Delft University of Technology
Civil Engineering Department
STEVIN - LABORATORY

REPORT 6-70-1

International Test Series on Aluminium

H. Kluwen
ir. W.A.J. Tromp

mei 1970

Delft,
Stevinweg 4,
Tel.: 33222 - 7329

Contents

preheated by means of a propane torch.
The temperature was checked with thermochrome pencils.
The testspecimen type A,D, E and F were first sawn and afterwards milled to a width of 80 mm. The auxiliary parts of the testspecimen type B were made of the same material as the testspecimens and removed by milling before testing.

3. Welding equipment

The welding was performed with a welding (LT) transformer type LT 402 with superimposed high frequencydevice with an argon arc controle unit type ACK 2 all manufactured by Smit Nijmegen. The torch was watercooled and the diameter of the tungsten electrode was 3/16".

4. Measurements before testing

Before testing the testspecimens were carefully measured and the fillets were measured as shown in the annexes.

5. Testing procedure

All the specimens were tested in a 100 tf Losenhausen vertical testing machine, the loading speed being less than 200 kgf/sec. The rupture load P was recorded and the fillets which failed first were noted.
No measurements of elongation or deformation were carried out.

6. Filler metals

The chemical composition* of the Al Mg 5 rod with diam. 4 mm, was:

Mg	4,9	(%)
Mn	0,54	"
Si	0,10	"
Fe	0,38	"
Cu	0,03	"

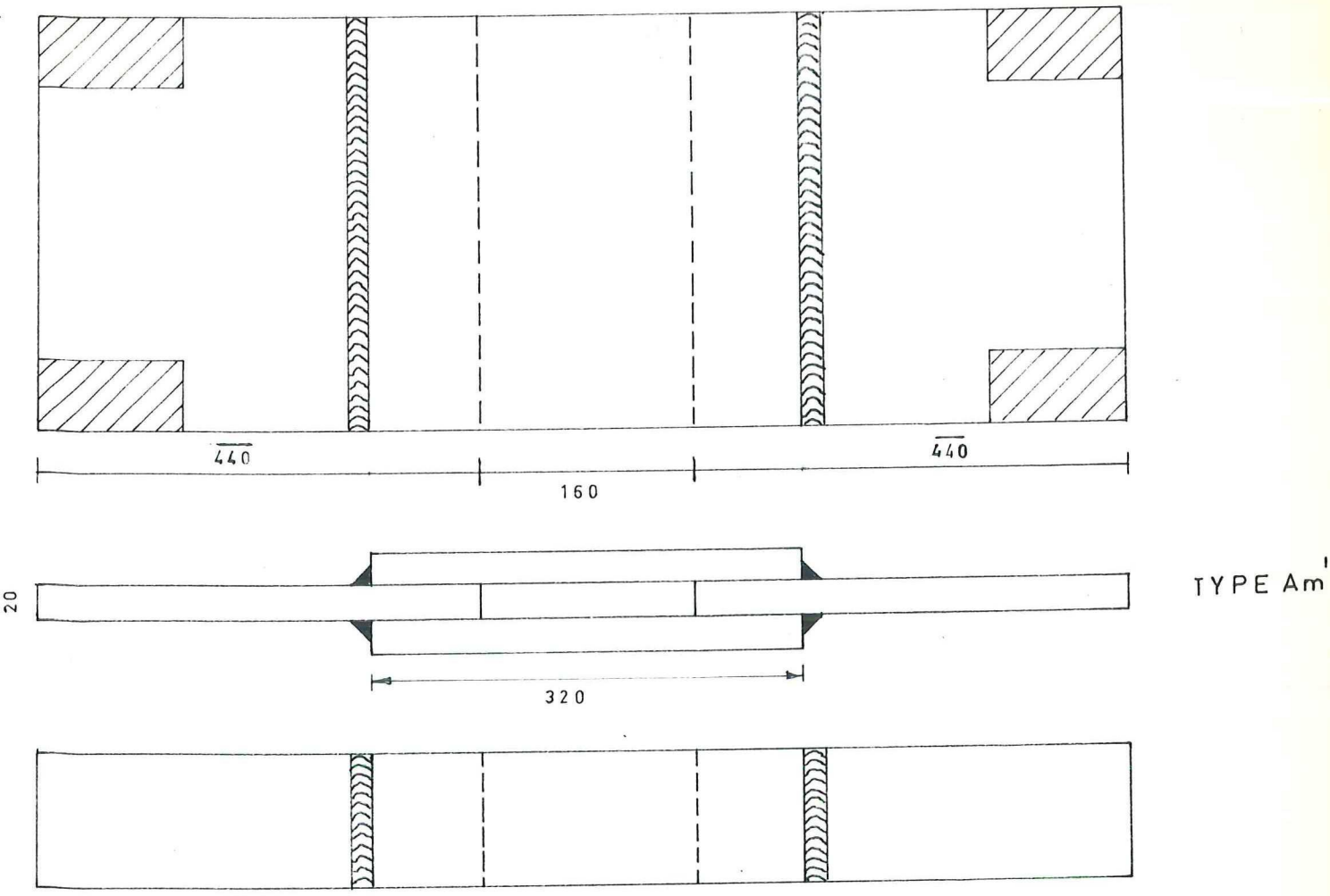
The chemical composition* of the Al Si 5 rod with diam. 4 mm, was:

Si	4,6	(%)
Fe	0,2	"
Cu	0,05	"
Mg	0,10	"
Mn	0,05	"
Cr	0,05	"

* According to specifications of the manufacturer.

weld belongs. The nominal stress means the rupture load divided by the nominal throat section. The real stress means the rupture load divided by the real throat section.

FIG. 1



The hatched parts have been used as auxiliary parts for type Bm'

