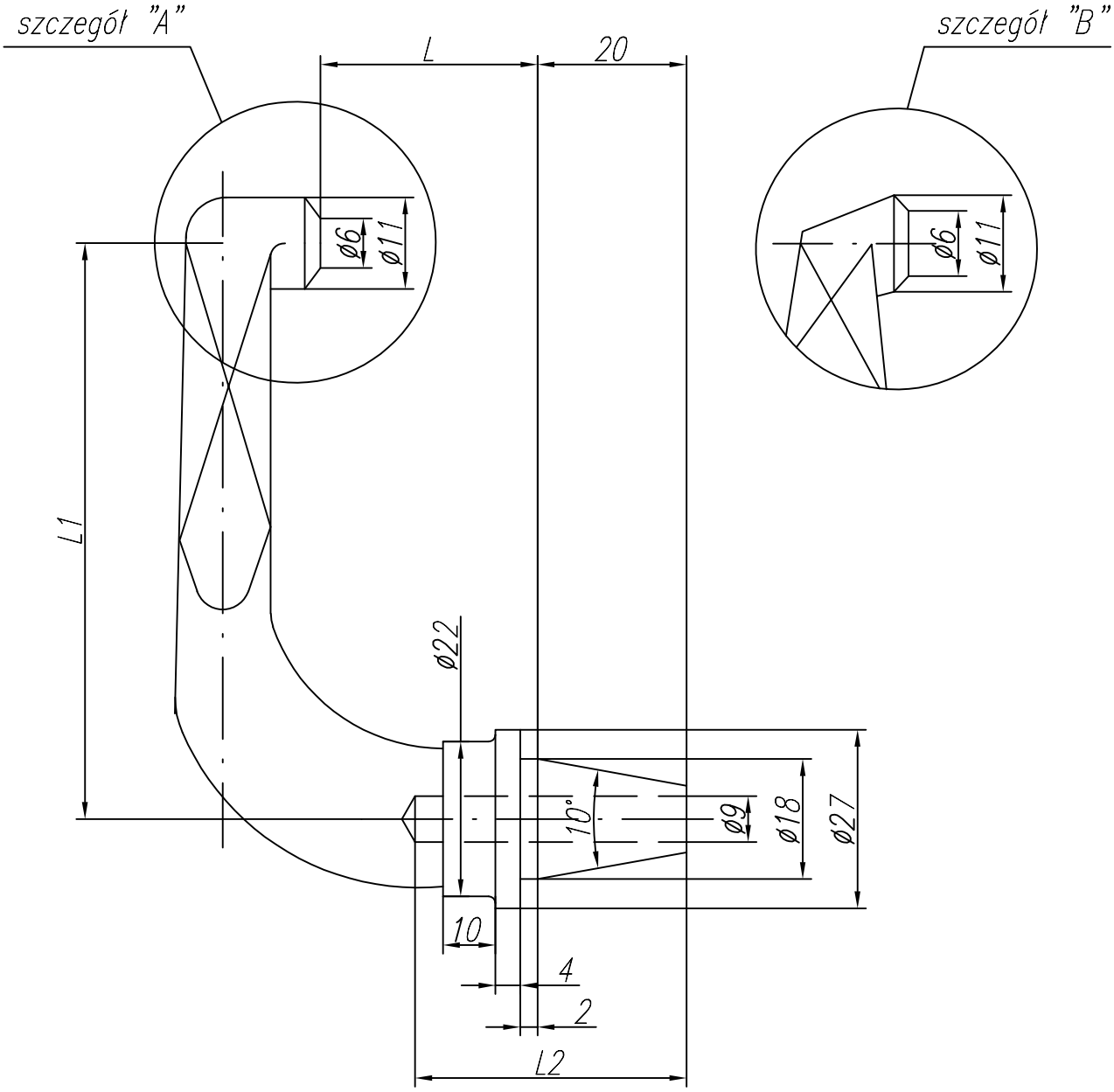
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	α		Cecha	Nr rysunku
1	115	35	117	10°		H-38-0	2-9-7022-75-0

Aspa
ZGRZEWANIE

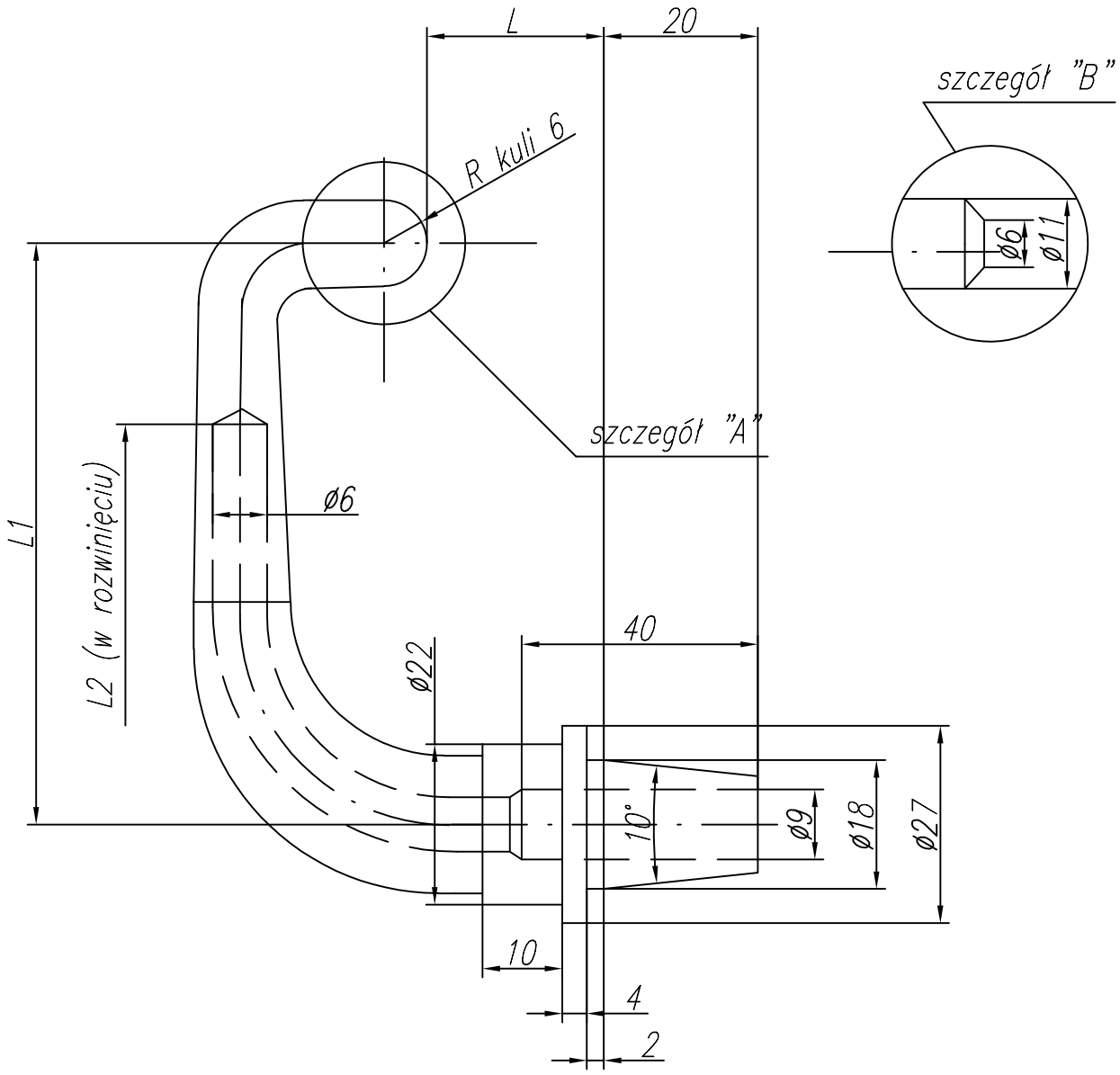
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	Szczegół	L2		Cecha	Nr rysunku
1	40	65	"B"	45		H-40-0	2-9-7022-82-0
2	31,5	75	"A"	42		H-40-1	2-9-7022-82-1

Aspa
ZGRZEWANIE

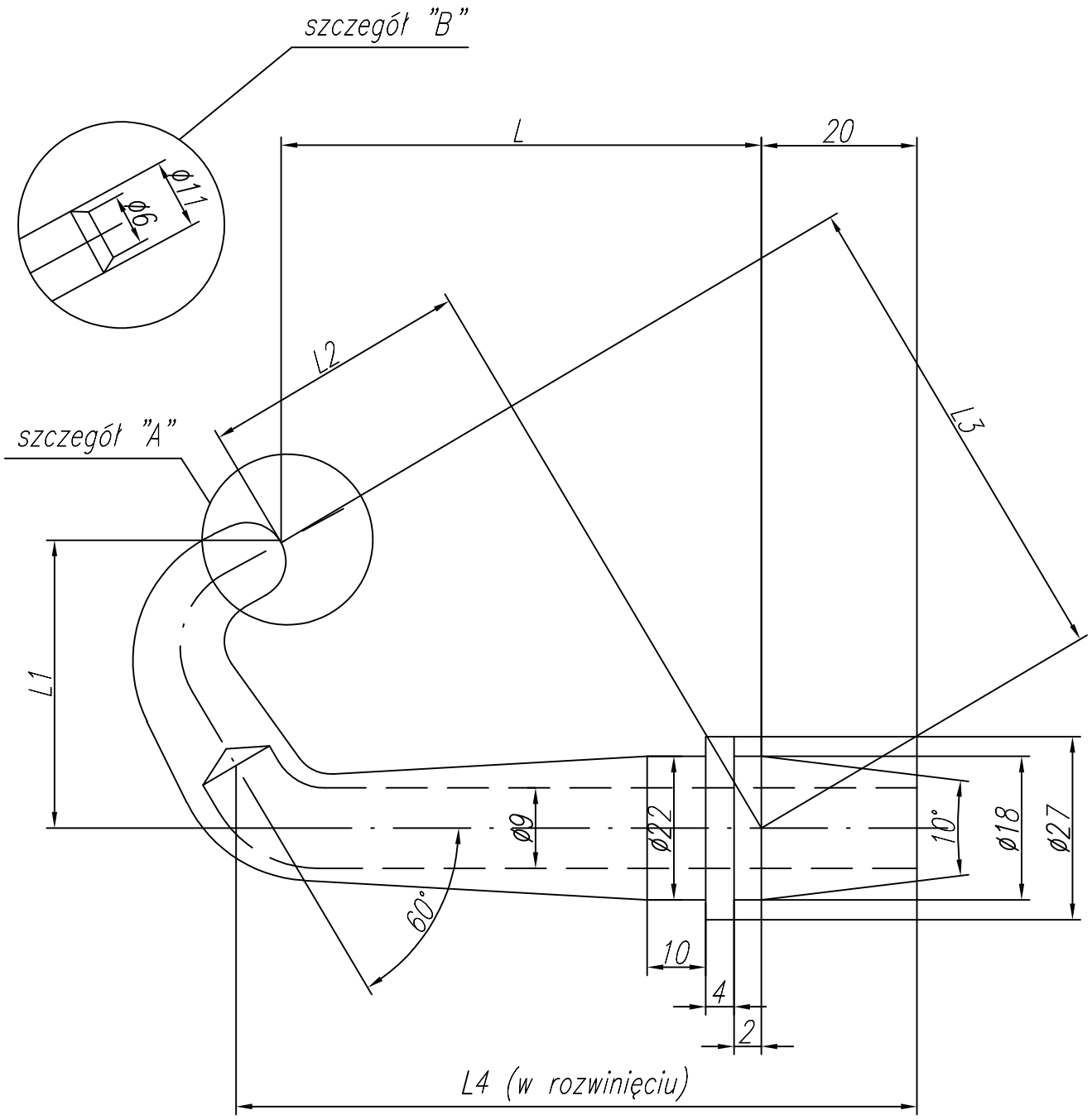
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	Szczegół	L2		Cecha	Nr rysunku
1	20	75	"A"	115		H-41-0	2-9-7022-90-0
2	32	90	"B"	135		H-41-1	2-9-7022-90-1
2	--	100	"A"	135		H-41-2	2-9-7022-90-2
2	32	100	"A"	135		H-41-3	2-9-7022-90-3

Aspa
ZGRZEWANIE

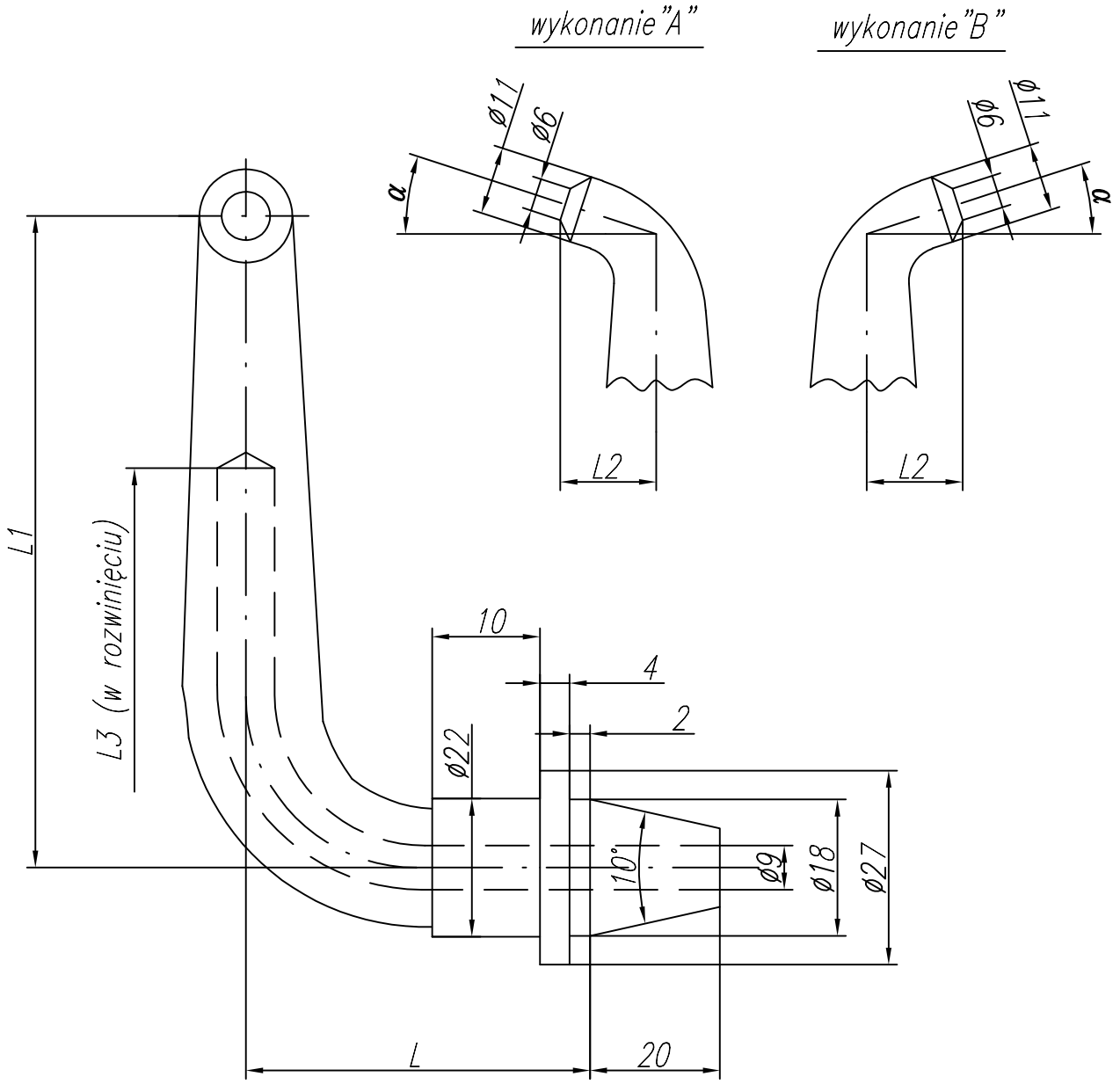
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3	Szczegół	L4		Cecha	Nr rysunku
1	54,6	54,6	20	74,5	"B"	105		H-42-0	2-9-7022-86-0
2	57,8	35,4	32	59,5	"B"	60		H-42-1	2-9-7022-86-1
3	62	43,5	32	68,5	"A"	65		H-42-2	2-9-7022-86-2
4*	69	27	46	58	"B"	85		H-42-3	2-9-7022-86-3