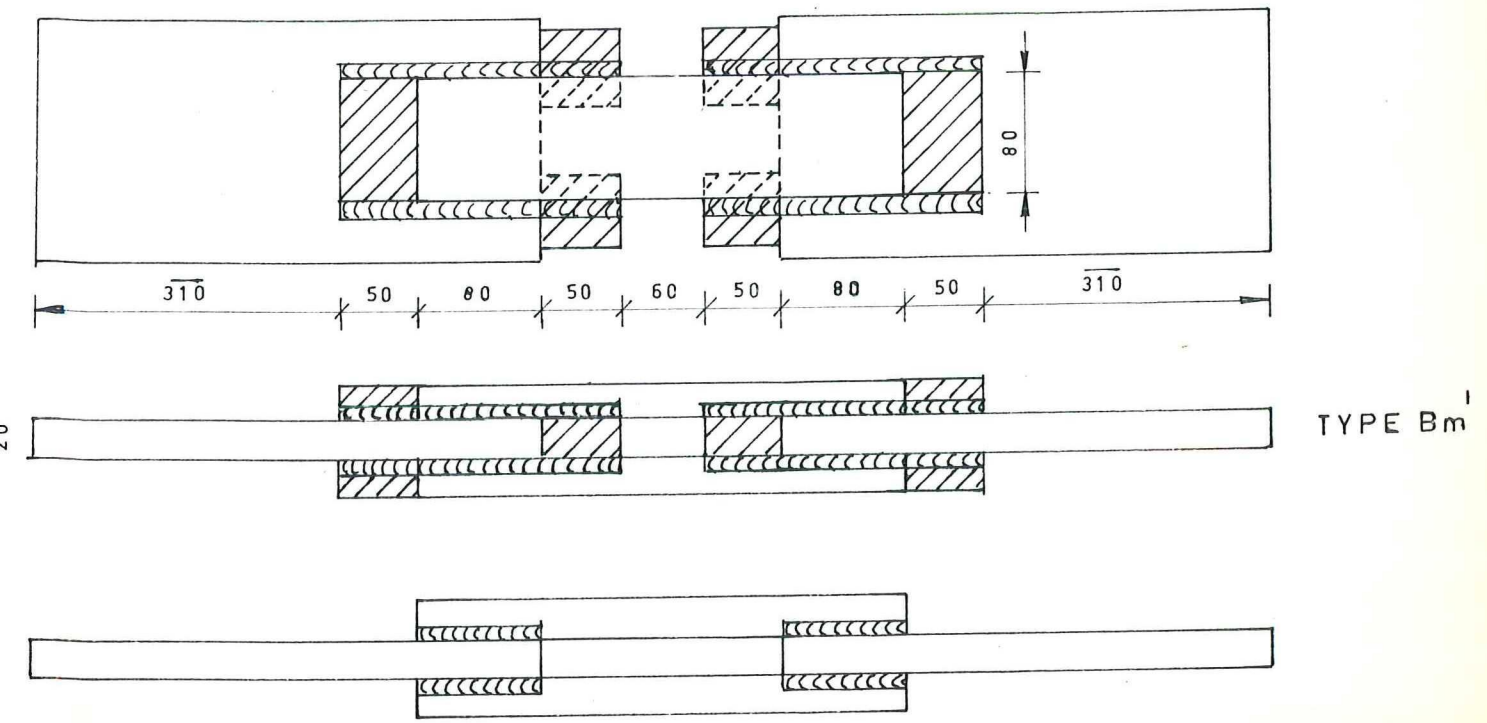


Table. 1

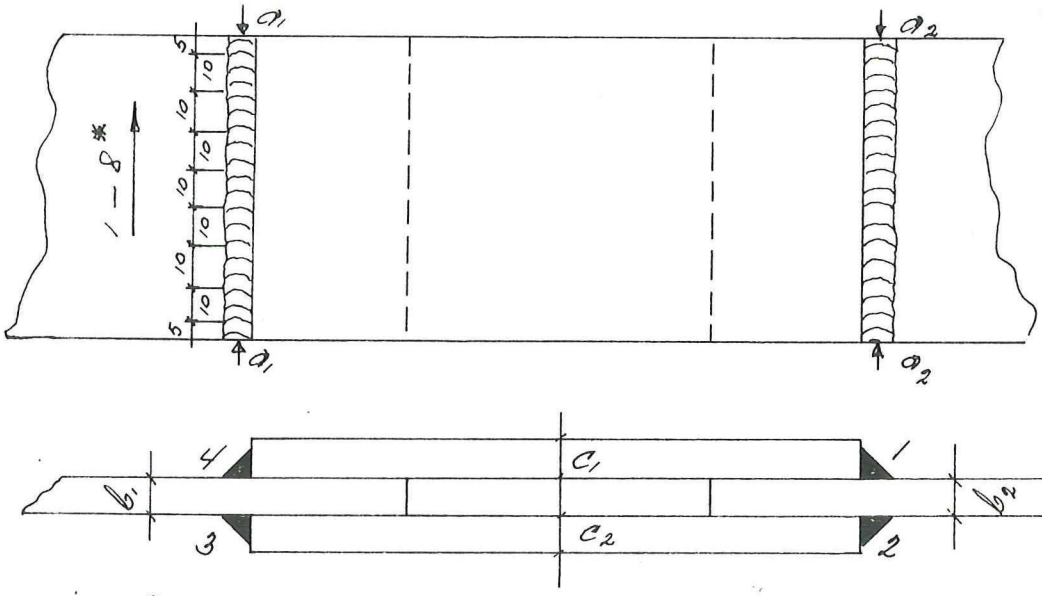
Material.		Type and N°:	Rupture load in kgf.	Nominal throat section. in cm^2	Real throat section. in cm^2	Nominal stress. in kgf/cm^2	Real stress. in kgf/cm^2
Weld	Parent.						
Al. Si 5	Al Mg Si 1	Am' - 1	12.600	11,20	10,91	1125	1154
	"	Am' - 2	12.400	11.20	11,62	1107	1067
Al. Mg 5	Al Mg 4.5 Mn.	Am' - 1	18.700	11.20	10.88	1670	1719
	"	Am' - 2	19.300	11.20	10.81	1723	1786
	Al. Zn. Mg.	Am' - 1	21.500	11.20	11,58	1920	1857
	"	Am' - 2	22.900	11,20	12.05	2045	1900
Al. Si 5	Al. Mg. Si 1	Bm' - 1	20.000	22,4	22.87	893	874
	"	Bm' - 2	21.000	22,4	24,30	938	864
Al. Mg 5	Al Mg 4.5 Mn.	Bm' - 1	30.900	22,4	21,99	1380	1405
	"	Bm' - 2	31.100	22,4	21,38	1388	1455
	Al Zn Mg.	Bm' - 1	28.500	22,4	23,41	1272	1217
	"	Bm' - 2	29.400	22,4	24,10	1313	1219
Al. Si 5	Al Mg Si 1	D' - 1	12.300	11,2	12,13	1098	1014
	"	D' - 2	12.000	11,2	12,23	1071	982
Al. Mg 5	Al Mg 4,5 Mn.	D' - 1	17.600	11,2	11.03	1571	1595
	"	D' - 2	17.800	11,2	11,23	1589	1585
	Al. Zn Mg.	D' - 1	18.000	11,2	11,68	1607	1541
	"	D' - 2	17.800	11,2	12,21	1589	1458
Al. Si 5	Al Mg Si 1	E' - 1	28.000 [1]	16,00	16,20	1750	1727
	"	E' - 2	26.500 [2]	16,00	16,16	1656	1640
Al. Mg 5	Al Mg 4.5 Mn.	E' - 1	49.000 [1]	16.00	15,84	3062	3093
	"	E' - 2	48.500 [1]	16.00	15,80	3031	3070
	Al Zn. Mg.	E' - 1	35.200 [1]	16,00	15,80	2200	2228
	"	E' - 2	35.600 [1]	16.00	15,82	2225	2250
Al. Si 5	Al Mg Si 1	F' - 1	16.700	11,2	13.22	1491	1263
	"	F' - 2	18.600	11,2	13.45	1661	1383
Al. Mg 5	Al Mg 4.5 Mn.	F' - 1	25.100	11,2	12,32	2241	2037
	"	F' - 2	25.500	11,2	12,46	2276	2046
	Al Zn Mg	F' - 1	25.600	11,2	13,02	2286	1966
	"	F' - 2	25.400	11,2	13,03	2268	1949

1/ rupture outside the weld.
2/ rupture in the weld.

Type: Am' № 1 Annex. № 1

Material: Al Mg Si 1
Rod type: Al. Si 5
diam: 4

a_1 = 79.9 mm a_2 = 80.1 mm
b_1 = 20.4 " b_2 = 20.4 "
c_1 = 20.2 " c_2 = 20.3 "



* points at which the welds have been measured.

Weld №	weld thickness in 0.01 mm.								average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	740	723	707	753	780	742	733	692	734	80,1
2	767	773	820	830	798	754	765	765	784	80,1
3	720	682	650	662	684	652	703	682	679	79.9
4	635	667	682	665	698	713	696	738	687	79.9

Welding date: 19-11-'69.

Preheating: ± 275 °C

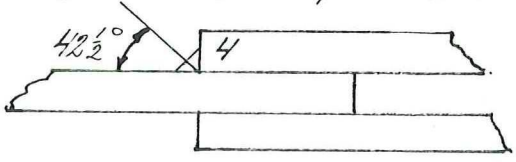
Argon supply: 10 l/min.

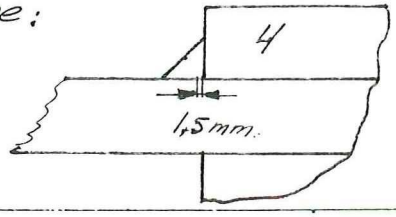
Welding current: 260 Amp

Welding sequence: 1.2.3.4.

Welding speed: 1 cm/6 sec.

Broken welds. location of rupture surface:





Testing date: 11-3-'70

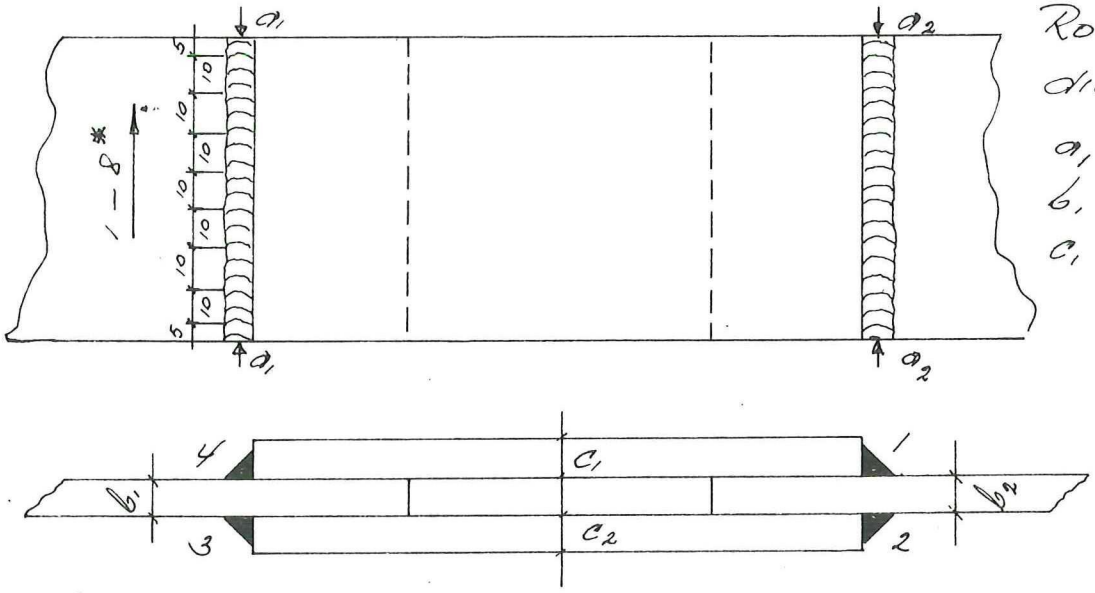
Max load: 12,6 tf Number of fillets broken: 1 (№ 4)

Remarks:

Type: Am' № 2 Annex. № 2

Material: Al Mg Si 1
Rod type: Al. Si 5
diam: 4

a_1 = 80,0 mm a_2 = 79,8 mm
b_1 = 20,4 " b_2 = 20,4 "
c_1 = 20,2 " c_2 = 20,2 "



* points at which the welds have been measured.

Weld №	weld thickness in 0.01 mm.								average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	688	714	730	735	720	775	714	670	718	79.8
2	725	740	731	668	780	813	812	800	759	79.8
3	695	700	690	745	720	755	710	700	714	80.0
4	748	715	747	684	762	770	717	770	739	80.0

Welding date: 19-11-'69

Preheating: ± 275 °C

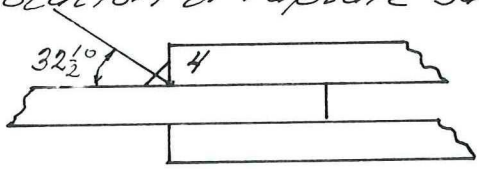
Argon supply: 10 l/min.

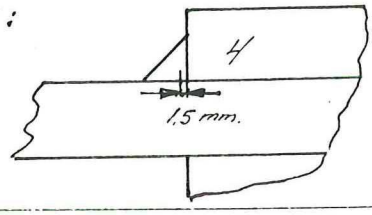
Welding current: 260 Amp

Welding sequence: 1. 2. 3. 4.