Aspa
ZGRZEWANIE

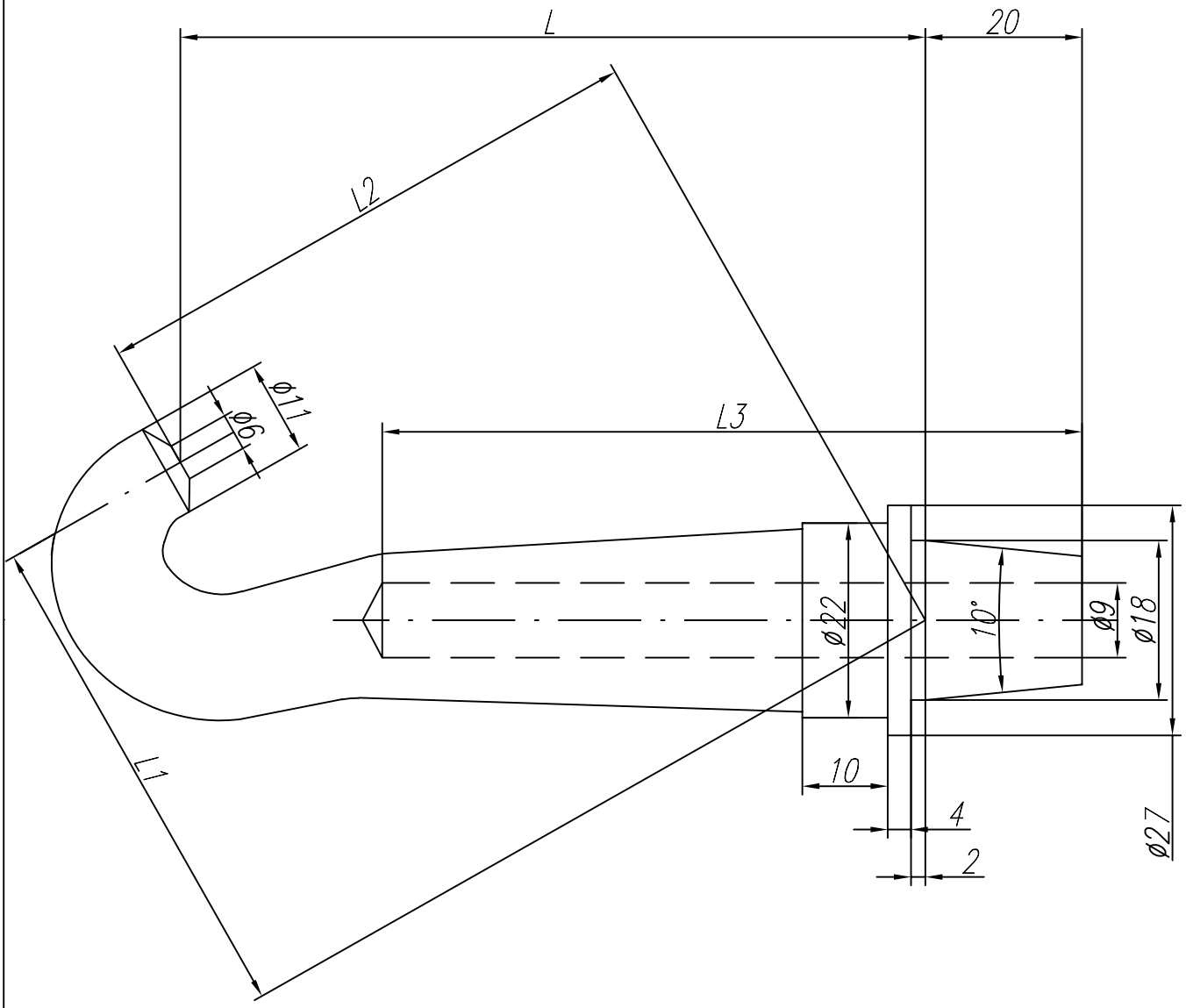
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	Wykonanie	α	L3		Cecha	Nr rysunku
1	55	95	25	"A"	15°	130		H-44-0	2-9-7022-78-0
2	55	95	25	"B"	15°	130		H-44-1	2-9-7022-78-1

Aspa
ZGRZEWANIE

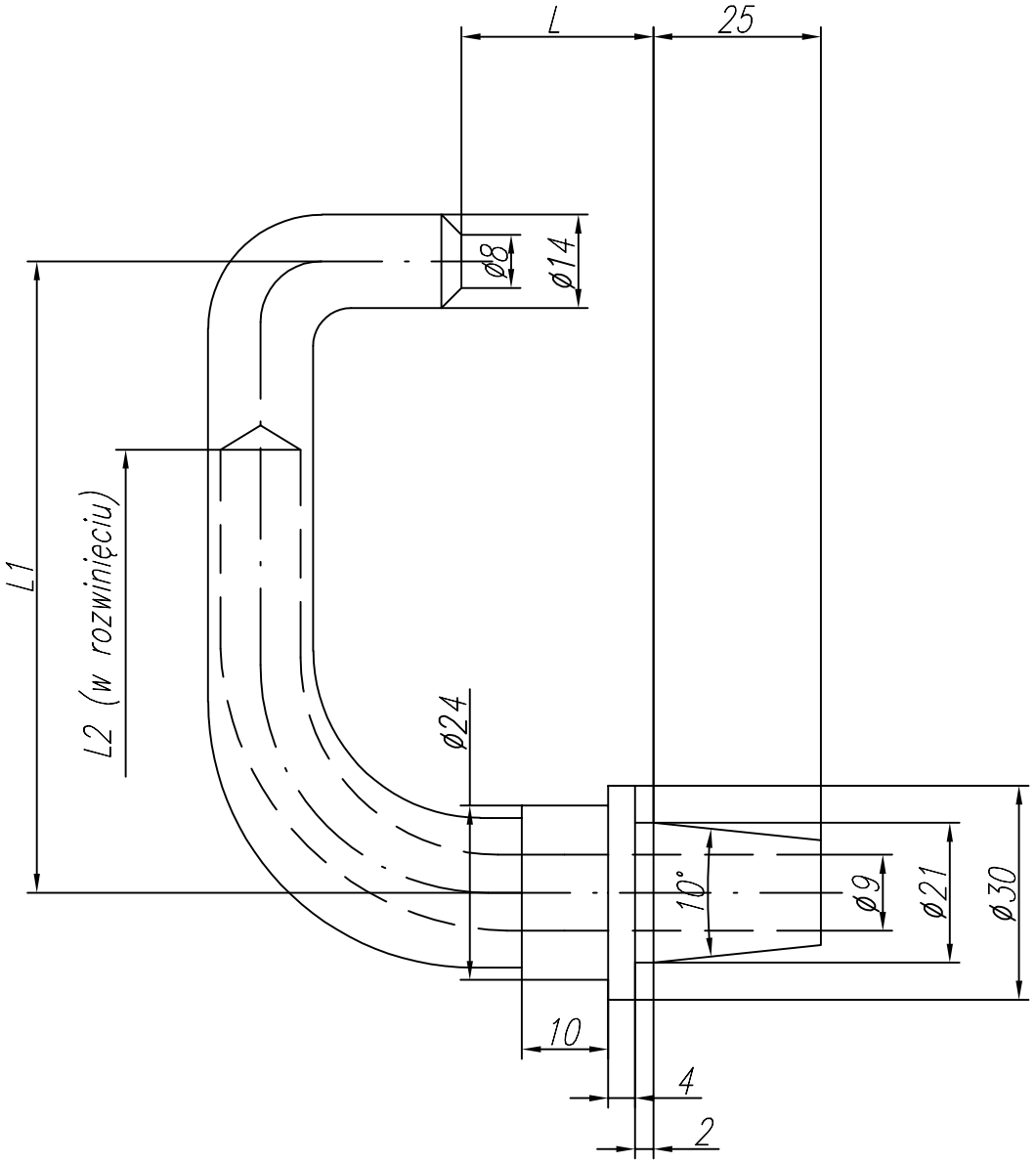
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3		Cecha	Nr rysunku
1	88	60	67	85		H-45-0	2-9-7022-76-0

Aspa
ZGRZEWANIE

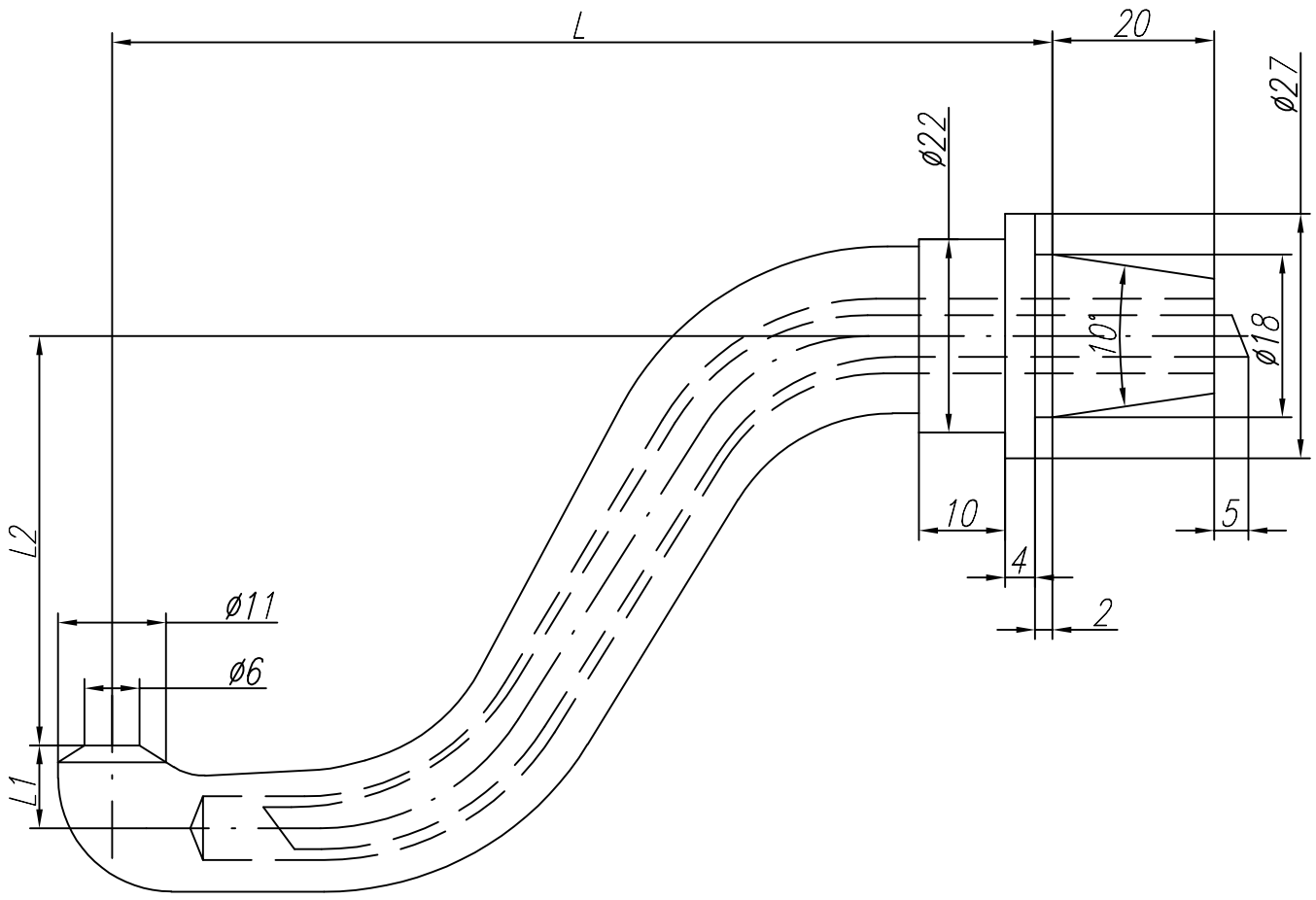
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2		Cecha	Nr rysunku
1*	35	90	135		H-47-0	2-9-7022-73-0

Aspa
ZGRZEWANIE

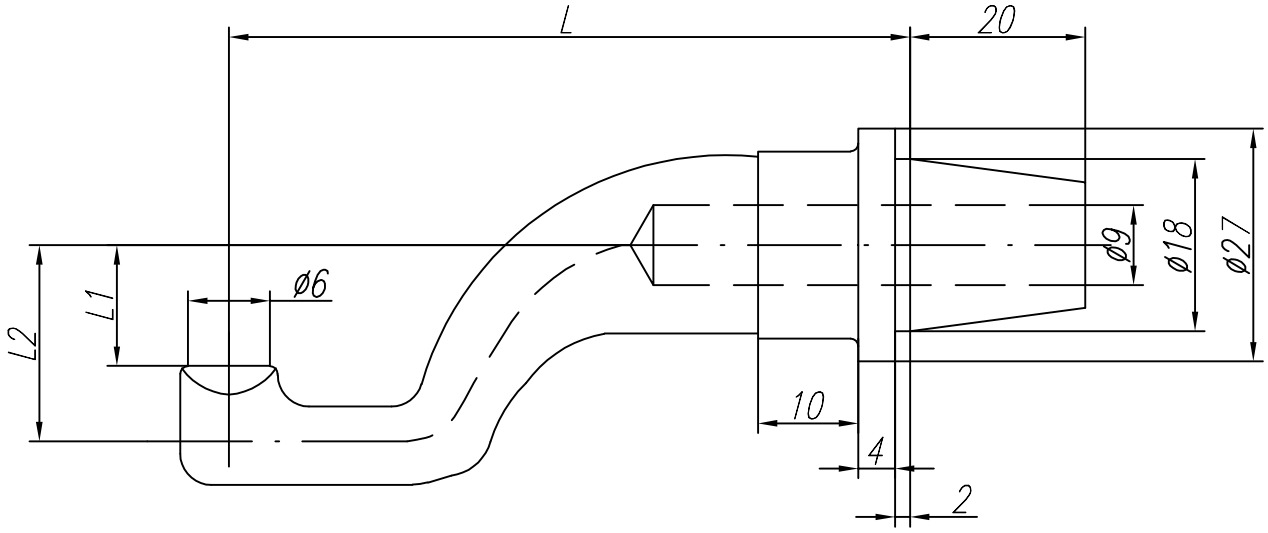
KATALOG
elektrod do zgrzewania oporowego