Welding speed: 1 cm / 6 sec

Broken welds. location of rupture surface:





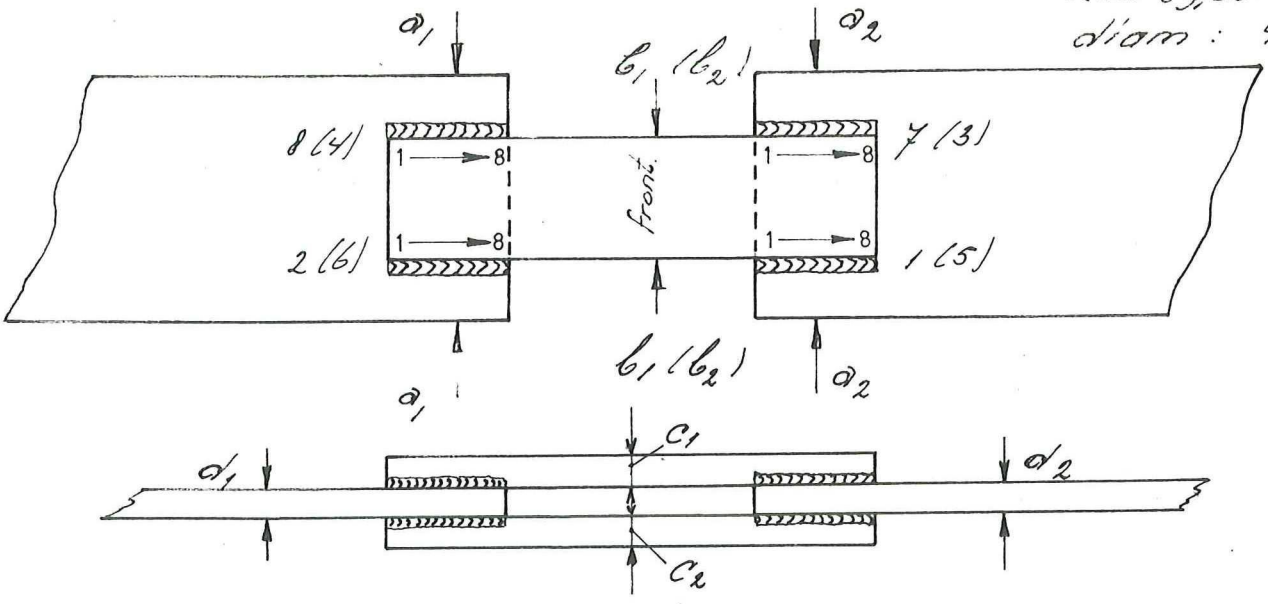
Testing date: 11-3-70

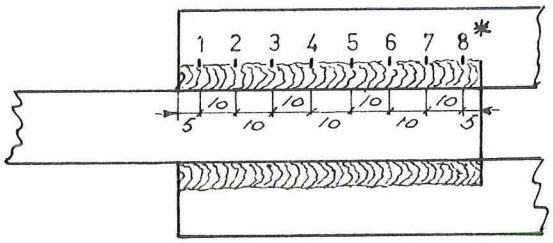
Max load: 12,4 tf Number of fillets broken: 1 (№ 4)

Remarks:

Type: Bm' No: 1 Annex. N° 3

Material: Al. Mg. Si 1
Rod type: Al. Si 5
diam: 4 mm.





a_1 = 159,6 mm a_2 = 159,8 mm
b_1 = 80,1 " b_2 = 80,1 "
c_1 = 20,3 " c_2 = 20,4 "
d_1 = 20,4 " d_2 = 20,4 "

* points at which the welds have been measured.

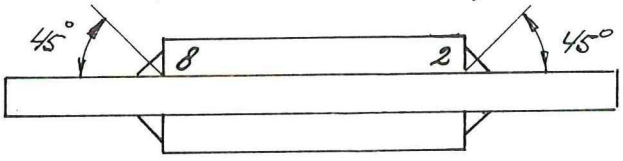
Weld N°	weld thickness.								Average 1 – 8	Weld length a, mm.	
	1	2	3	4	5	6	7	8			
1	646	666	682	677	665	642	630	643	656	80,7	
2	670	675	632	680	731	688	692	706	684	80,2	
3	785	758	738	722	743	771	722	727	746	80,8	
4	700	742	697	712	720	688	703	703	708	81,0	
5	677	709	725	710	697	722	718	744	713	80,7	
6	727	720	724	707	707	687	715	754	718	80,8	
7	708	695	698	702	695	684	731	729	705	80,6	
8	730	724	729	744	713	717	707	750	727	80,5	

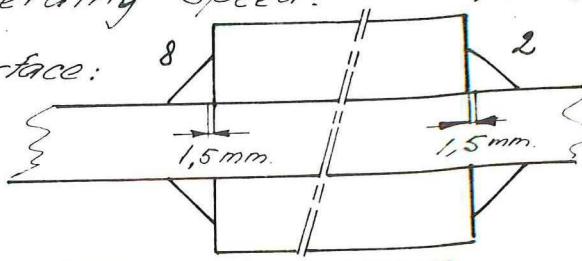
Welding date: 20-11-'69
Welding current: 240 Amp.

Preheating: ± 250 °C
Welding sequence: 1, 2, 3 etc

Argon supply: 10 l/min.
Welding speed: 1 cm/6sec

Broken welds, location of rupture surface:





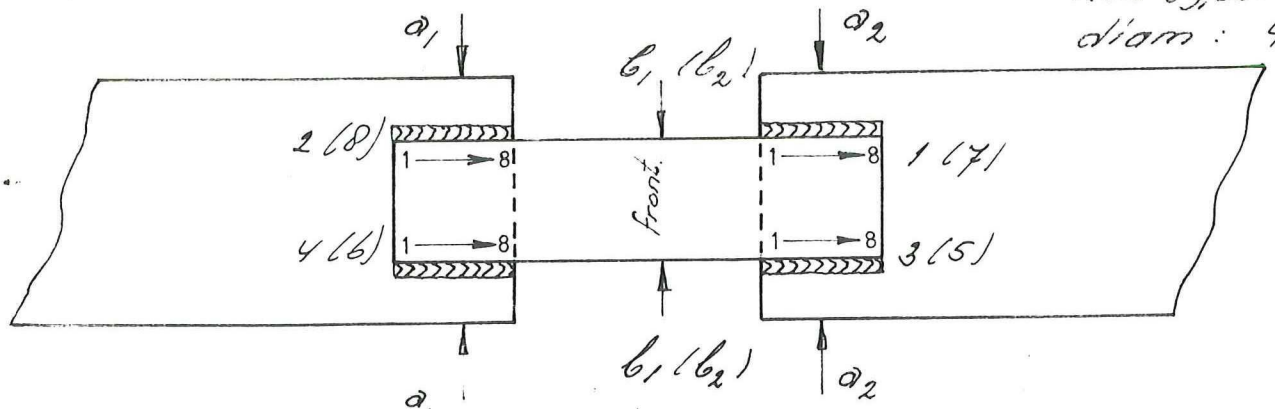
Testing date: 5-3-'70

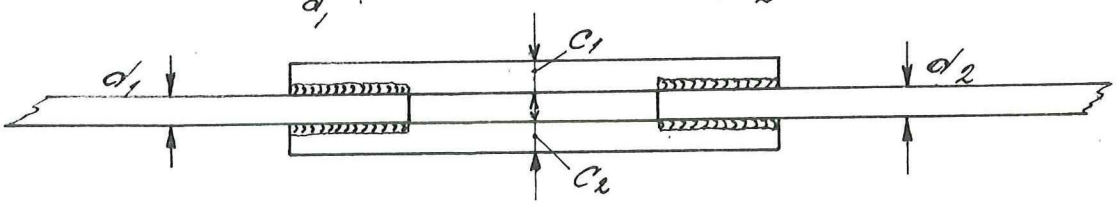
Max. load: 20,0 tf Number of fillets broken: 2 (N°2, N°8)

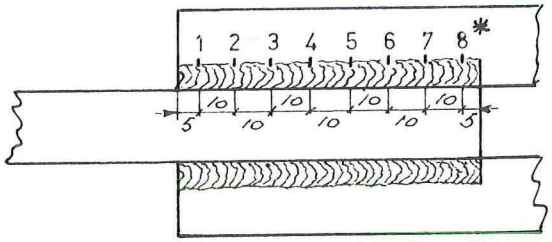
Remarks:

Type: Bm' No: 2 Annex. N° 4 .

Material: Al. Mg. Si' 1
Rod type: Al. Si 5
diam: 4 mm.







a_1 = 159.9 mm a_2 = 159,6 mm
b_1 = 80,0 " b_2 = 80,0 "
c_1 = 20,5 " c_2 = 20,4 "
d_1 = 20,2 " d_2 = 20,2 "

* points at which the welds have been measured.

Weld N°	weld thickness.								Average 1 – 8	Weld length 0,1 mm.	
	1	2	3	4	5	6	7	8			
1	782	792	768	752	758	756	735	745	761	81,4	
2	749	745	749	785	749	797	800	785	770	80,2	
3	743	741	758	756	750	760	732	720	745	82,1	
4	753	765	745	739	743	778	729	770	753	80,2	
5	732	720	732	729	725	733	717	745	729	81,6	
6	754	758	740	797	729	762	775	830	768	80,8	
7	717	713	690	698	748	700	690	694	706	80,8	
8	714	696	729	737	707	740	762	754	730	80,6	

Welding date: 21-11-'69

Welding current: 220 Amp.

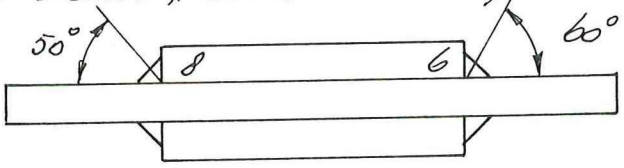
Preheating: ± 250 °C

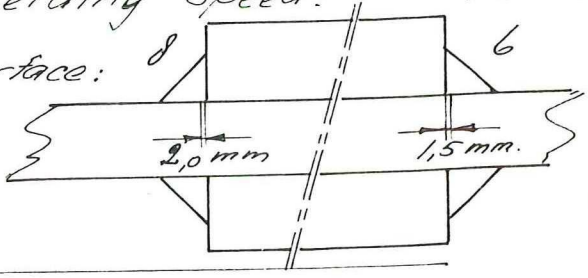
Welding sequence: 1, 2, 3 etc.

Argon supply: 10 l/min.

Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:





Testing date: 5-3-'70

Max. load: 21,0 tf Number of fillets broken: 2 (N° 6 N° 8)

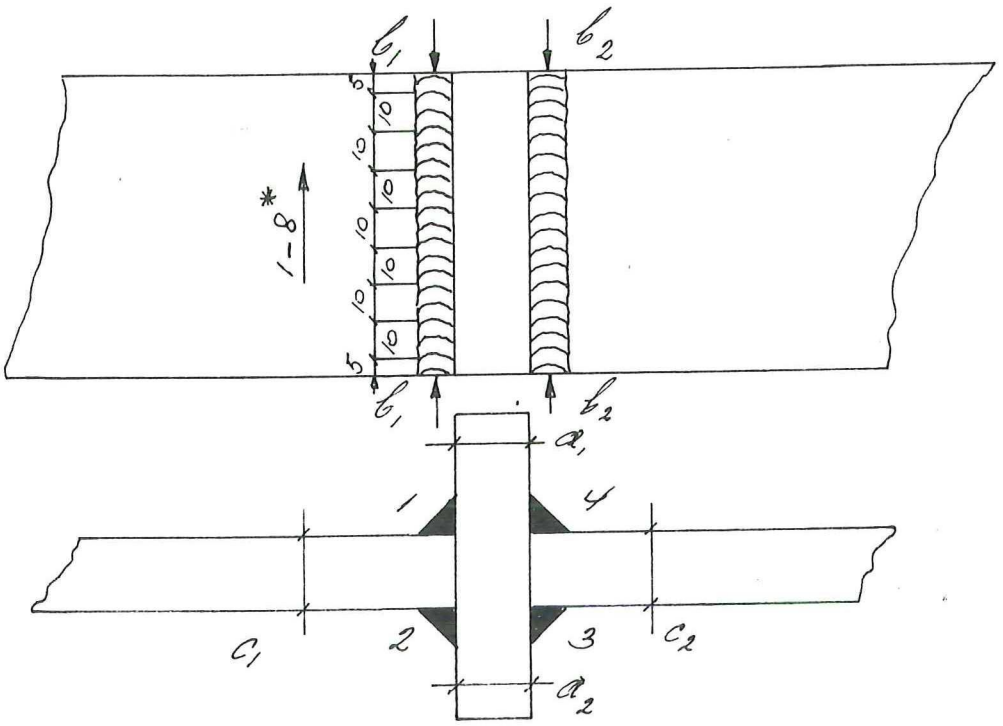
Remarks:

Type : D' № : 1 Annex № 5

Material: Al Mg Si 1

Rod type : Al Si 5

diam : 4 mm.



a_1 = 20,1 mm a_2 = 20,2 mm

b_1 = 80,2 " b_2 = 80,2 "

c_1 = 20,5 " c_2 = 20,5 "

* points at which the welds have been measured.

Weld. №	weld thickness								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	735	752	725	726	725	716	727	740	731	80,2
2	729	735	759	741	775	746	753	790	754	80,2
3	766	747	770	770	790	774	762	730	762	80,2
4	782	768	715	731	786	748	729	743	750	80,2

Welding date : 21-11-69

Preheating : ± 250 °C

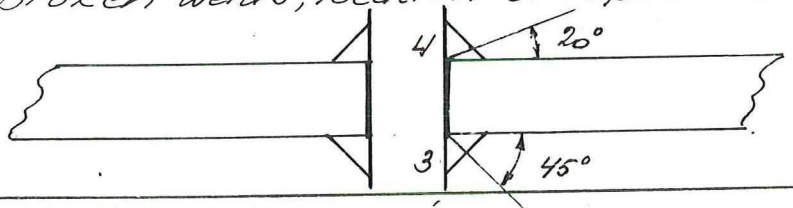
Argon supply : 10 l/min

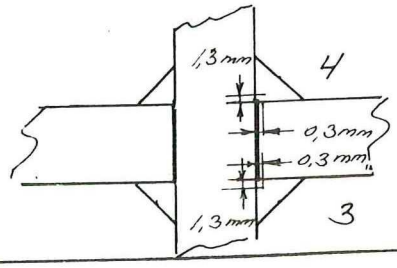
Welding current : 210 Amp

Welding sequence : 1, 2, 3, 4.

Welding speed : 1 cm/6 sec.

Broken welds, location of rupture surface :





Testing date : 11-3-70

Max. load : 12,3 tf Number of fillets broken : 2 (№ 3, № 4)

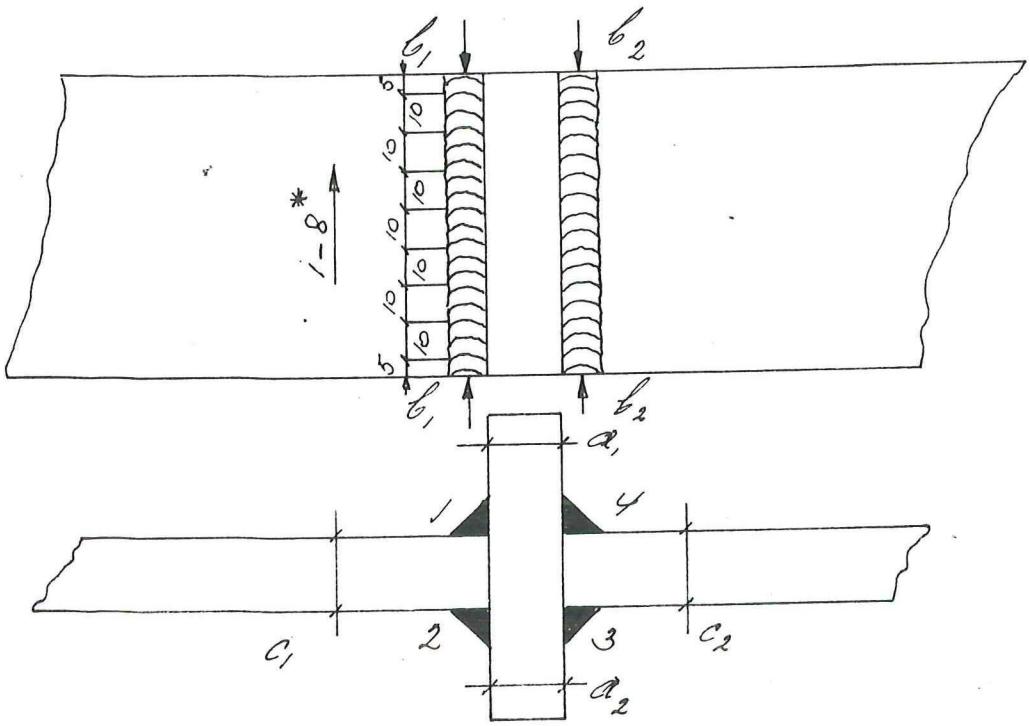
Remarks :

Type: D' № 2 Annex № 6

Material: Al Mg 5' 1

Rod type: Al. 5' 5

diam: 4 mm.



a_1 = 20,2 mm a_2 = 20,2 mm

b_1 = 79,8 " b_2 = 79,8 "

c_1 = 20,5 " c_2 = 20,5 "

* points at which the welds have been measured.

Weld. №	weld thickness								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	730	733	756	730	766	763	748	743	746	79.8
2	726	749	730	728	747	778	739	730	741	79.8
3	800	780	772	735	798	810	792	783	784	79.8
4	765	763	722	756	770	728	725	758	748	79.8

Welding date: 21-11-69

Preheating: ± 250 °C

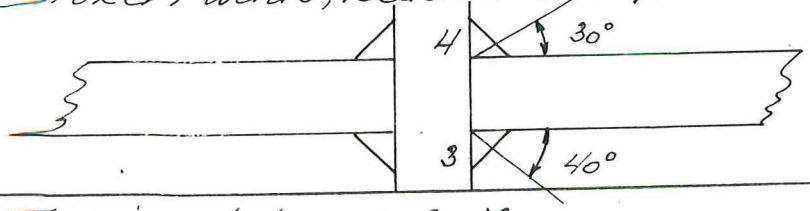
Argon supply: 10 l/min

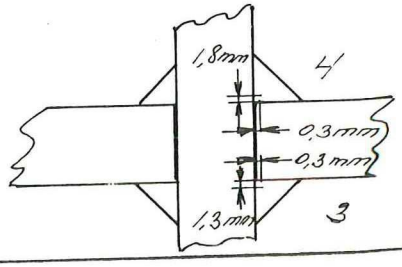
Welding current: 210 Amp

Welding sequence: 1, 2, 3, 4.

Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:





Testing date: 11-3-70

Max. load: 12,0 tf Number of fillets broken: 2 (№ 3. № 4)

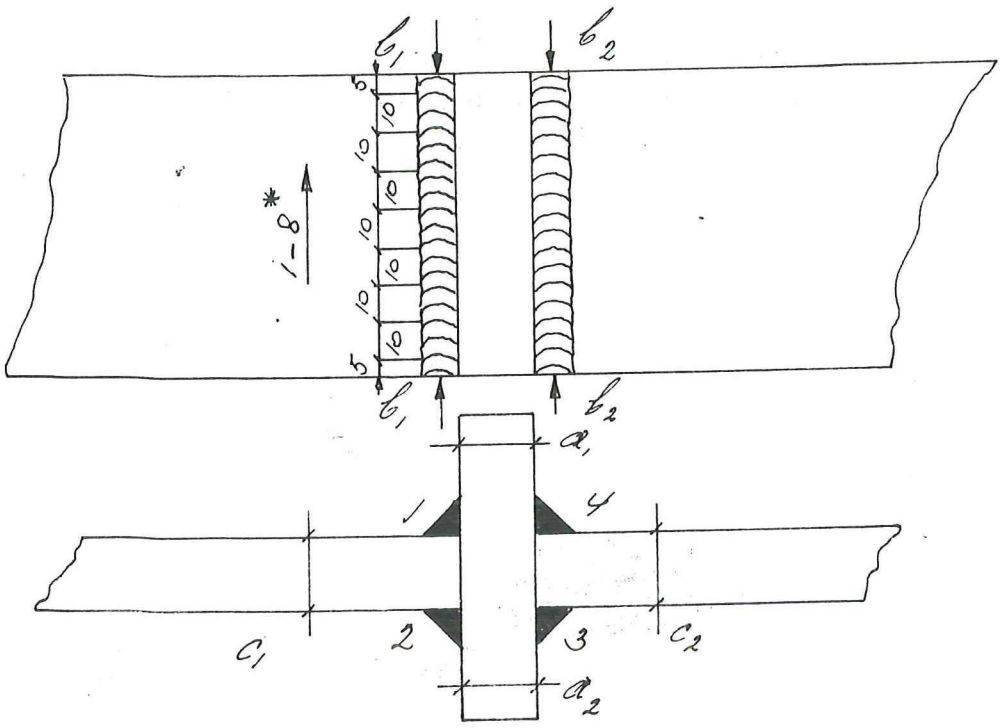
Remarks:

Type : D' № : 2 Annex № 6

Material: Al Mg Si

Rod type : Al. Si 5

diam : 4 mm.



a_1 = 20,2 mm a_2 = 20,2 mm

b_1 = 79,8 . b_2 = 79,8

c_1 = 20,5 . c_2 = 20,5

* points at which the welds have been measured.