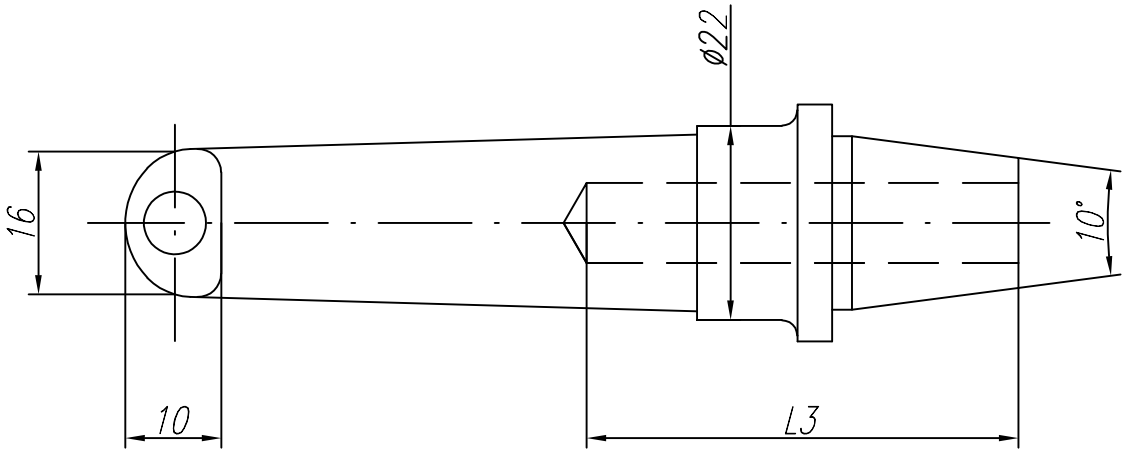


Lp	L	L1	L2		Cecha	Nr rysunku
1*	105	11	44		H-50-0	2-9-1197-17-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

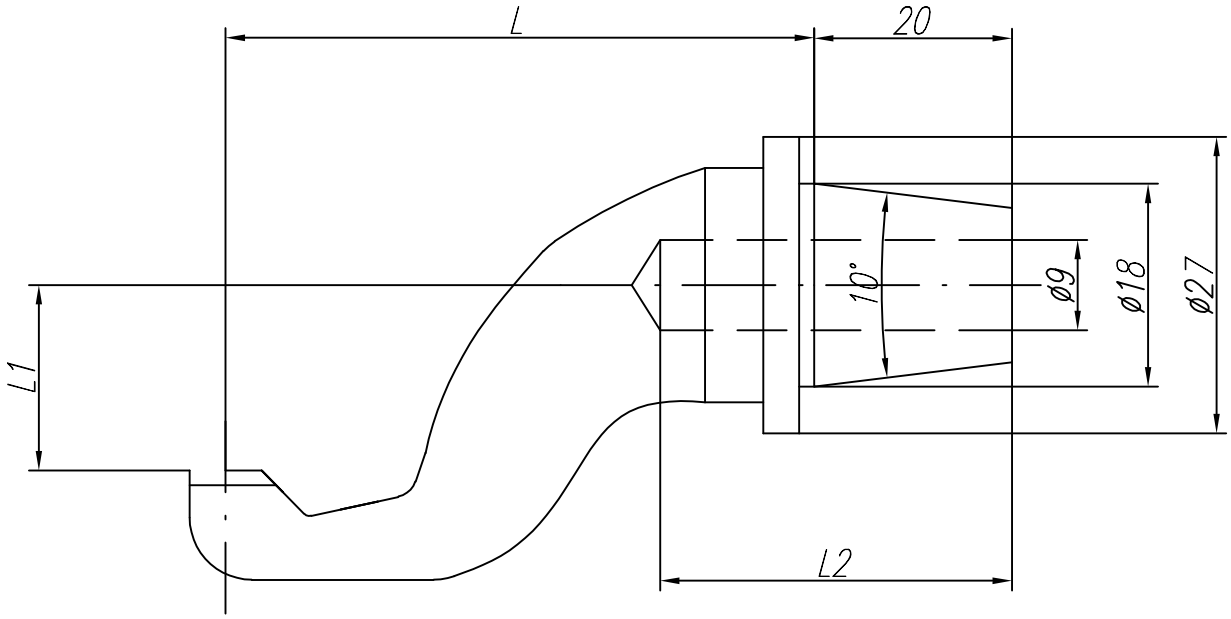


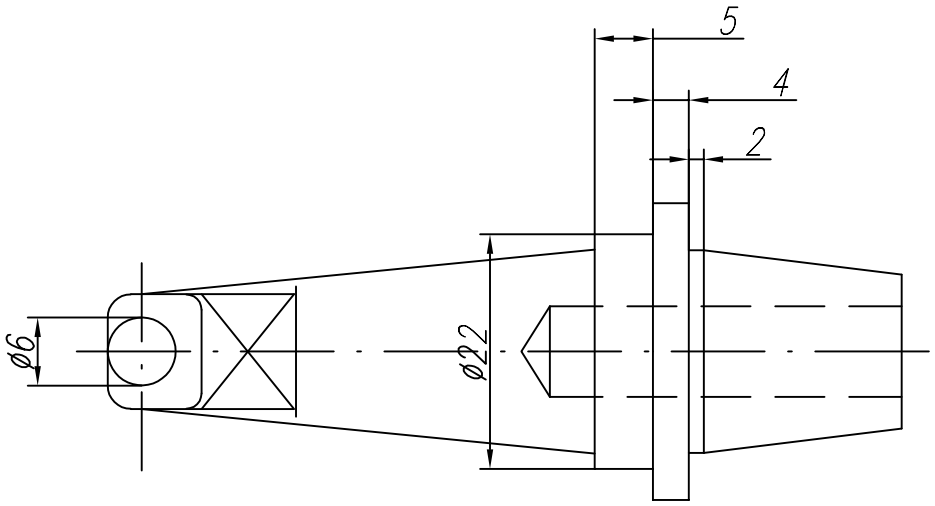


Lp	L	L1	L2	L3		Cecha	Nr rysunku
1*	75	15	22	48		H-51-0	2-9-7022-94-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

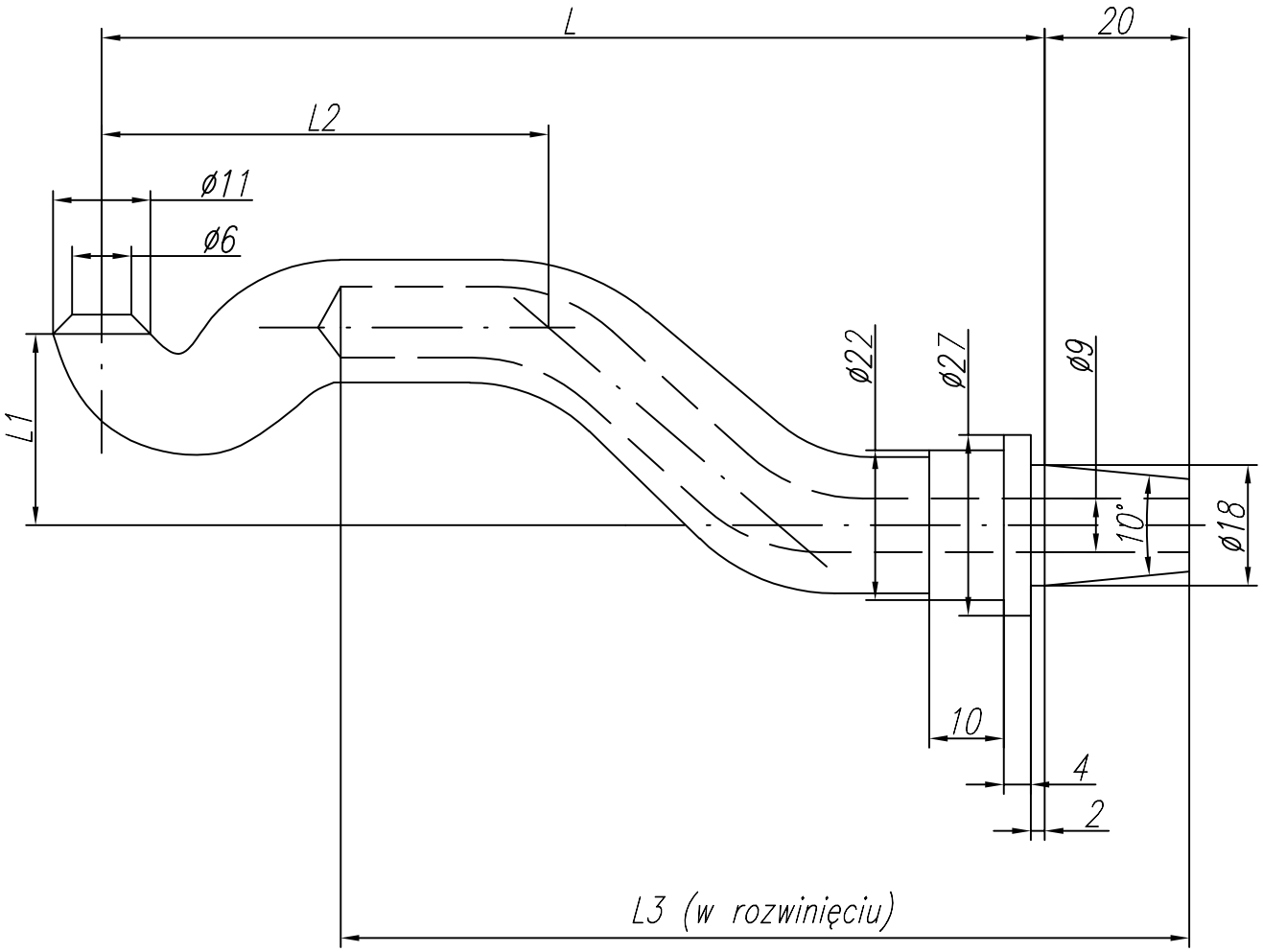




Lp	L	L1	L2		Cecha	Nr rysunku
1*	55	17	35		H-52-0	2-9-7022-93-0

Aspa
ZGRZEWANIE

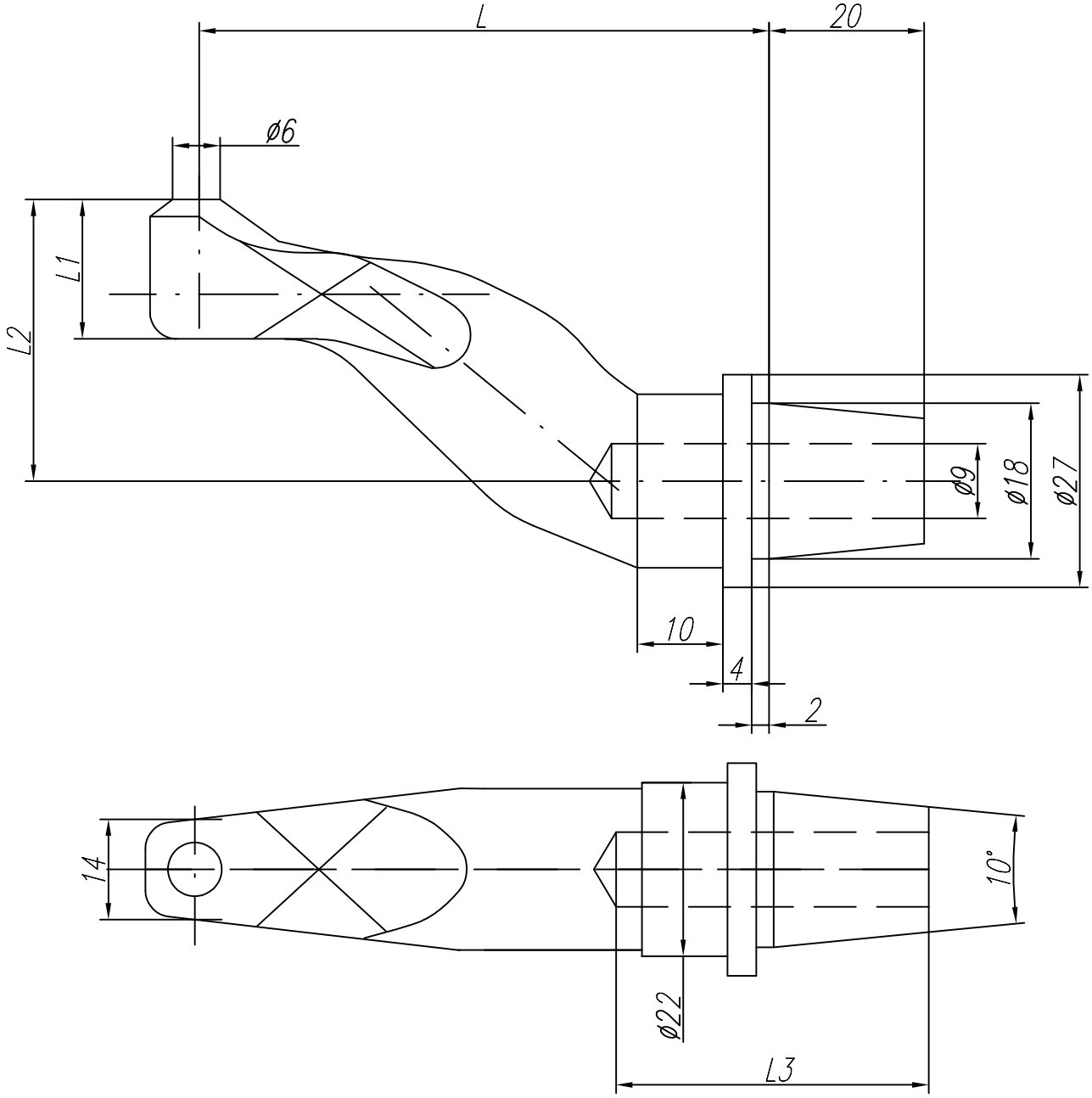
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3		Cecha	Nr rysunku
1*	120	25	55	118		H-53-0	2-9-7022-66-0

Aspa
ZGRZEWANIE

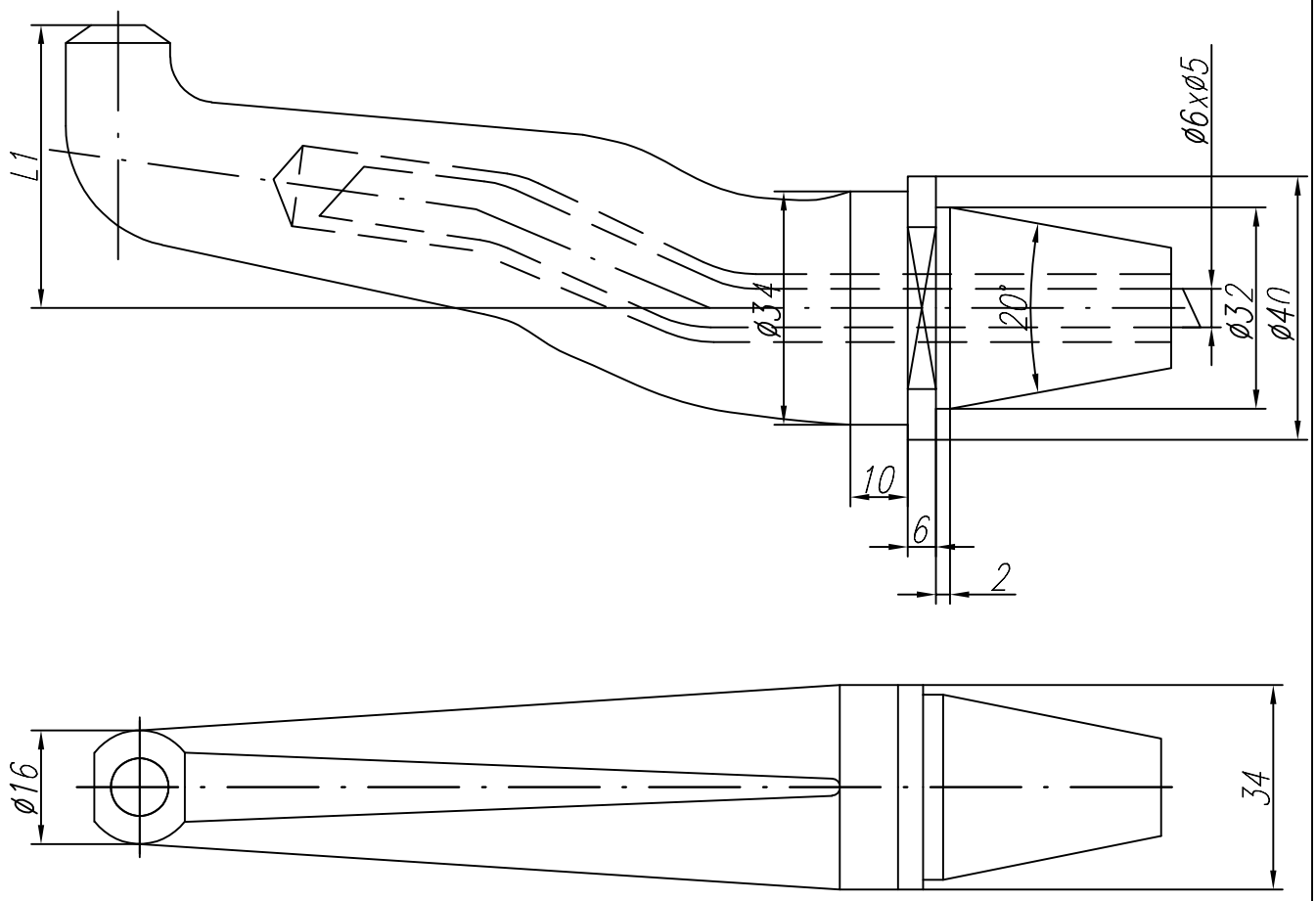
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3		Cecha	Nr rysunku
1*	65	15	28	40		H-54-0	2-9-7022-92-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

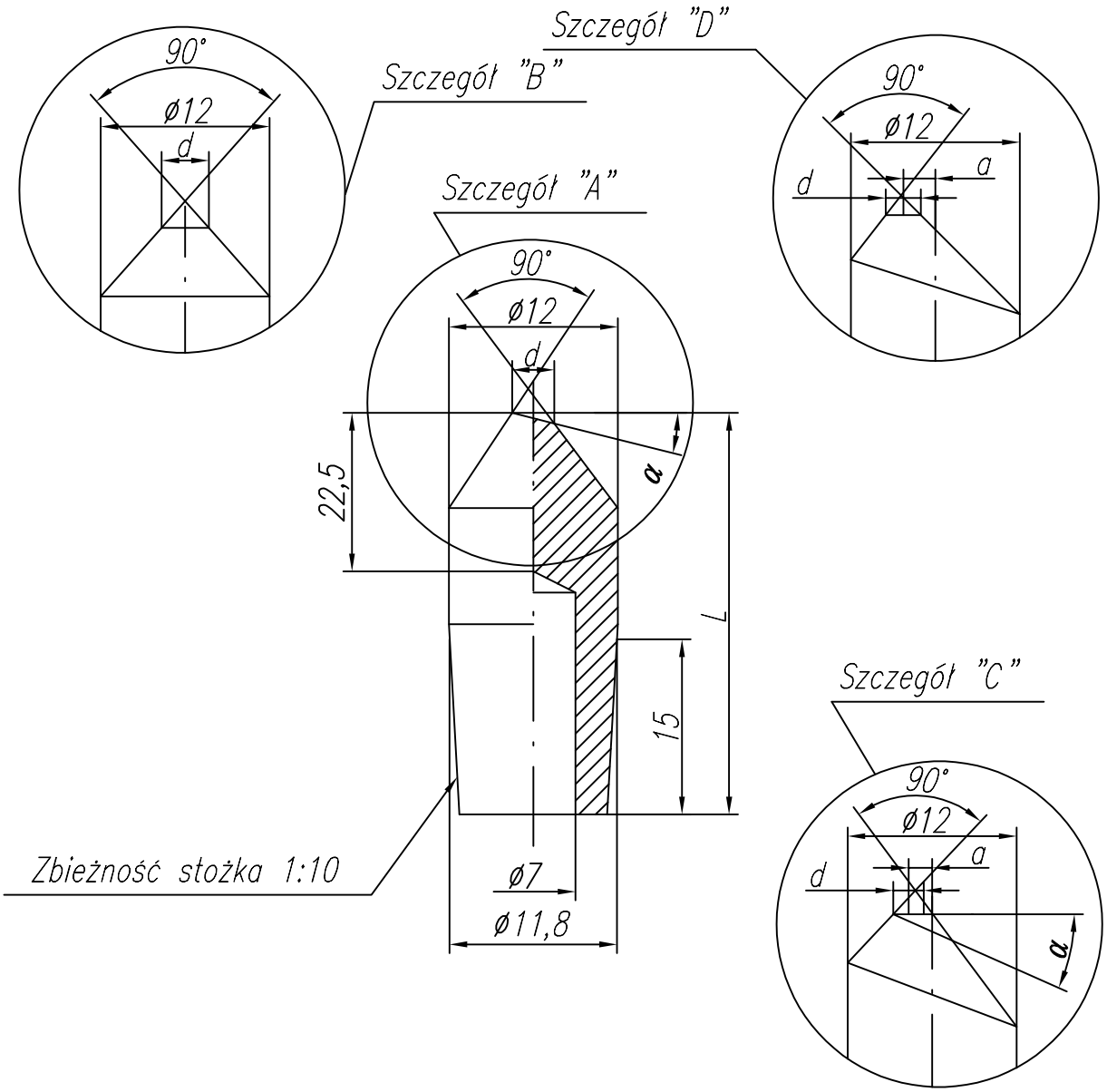


Lp	L	L1		Cecha	Nr rysunku
1*	126	40		H-59-0	2-7-1197-18-0

Elektrody specjalne

Aspa
ZGRZEWANIE

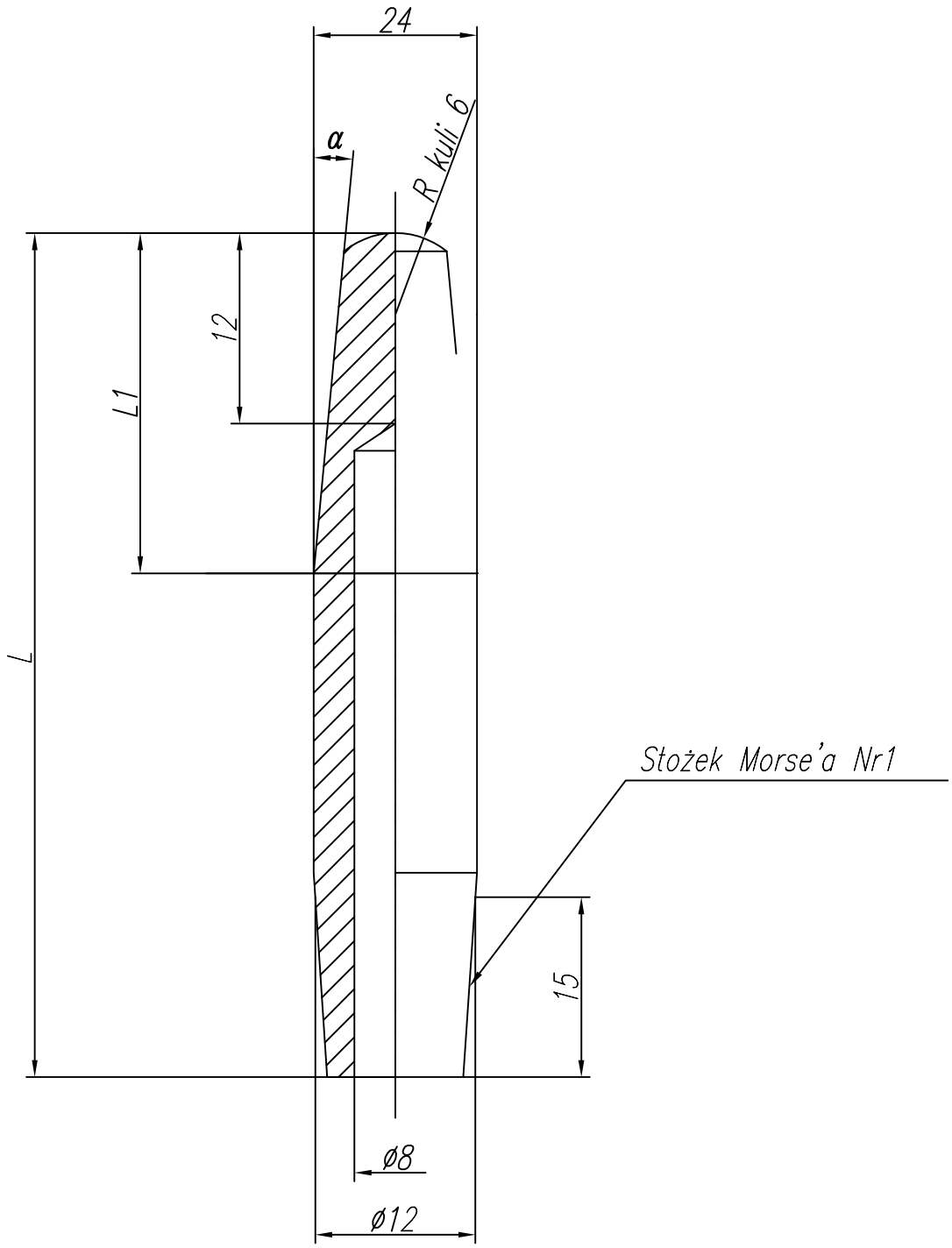
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d	a	α	Szczegół		Cecha	Nr rysunku
1	30	ø3	–	15°	A		S–01–0	2–9–1622–64–0
2	40	ø3	–	–	B		S–01–1	2–9–1622–64–1
3	50	ø3	–	–	B		S–01–2	2–9–1622–64–2
4	50	ø3	3	–	D		S–01–3	2–9–1622–64–3
5	55	ø3	3	20°	C		S–01–4	2–9–1622–64–4
6	55	ø3	–	–	B		S–01–5	2–9–1622–64–5
7	60	ø3	3	–	D		S–01–6	2–9–1622–64–6

Aspa
ZGRZEWANIE

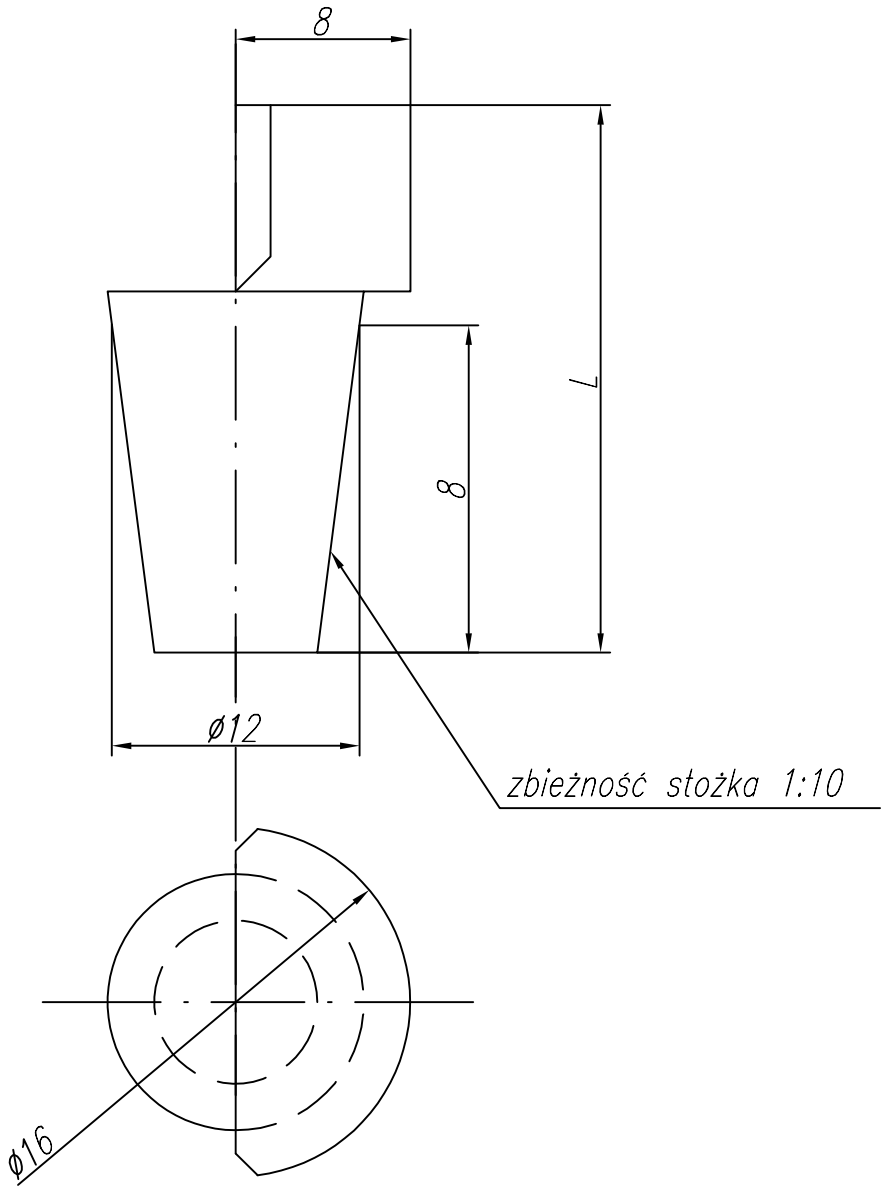
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	α		Cecha	Nr rysunku
1	65	--	--		S-02-0	2-9-1622-53-0
2	75	--	--		S-02-1	2-9-1622-53-1
3	85	25	5°		S-02-2	2-9-1622-53-2