Weld. №	weld thickness								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	730	733	756	730	766	763	748	743	746	79,8
2	726	749	730	728	747	778	739	730	741	79,8
3	800	780	772	735	798	810	792	783	784	79,8
4	765	763	722	756	770	728	725	758	748	79,8

Welding date : 21-11-69

Preheating : ± 250 °C

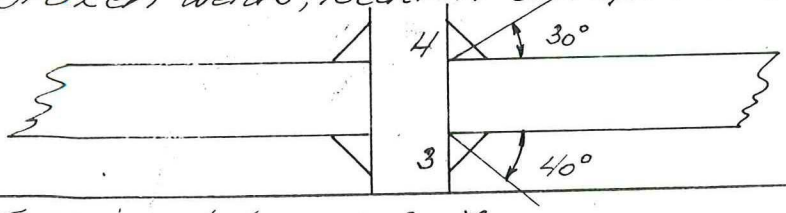
argon supply: 10 l/min

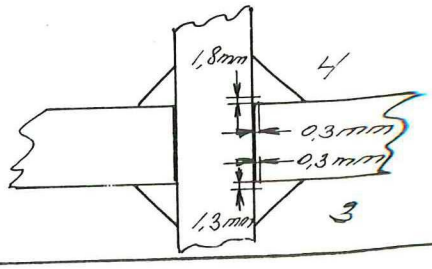
Welding current: 210 Amp

Welding sequence: 1, 2, 3, 4.

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:





Testing date : 11-3-70

Max. load: 12,0 tf Number of fillets broken: 2 (№ 3. №

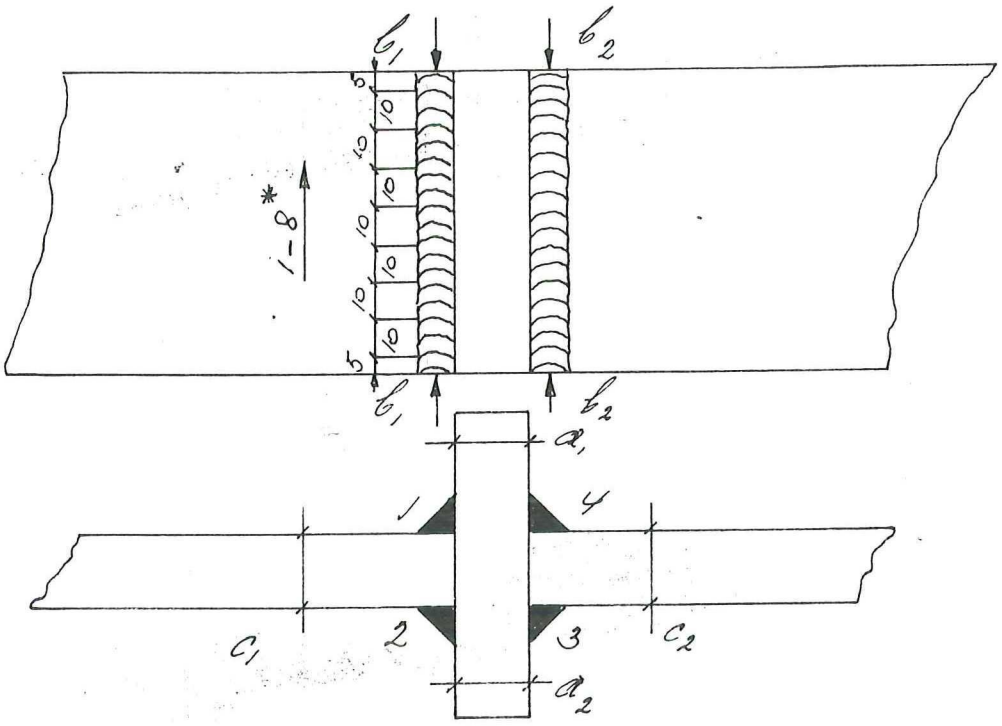
Remarks:

Type : D' № : 2 Annex № 6

Material: Al Mg Si' 1

Rod type: Al. Si' 5

diam: 4 mm.



a_1 = 20,2 mm a_2 = 20,2 mm

b_1 = 79,8 " b_2 = 79,8 "

c_1 = 20,5 " c_2 = 20,5 "

* points at which the welds have been measured.

Weld. №	weld thickness								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	730	733	756	730	766	763	748	743	746	79.8
2	726	749	730	728	747	778	739	730	741	79.8
3	800	780	772	735	798	810	792	783	784	79.8
4	765	763	722	756	770	728	725	758	748	79.8

Welding date: 21-11-69

Preheating: ± 250 °C

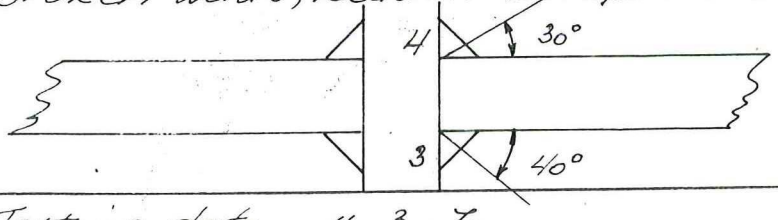
argon supply: 10 l/min

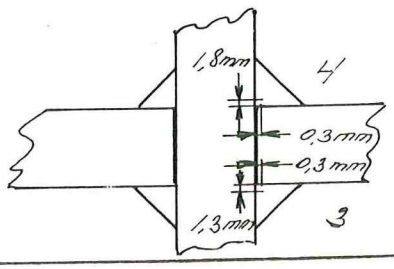
Welding current: 210 Amp

Welding sequence: 1, 2, 3, 4.

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:





Testing date: 11-3-70

Max. load: 12,0 tf Number of fillets broken: 2 (№ 3. № 4)

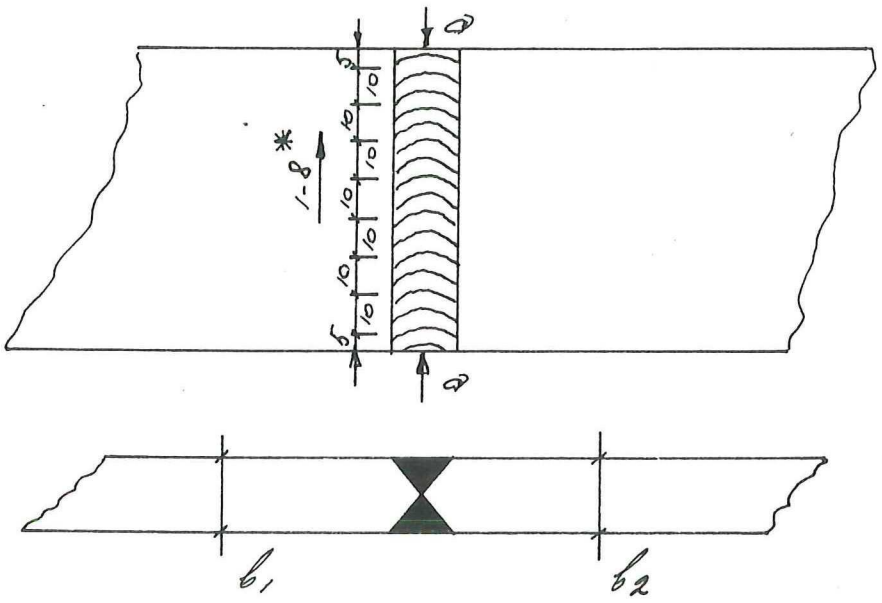
Remarks:

Type : E' N° 1 Annex. N° 7

Material: Al. Mg. Si 1

Rod type: Al. Si 5

diam: 4 mm.



a = 80.0 mm

b_1 = 20,3 " b_2 = 20,2 m

* points at which the welds have been measured.

Weld N°	weld thickness in 0,01 mm.								Average 1 — 8	Weld length mm
	1	2	3	4	5	6	7	8		
1	125	110	116	108	092	118	107	110	111	80.0
2	154	161	182	169	155	177	185	177	170	80.0

Welding date: 24-11-'69

Preheating: ± 250 °C

Argon supply: 10 l/min

Welding current: 220 Amp

Welding sequence:

Welding speed: 1 cm/6 sec

Broken welds, location of rupture surface:

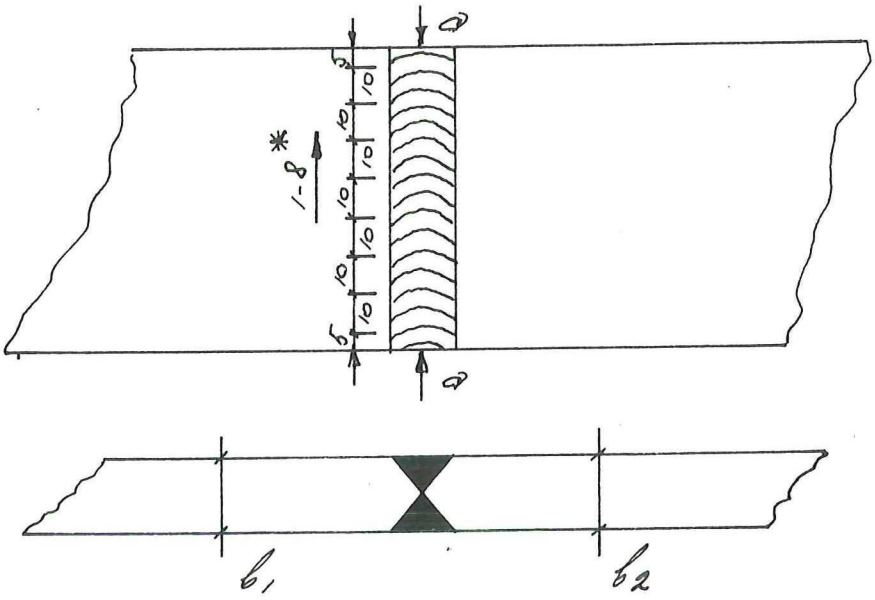
Testing date: 11-3-70

Max load: 28,0 Number of fillets broken: 0 (Material).