Aspa
ZGRZEWANIE

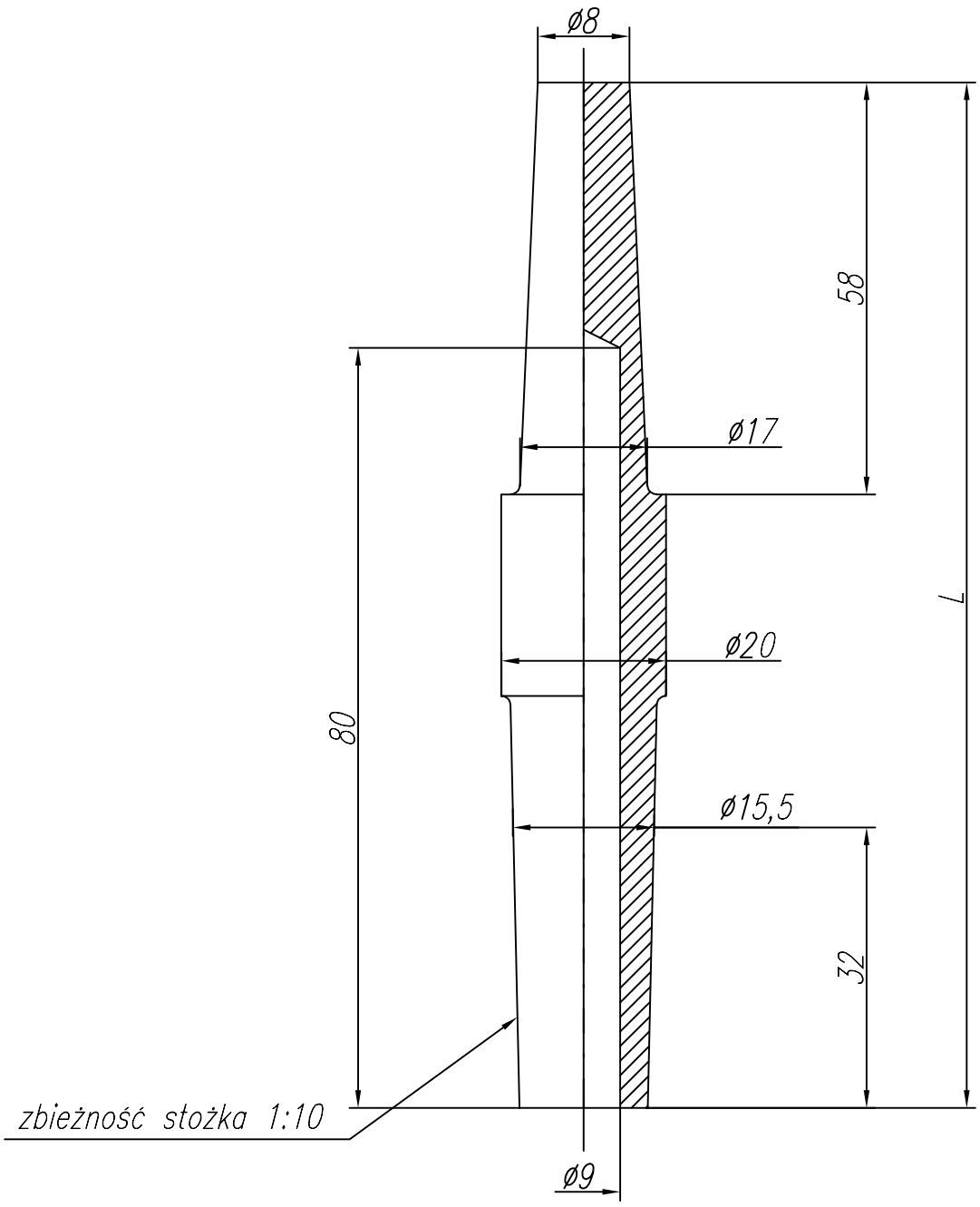
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	20		S-03-0	2-9-1622-63-0

Aspa
ZGRZEWANIE

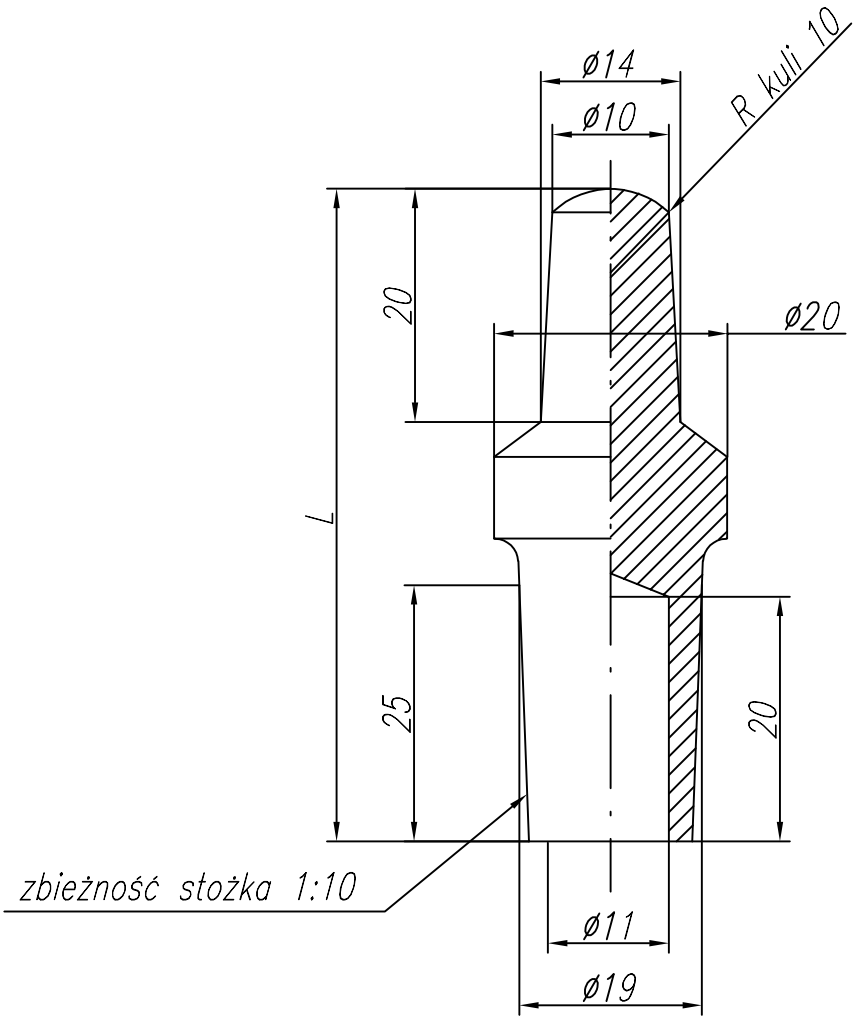
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	140		S-04-0	2-9-1622-61-0

Aspa
ZGRZEWANIE

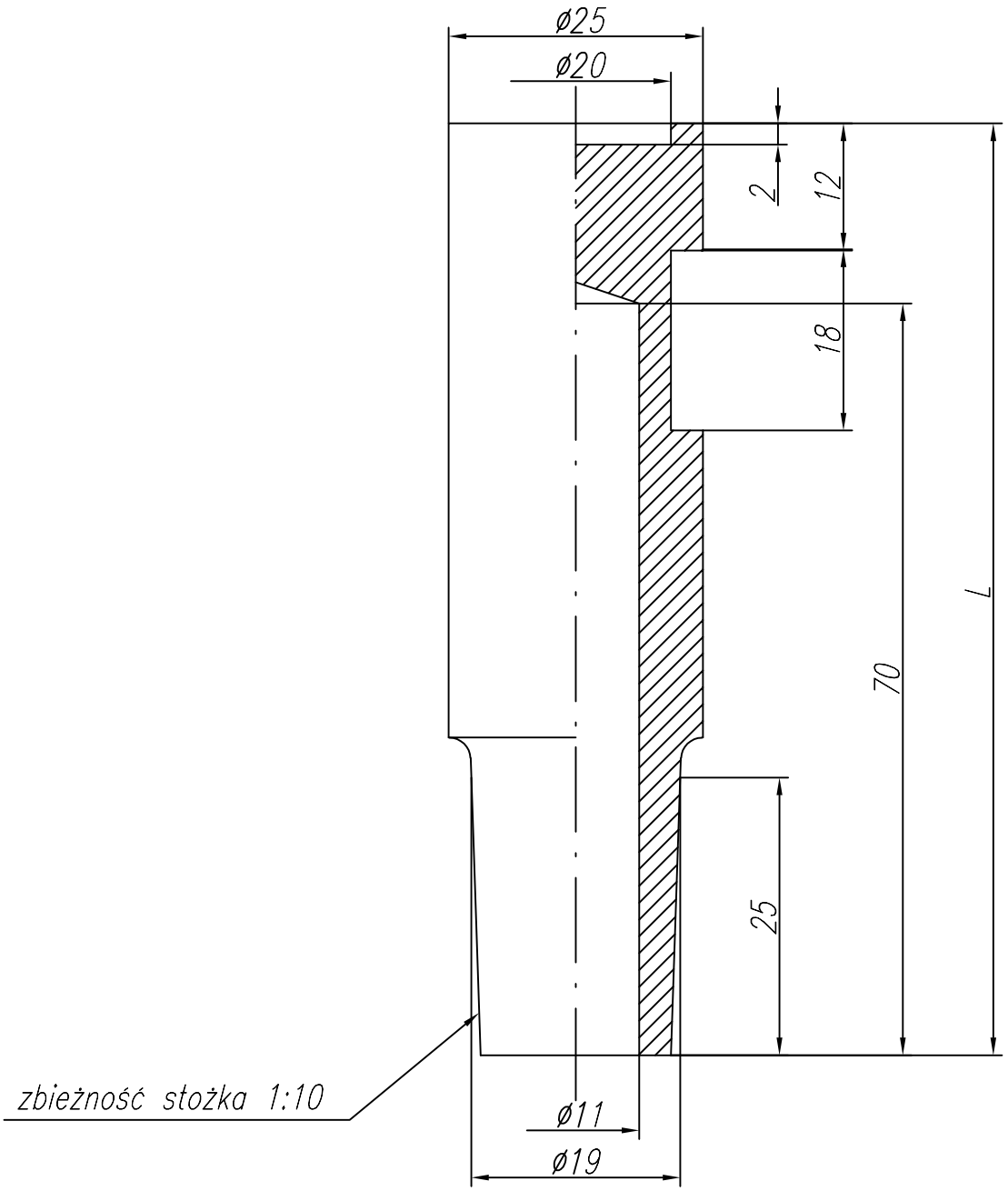
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	50		S-05-0	2-9-1622-54-0

Aspa
ZGRZEWANIE

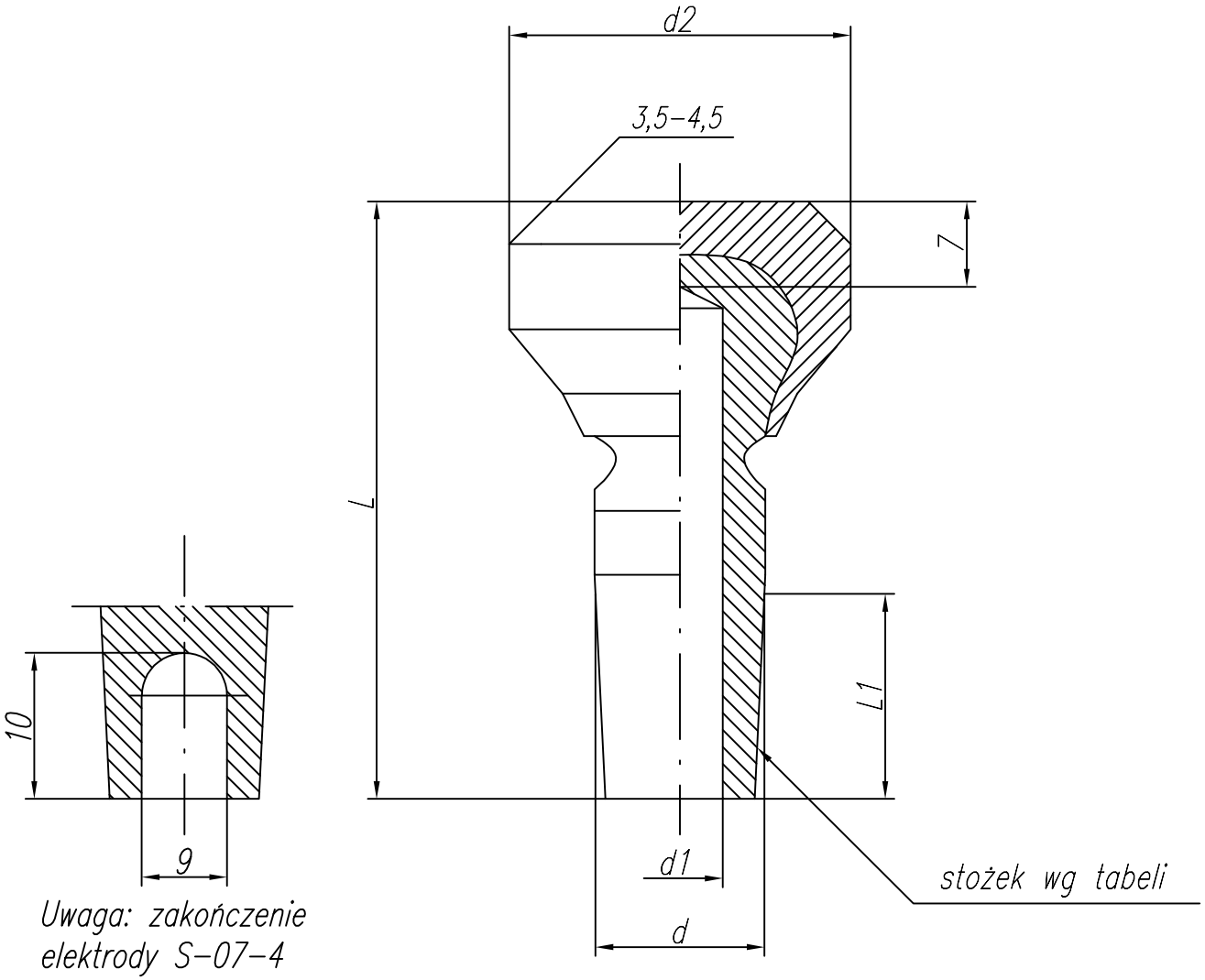
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	85		S-06-0	2-9-1622-65-0