Remarks:

Type : E' N° 2 Annex. N° 8

Material: Al Mg Si 1
Rod type: Al. Si 5
diam: 4 mm.



a = 80.0 mm
b_1 = 20,2 " b_2 = 20,2 mm

* points at which the welds have been measured.

Weld N°	weld thickness								average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	124	131	150	143	134	140	131	114	133	80.0
2	160	146	163	185	124	141	126	168	152	80.0

Welding date: 24-11-69

Preheating: ± 250 °C

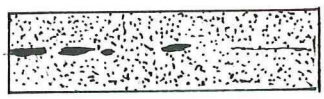
Argon supply: 10 l/min

Welding current: 220 Amp

Welding sequence:

Welding speed: 1cm / 6 sec.

Broken welds, location of rupture surface:



Testing date: 16-3-'70

Max load: 26,5 tf Number of fillets broken: 2.

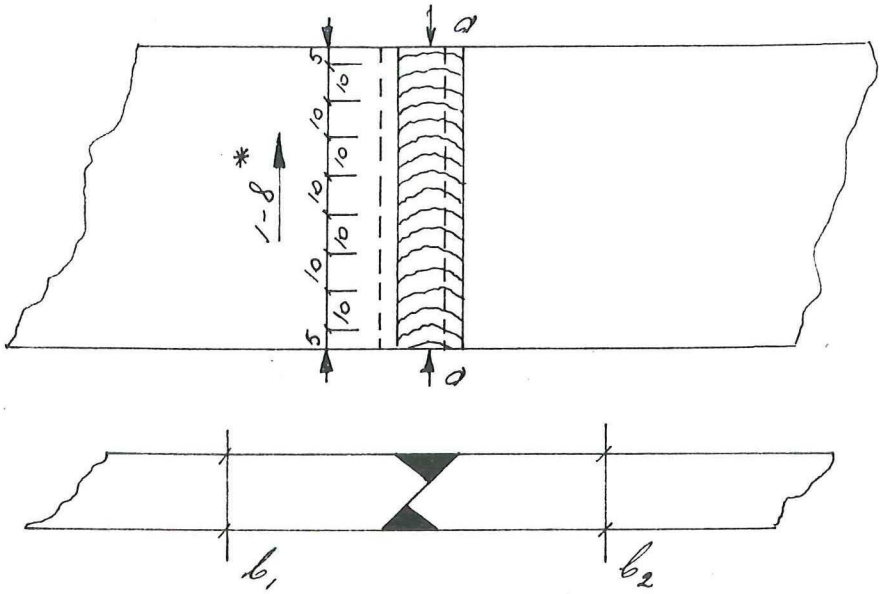
Remarks:

Type : F' № 1 Annex № 9

Material : Al Mg 5

Rod type : Al Si 5

diam : 4 mm.



a = 80,2 mm

b_1 = 20,3 " b_2 = 20,3

* points at which the welds have been measured.

Weld. №	weld thickness								Average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	118	143	143	147	135	148	160	146	143	80,2
2	100	90	75	120	130	108	117	100	105	80,2

Welding date : 21-11-'69

Preheating : ± 250 °C

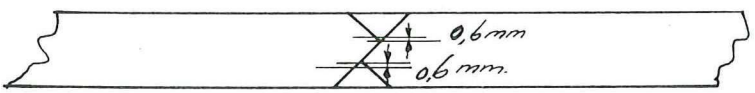
Argon supply : 10 l/min

Welding current : 220 Amp.

Welding sequence :

Welding speed : 1 cm/6 sec.

Broken welds. location of rupture surface :



Testing date : 11-3-70

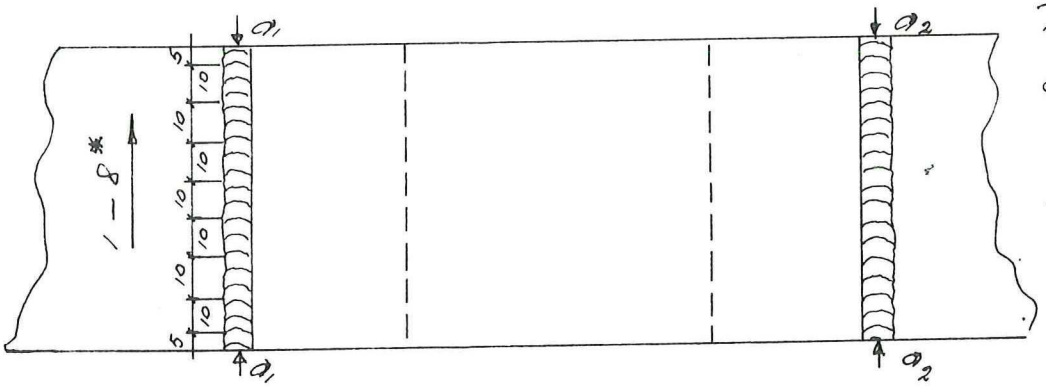
Max. load : 16,7 tF Number of fillets broken : 2

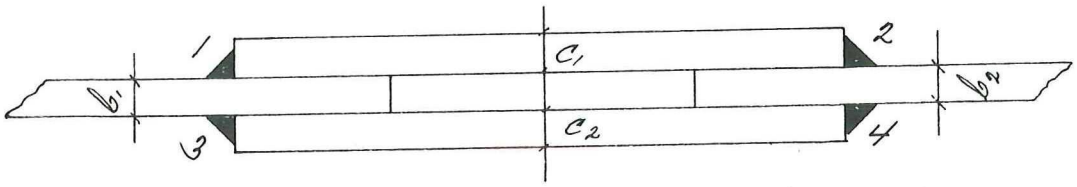
Remarks :

Type: Am' Nº: 1 Annex. Nº 11

Material: Al Mg 4,5 Mn
Rod type: Al Mg 5
diam: 4 mm.

a_1 = 80.1 mm a_2 = 80.0 mm
b_1 = 19,8 " b_2 = 19.7 "
c_1 = 19,6 " c_2 = 19,6 "





* points at which the welds have been measured.

Weld Nº	weld thickness in 0.01 mm								Averoge 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	672	678	655	659	674	672	658	656	666	80,1
2	682	664	691	703	720	735	700	712	701	80.0
3	687	700	703	705	703	698	665	672	692	80.1
4	735	743	655	743	688	734	744	768	726	80.0

Welding date: 25_11_69.

Preheating: ± 250 °C

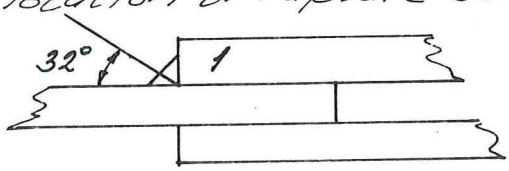
Argon supply: 10 l/min.

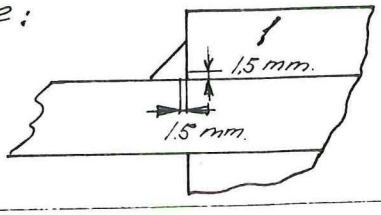
Welding current: 180-190 Amp

Welding sequence: 1, 2, 3, 4

Welding speed: 10cm / 6 sec.

Broken welds. location of rupture surface:





Testing date: 5_3_70

Max load: 18,7 tf Number of fillets broken: 1 (Nº 1)

Remarks:

Type: Am' № 2 Annex. № 12

Material: Al Mg 4.5 Mn

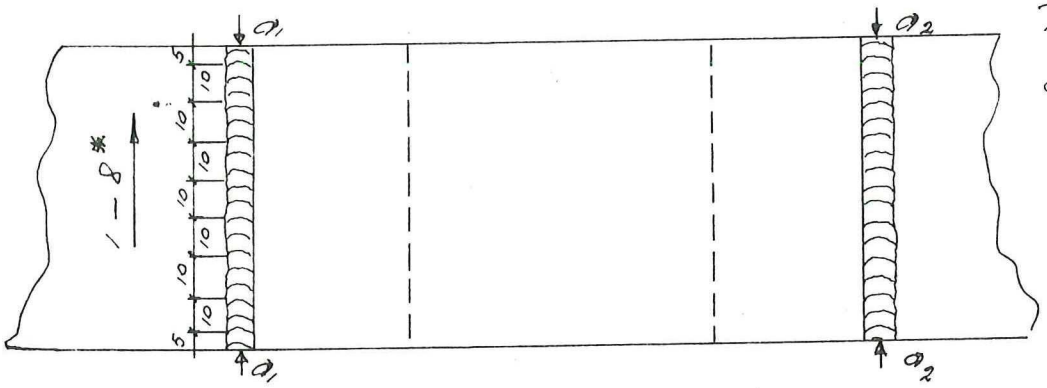
Rod type: Al Mg 5

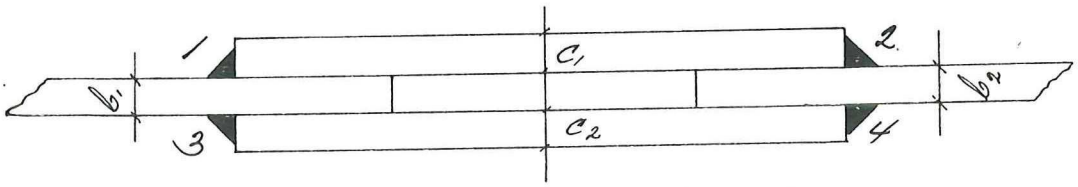
diam: 4 mm.

a_1 = 80.1 mm a_2 = 79.9 mm

b_1 = 19.8 " b_2 = 19.8 "

c_1 = 19.6 " c_2 = 19.7 "





* points at which the welds have been measured.