Aspa
ZGRZEWANIE

KATALOG
elektrod do zgrzewania oporowego

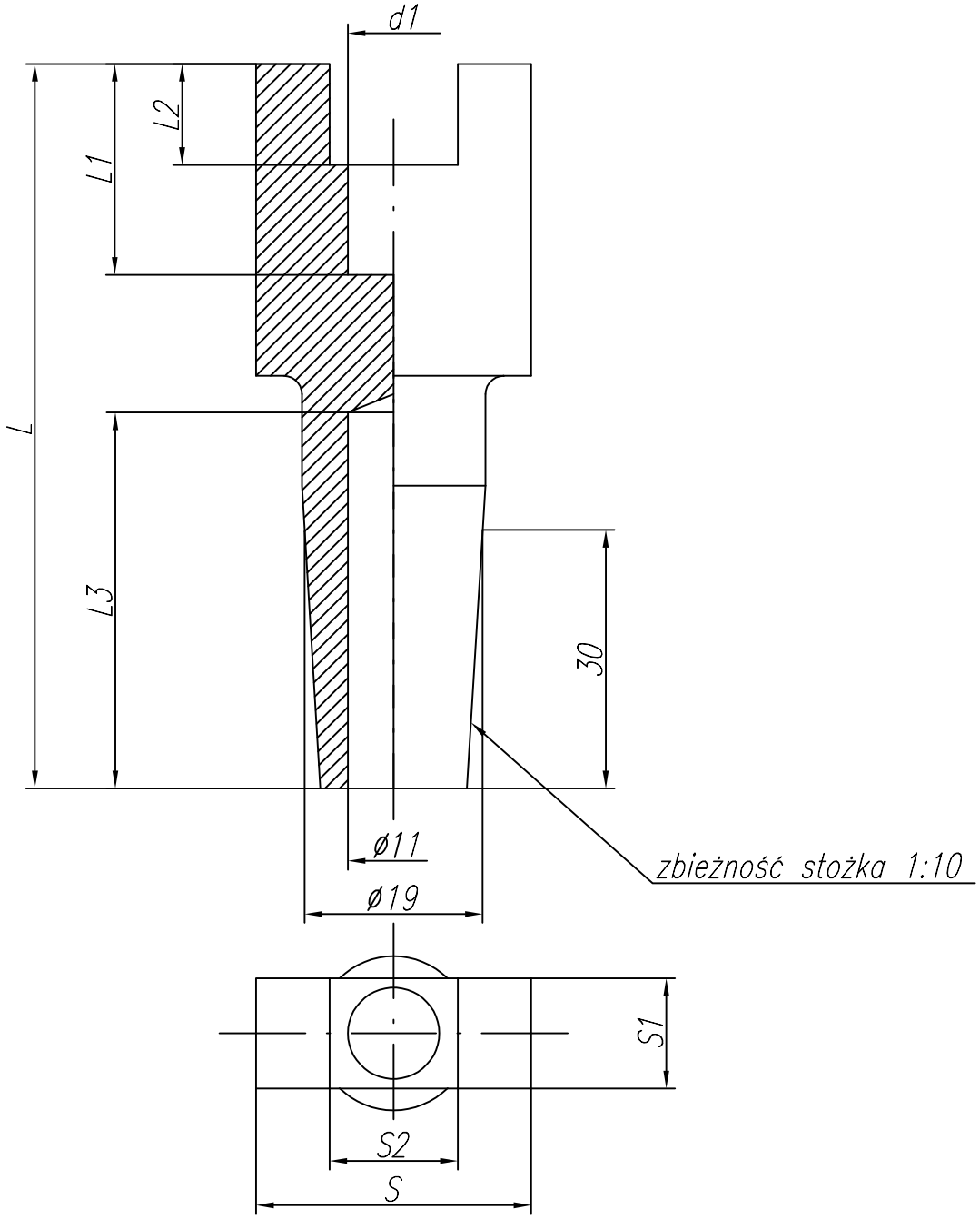


Uwaga: zakończenie elektrody S–07–4

Lp	L	L1	d	d1	d2	Stożek		Cecha	Nr rysunku
1	51,5	20	ø19	ø11	ø25	1:10		S–07–0	2–7–1197–03–0
2	51,5	16	ø12,7	ø8	ø25	1:10		S–07–1	2–7–1197–03–1
3	53,5	22	ø16	ø10	ø32	Morse'a Nr2		S–07–2	2–7–1197–03–2
4	51,5	20	ø15,5	ø9	ø25	1:10		S–07–3	2–7–1197–03–3
5	51,5	20	ø15,5	ø9	ø25	1:10		S–07–4	2–7–1197–03–4

Aspa
ZGRZEWANIE

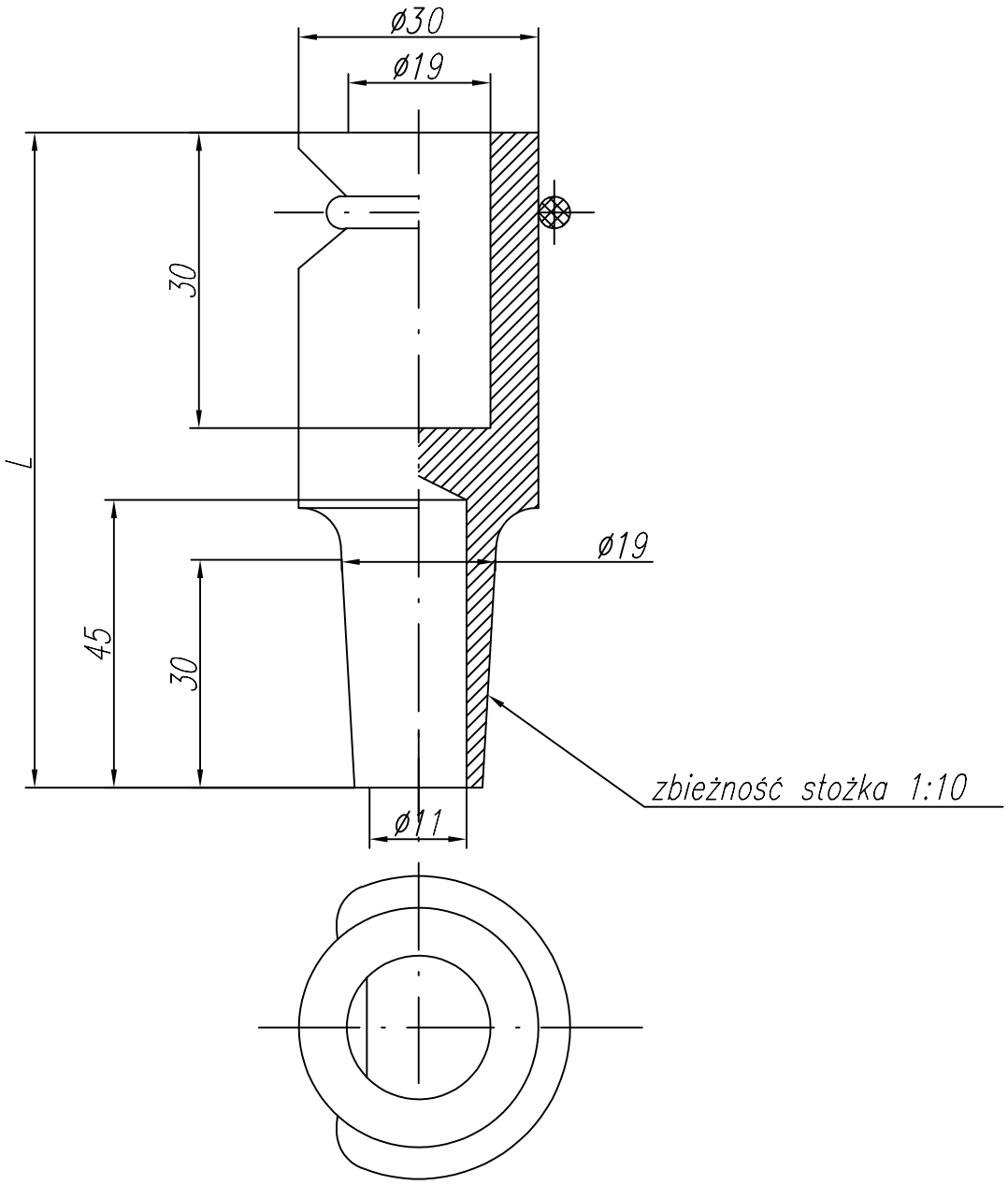
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	L2	L3	d1	S2	S	S1	Cecha	Nr rysunku
1	80	26	15	34	ø10	14,5	30	15	S-08-0	2-9-1622-33-0
2	70	–	15	24	–	14,5	30	15	S-08-1	2-9-1622-33-1
3	60	–	–	30	–	–	45	20	S-08-2	2-9-1622-33-1

Aspa
ZGRZEWANIE

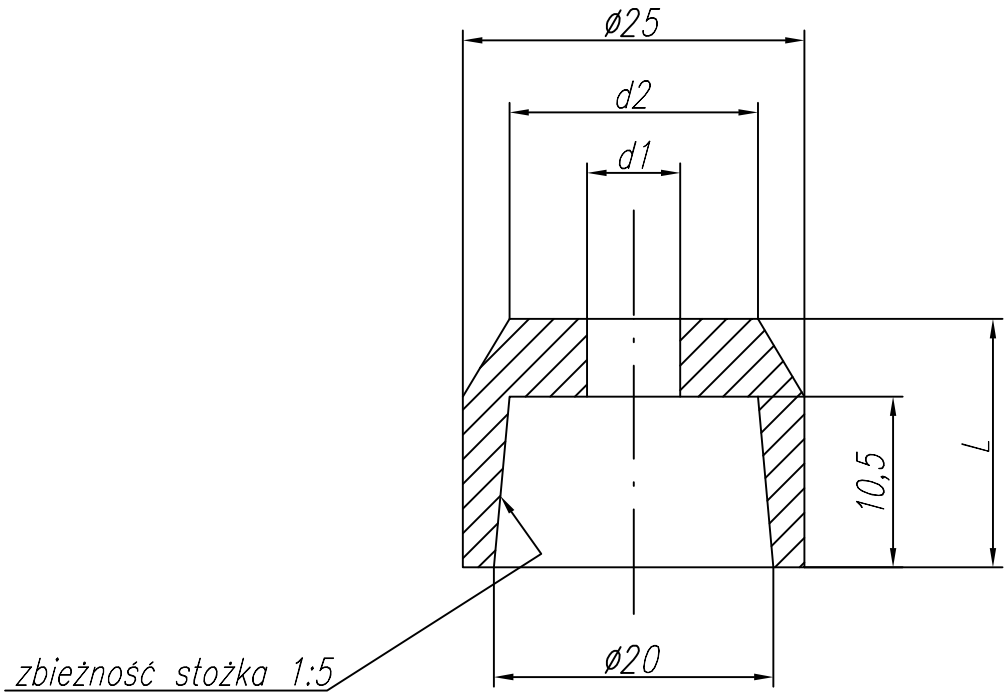
KATALOG
elektrod do zgrzewania oporowego



Lp	L		Cecha	Nr rysunku
1	85		S-09-0	2-7-1197-21-0

Aspa
ZGRZEWANIE

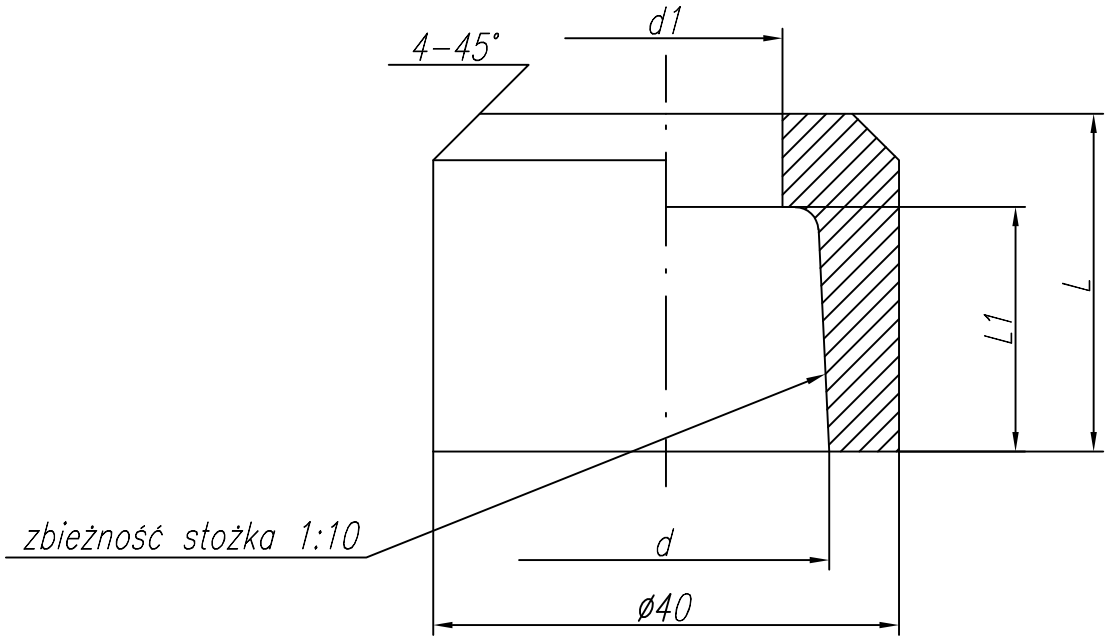
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d1	d2		Cecha	Nr rysunku
1	15,5	ø5,1	ø18		S-15-0	2-9-3112-07-0
2	15,5	ø6,1	ø18		S-15-1	2-9-3112-07-1
3	15,5	ø8,1	ø20		S-15-2	2-9-3112-07-2
4	15,5	ø10,1	ø20		S-15-3	2-9-3112-07-3