Weld №	weld thickness in 0.01 mm								Average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	647	676	673	692	676	681	668	658	671	80.1
2	708	714	680	679	664	669	660	680	682	79.9
3	721	675	663	667	680	688	656	675	678	80.1
4	778	744	760	734	751	762	691	748	746	79.9

Welding date: 25-11-'69

Preheating: ± 250 °C

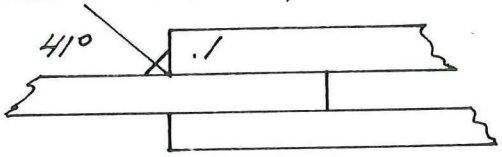
Argon supply: 10 l/min.

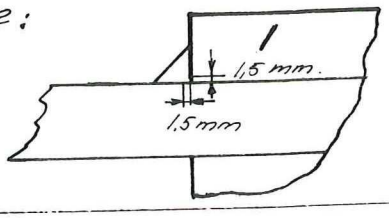
Welding current: 180-190 Amp

Welding sequence: 1, 2, 3, 4

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:





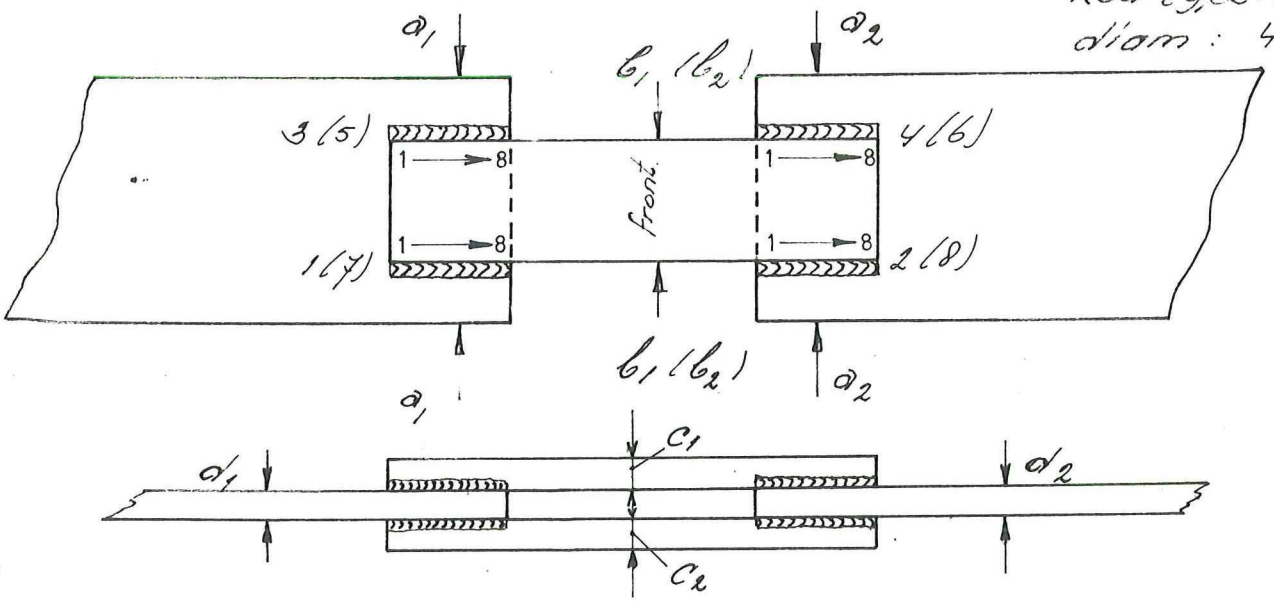
Testing date: 5-3-'70

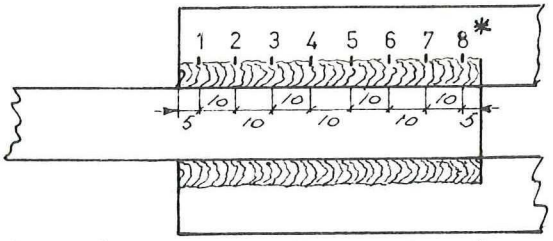
Max load: 19,3 tf Number of fillets broken: 1 (№ 1).

Remarks:

Type: Bm' No: 2 Annex. N° 14

Material: Al Mg 4.5 Mn.
Rod type: Al Mg 5
diam: 4 mm.





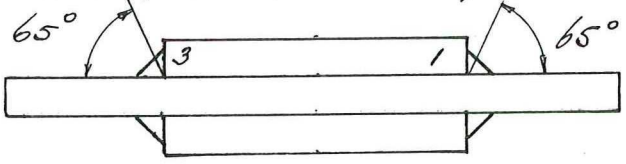
a_1 = 163 mm a_2 = 161,5 mm
b_1 = 80.0 " b_2 = 80.0 "
c_1 = 19.7 " c_2 = 19.6 "
d_1 = 19.9 " d_2 = 19.9 "

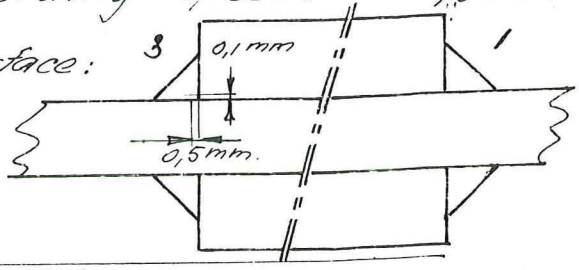
* points at which the welds have been measured.

Weld N°	weld thickness. in 0.01 mm.								Average 1 – 8	Weld length 0,1 mm.	
	1	2	3	4	5	6	7	8			
1	660	652	643	680	630	620	621	646	644	82.0	
2	644	650	655	630	650	680	671	676	657	80.6	
3	720	689	671	640	663	669	636	638	666	81.9	
4	627	664	656	683	700	687	682	722	678	80.3	
5	683	673	678	670	650	652	635	627	659	81.0	
6	682	700	688	680	686	688	692	735	694	81.3	
7	648	653	666	650	661	654	627	665	653	81.3	
8	652	670	700	672	662	674	684	670	673	81.8	

Welding date: 27-11-'69
Welding current: 190 Amp.
Preheating: ± 250 °C
Welding sequence: 1, 2, 3 etc.
Argon supply: 10 l/min.
Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:

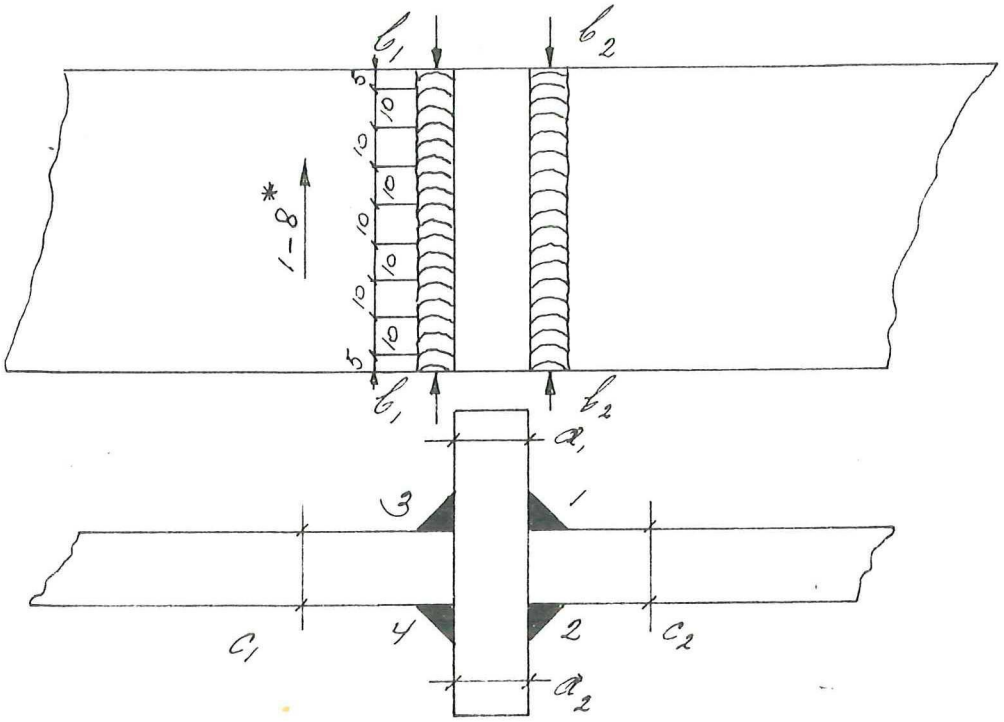




Testing date: 5-3-70
Max. load: 31,1 tf Number of fillets broken: 2 (N° 1 N° 3)
Remarks:

Type : D' N°: 2 Annex N° 16

Material: Al Mg 4,5 Mn.
Rod type: Al Mg 5
diam: 4 mm.



a_1 = 19,5 mm a_2 = 19,5 mm
b_1 = 79.7 " b_2 = 79.7 "
c_1 = 19.7 " c_2 = 19.7 "

* points at which the welds have been measured.