Aspa
ZGRZEWANIE

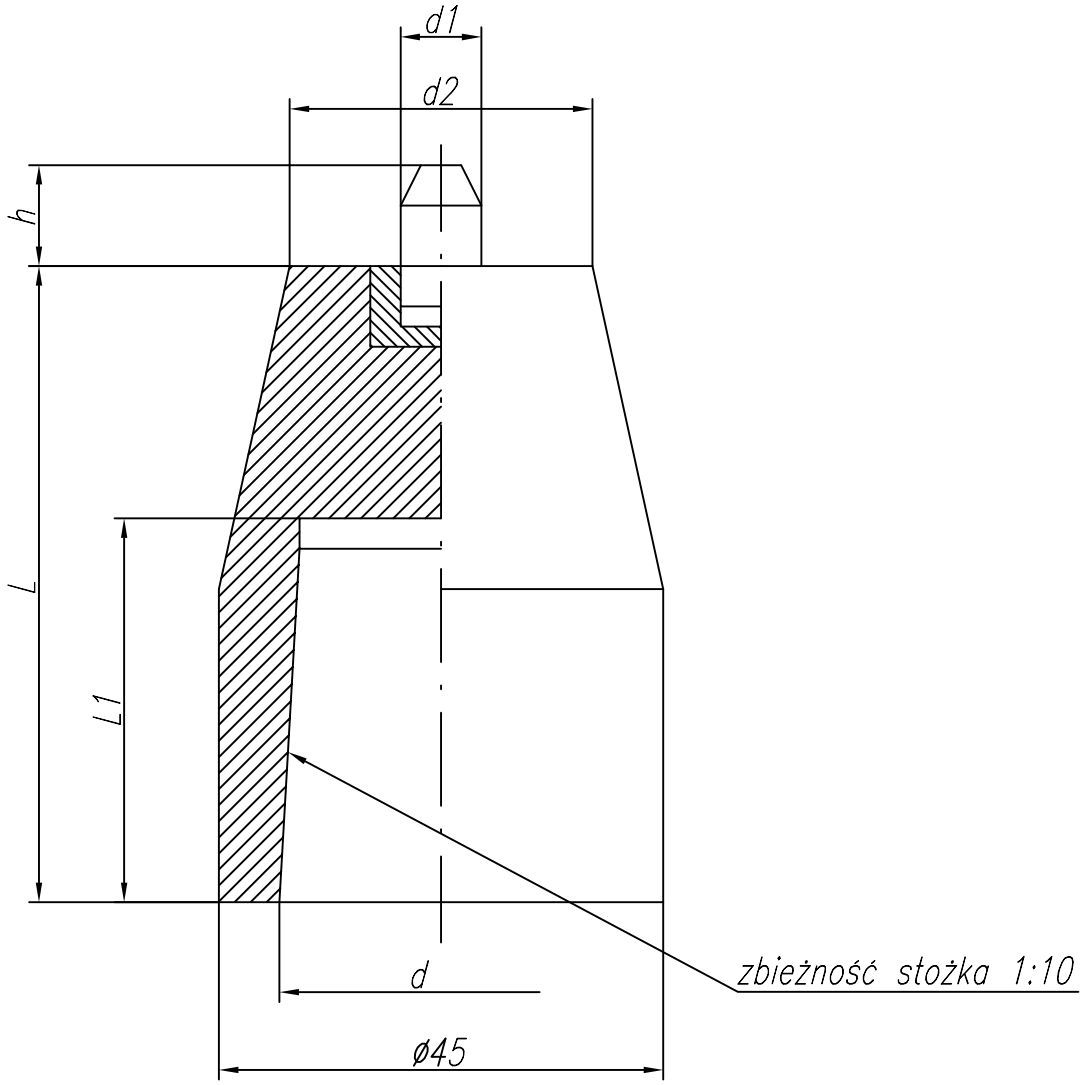
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d	d1		Cecha	Nr rysunku
1	30	22	ø28	ø22		S-16-0	2-9-3112-03-0

Aspa
ZGRZEWANIE

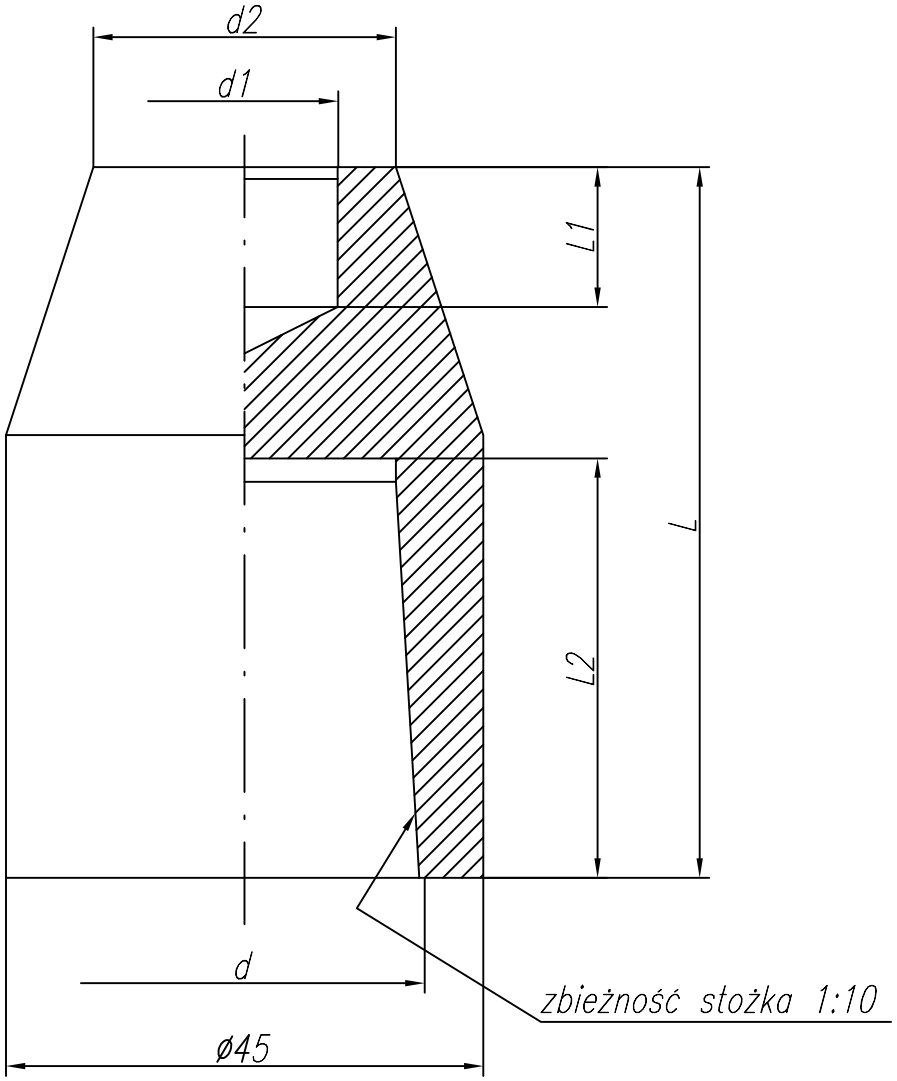
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d	L1	h	d1	d2		Cecha	Nr rysunku
1	65	ø32	43	10	ø8,5	ø25		S-17-0	2-7-1197-08-0

Aspa
ZGRZEWANIE

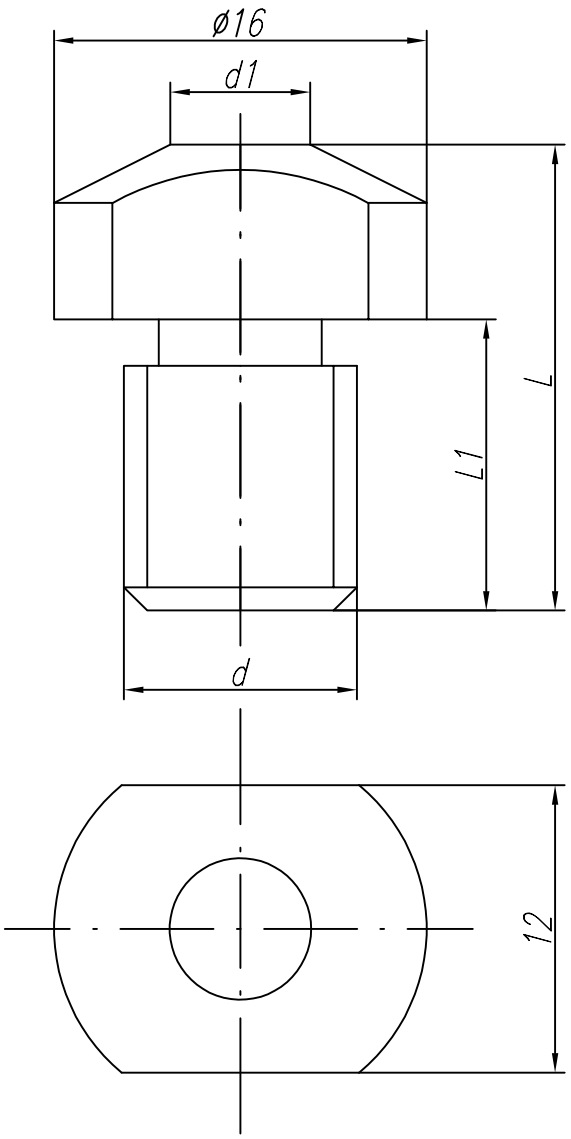
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L2	L1	d	d1	d2		Cecha	Nr rysunku
1	65	37	13	ø32	ø15	ø25		S-18-0	2-9-1622-98-0

Aspa
ZGRZEWANIE

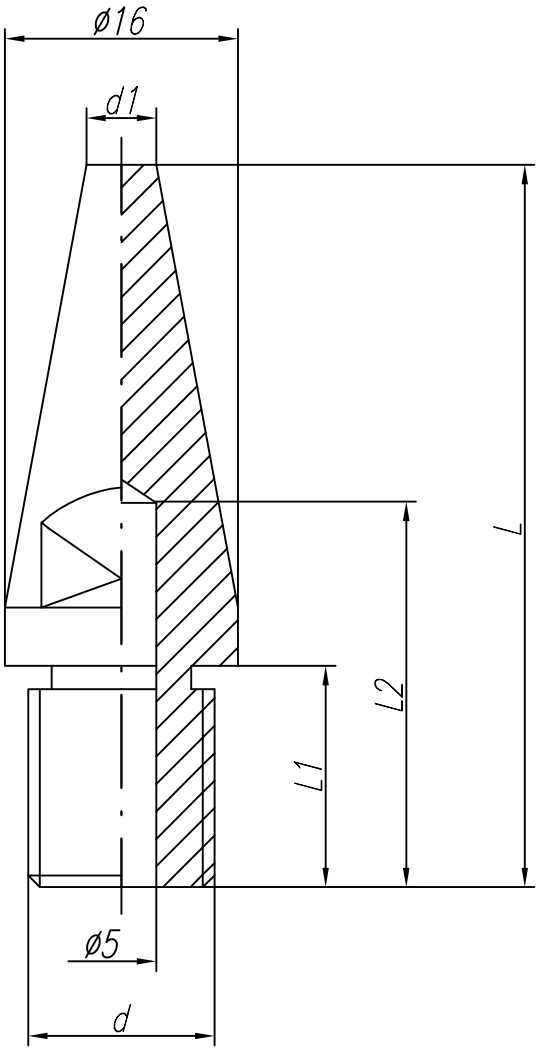
KATALOG
elektrod do zgrzewania oporowego



Lp	L	d	L1	d1		Cecha	Nr rysunku
1	21	M10	13	ø6		S-20-0	2-9-1622-29-0

Aspa
ZGRZEWANIE

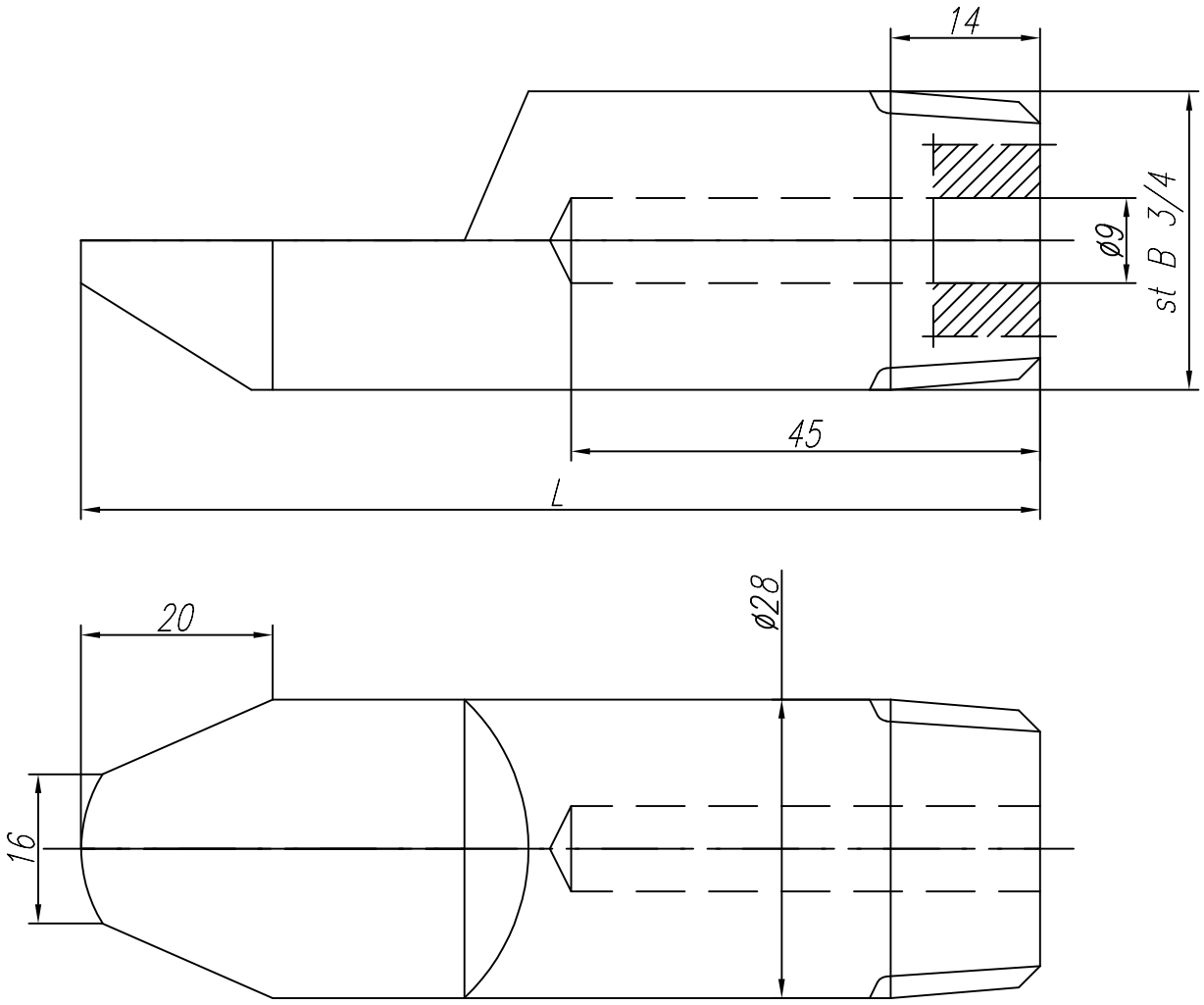
KATALOG
elektrod do zgrzewania oporowego



Lp	L	L1	d	d1	L2		Cecha	Nr rysunku
1	65	20	M12	ø6	35		S-21-0	2-9-1622-30-0

Aspa
ZGRZEWANIE

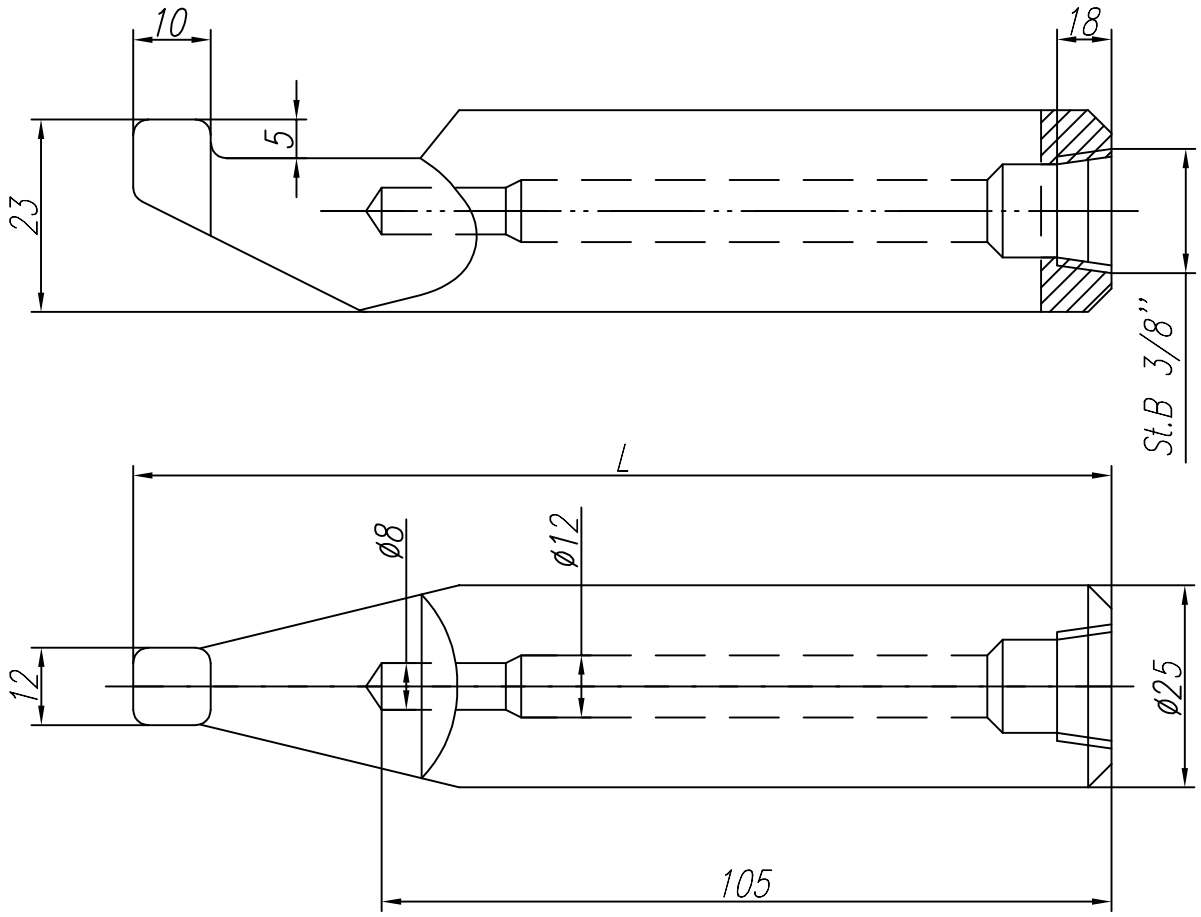
KATALOG
elektrod do zgrzewania oporowego



Lp	L						Cecha	Nr rysunku
1	80						S-22-0	2-9-7012-09-0
2	95						S-22-1	2-9-7012-09-1

Aspa
ZGRZE ANIE

KATALOG
elektrod do zgrzewania oporowego

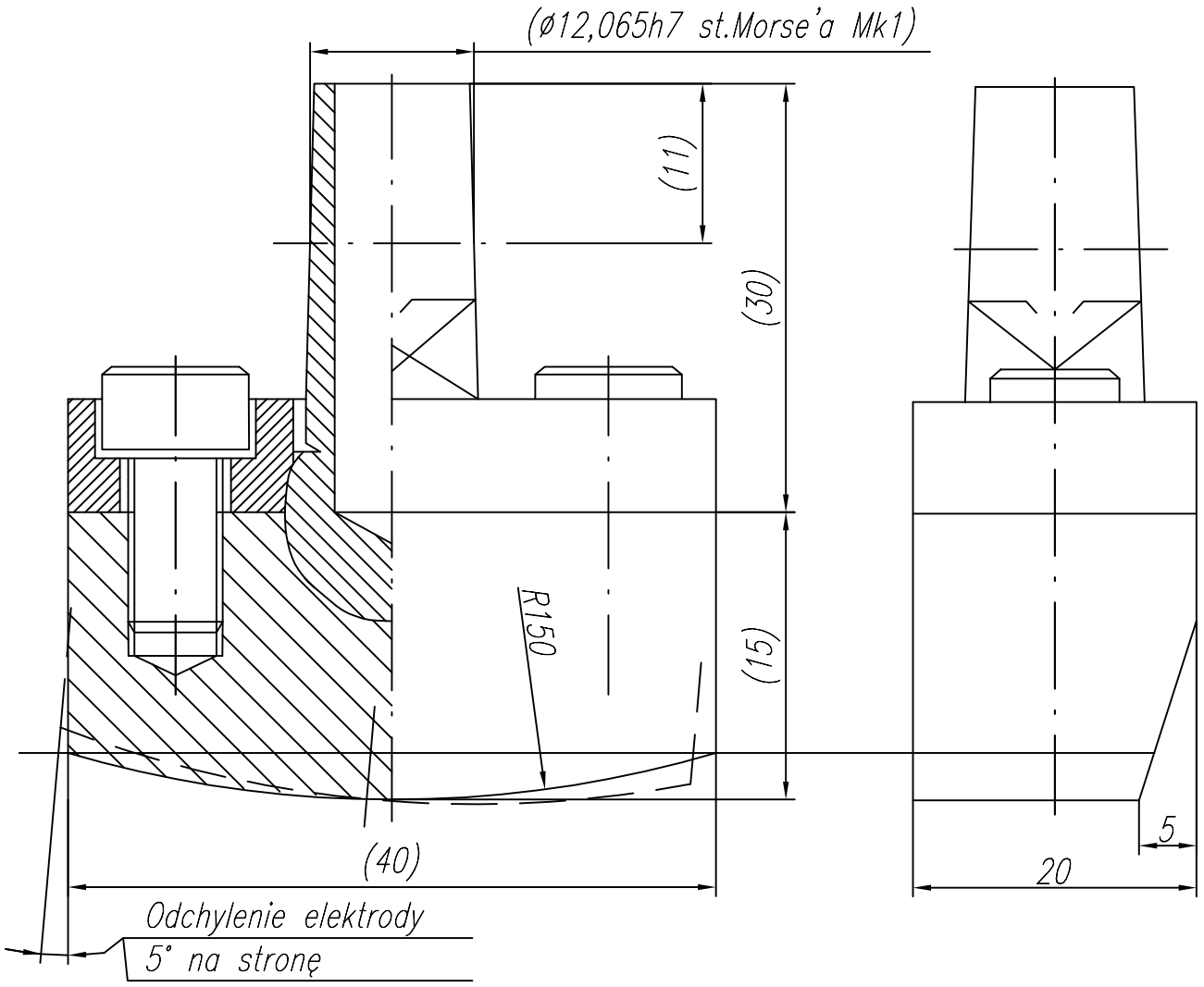


Lp	L						Cecha	Nr rysunku
1	135						S-23-0	2-9-7012-10-0

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego

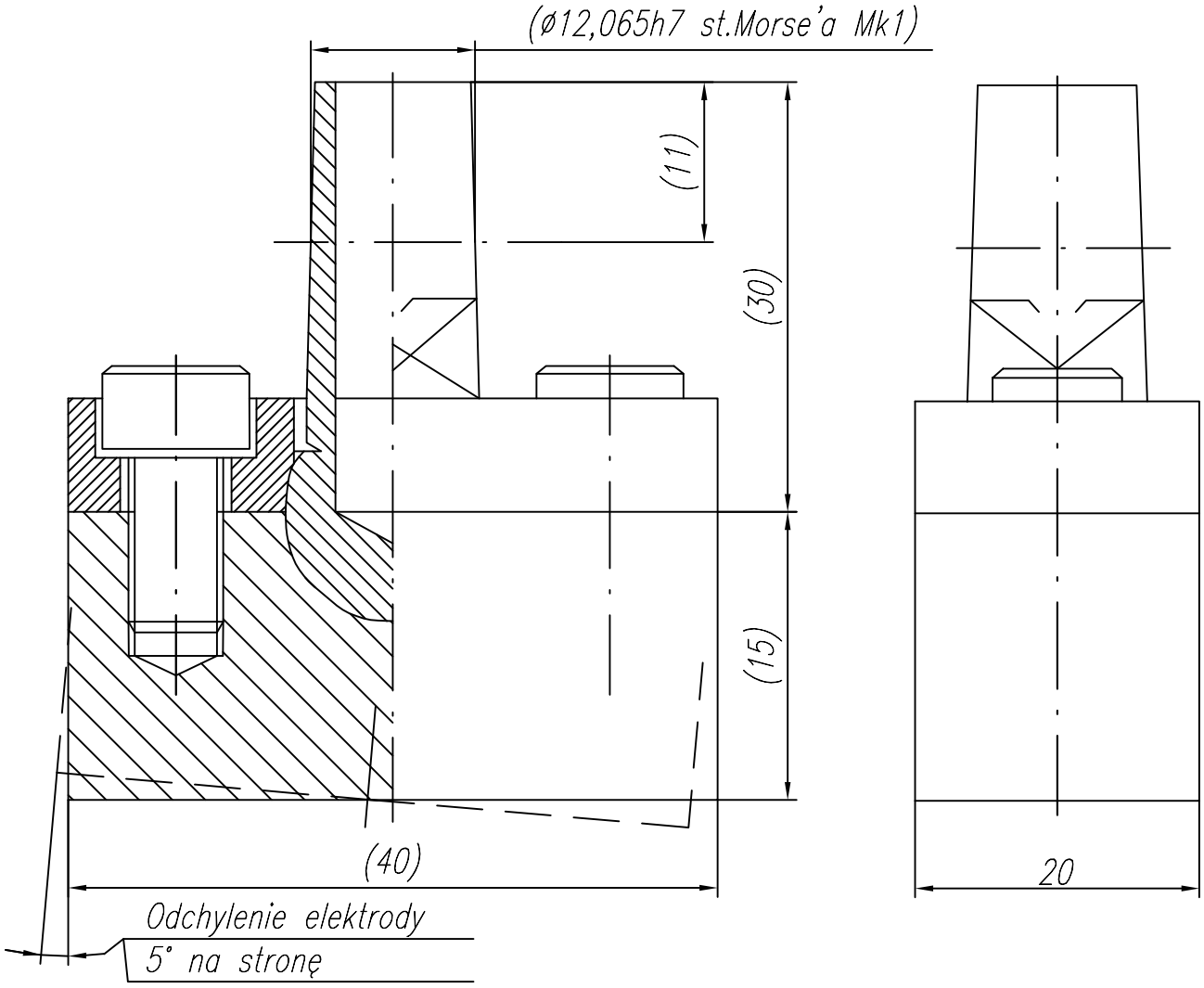


Lp		Nr rys. lub norma
1		2-7-1197-33-0

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego

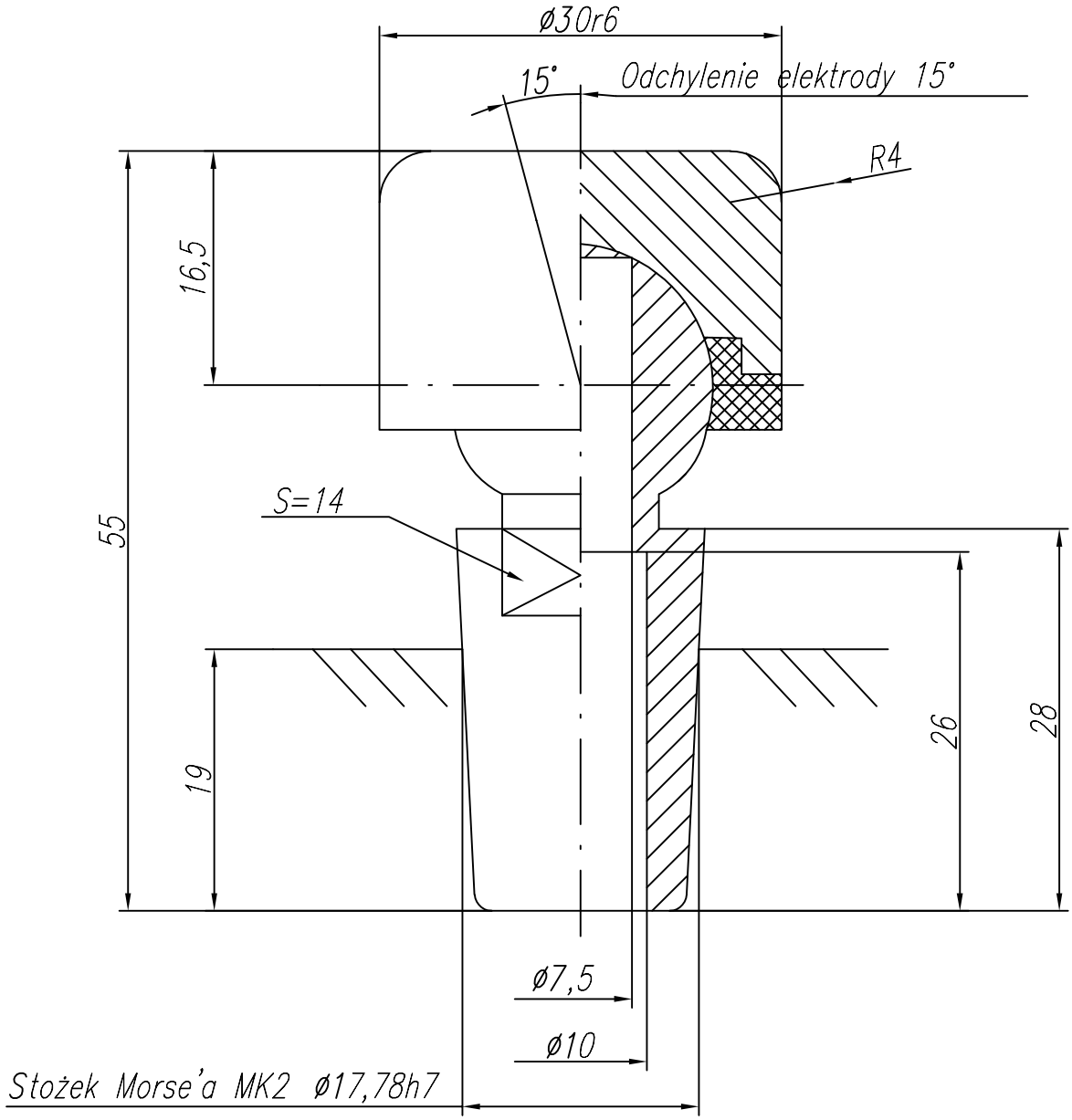


Lp		Nr rys. lub norma
1		2-7-1197-34-0

Aspa
ZGRZEWANIE

KATALOG

elektrod do zgrzewania oporowego



Lp		Nr rysunku
1		2-7-1197-35-0