Weld. N°	weld thickness in 0.01 mm.								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	710	673	689	714	705	701	740	724	707	79.7
2	717	679	703	696	707	707	736	730	709	79.7
3	722	679	702	697	714	703	735	733	711	79.7
4	690	697	688	671	715	710	708	705	698	79.7

Welding date: 25-11-'69

Preheating: ± 250 °C

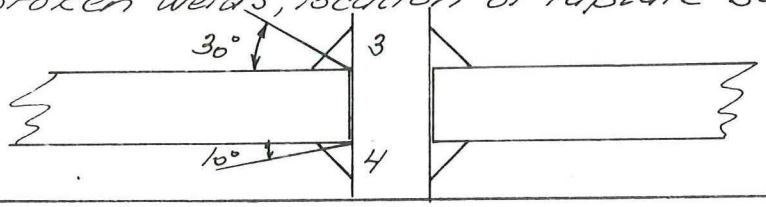
Argon supply: 10 l/min

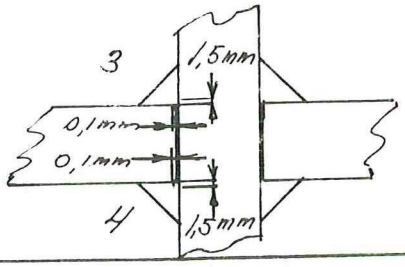
Welding current: 210 Amp

Welding sequence: 1,2,3,4.

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:





Testing date: 11-3-'70

Max. load: 17,8 tf Number of fillets broken: 1 (N° 3)

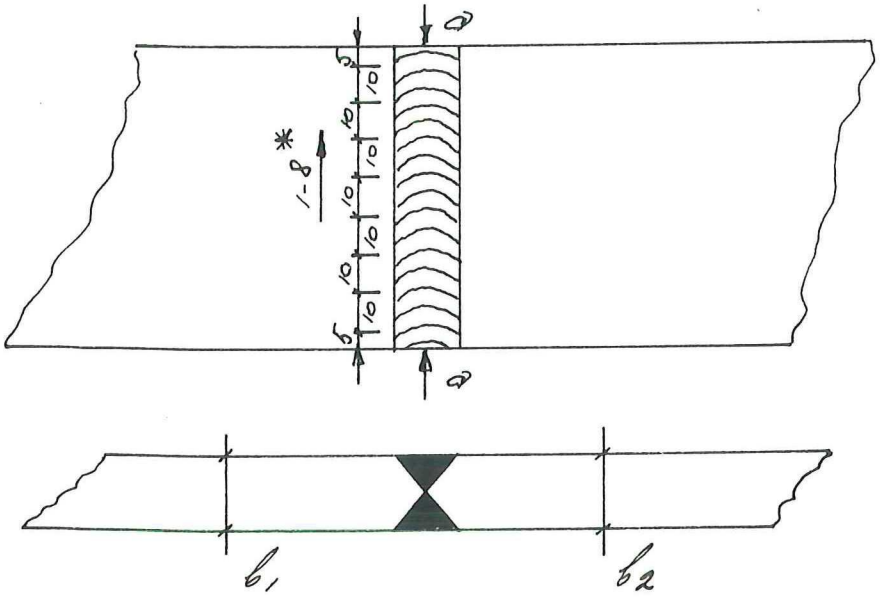
Remarks: 8,9

Type : E' № 1 Annex. № 17

Material: AlMg4.5Mn

Rod type: AlMg5

diam: 4 mm.



a = 80.0 mm

b_1 = 19.8 . b_2 = 19.7 mm.

* points at which the welds have been measured.

Weld №	weld thickness in 0.01 mm.								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	138	167	160	141	141	123	133	102	138	80.0
2	52	54	89	45	58	90	82	77	68	80.0

Welding date: 25-11-69

Preheating: ± 250 °C

Argon supply: 10 l/min

Welding current: 180 Amp

Welding sequence:

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:

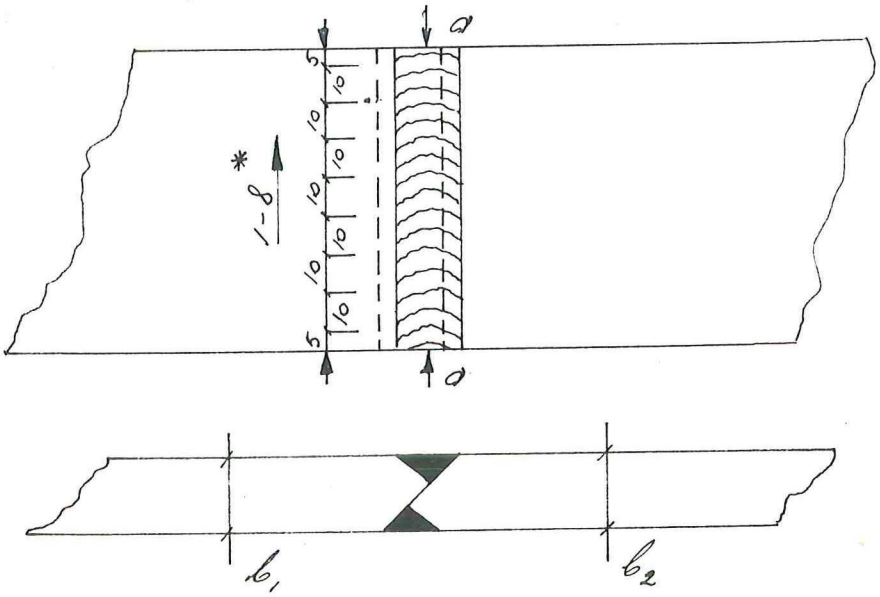
Testing date: 11-3-70

Max load: 49.0 tF Number of fillets broken: 0 (Material)

Remarks:

Type : F' № 2 Annex № 20

Material: Al Mg 4.5/M
Rod type: Al Mg 5
diam : 4 mm.

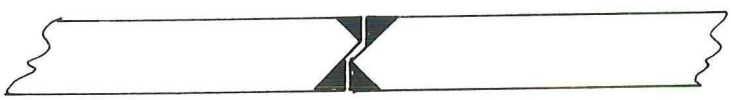


a = 80.2 mm
b_1 = 19.6 " b_2 = 19.6 mm

* points at which the welds have been measured.

Weld. №	weld thickness in 0,01 mm.								average 1–8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	32	52	27	26	65	33	24	34	37	80.2
2	122	111	105	144	90	116	125	121	117	80.2

Welding date: 26-11-'69
Preheating: ± 250 °C
Argon supply: 10 l/min
Welding current: 180 Amp.
Welding sequence:
Welding speed: 1cm/6 sec.
Broken welds. location of rupture surface:

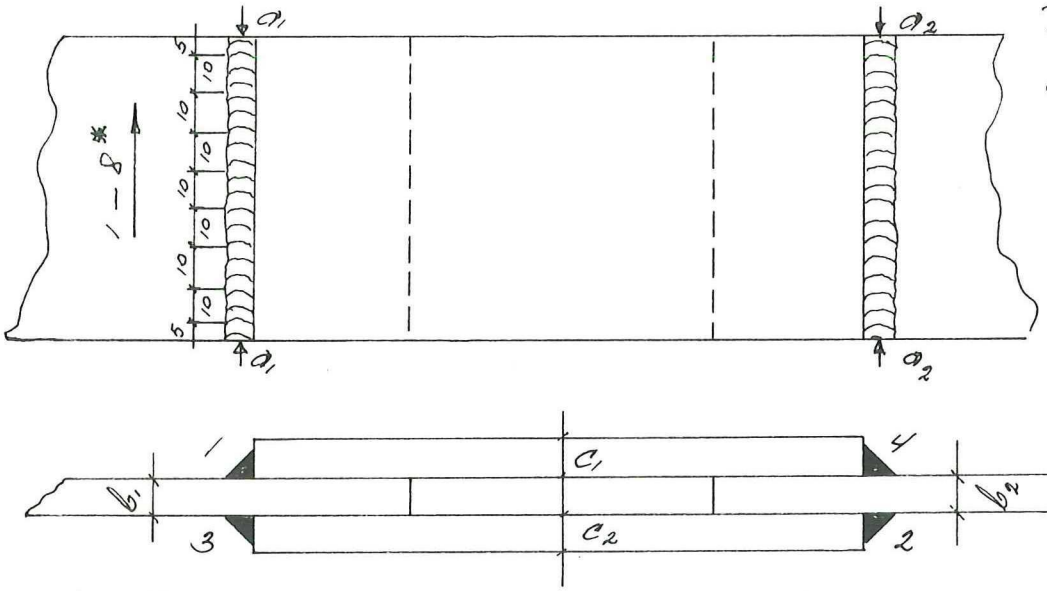


Testing date: 11-3-'70
Max. load: 25,5 tf Number of fillets broken: 2.
Remarks:

Type: Am' № 1 Annex. № 21

Material: Al Zn Mg.
Rod type: Al Mg 5
diam: 4 mm.

a_1 = 80.0 mm a_2 = 80.0 mm
b_1 = 19,5 " b_2 = 19,5 "
c_1 = 19,5 " c_2 = 19,8 "



* points at which the welds have been measured.

Weld №	weld thickness in 0,01 mm.								Average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	817	797	765	815	814	790	770	761	791	80.0
2	703	671	724	724	747	753	752	740	727	80.0
3	740	697	712	716	720	731	729	724	721	80.0
4	697	716	750	690	741	744	695	730	720	80.0

Welding date: 10-12-69

Preheating: ± 280 °C

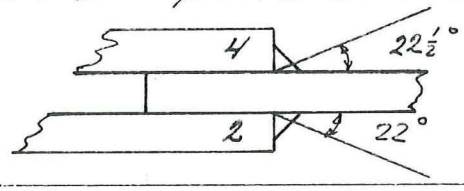
Argon supply: 10 l/min.

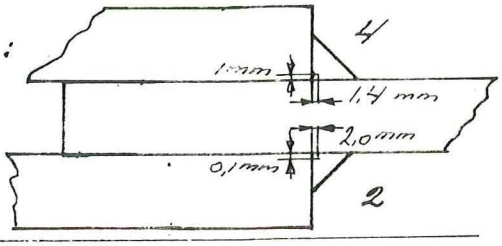
Welding current: 260 Amp

Welding sequence: 1, 2, 3, 4.

Welding speed: 1 cm / 6 sec.

Broken welds. location of rupture surface:





Testing date: 11-3-70

Max load: 21,5 tf Number of fillets broken: 2 (№ 2 № 4)

Remarks:

Type: Am' № 2 Annex. № 22

Material: Al Zn. Mg. 5

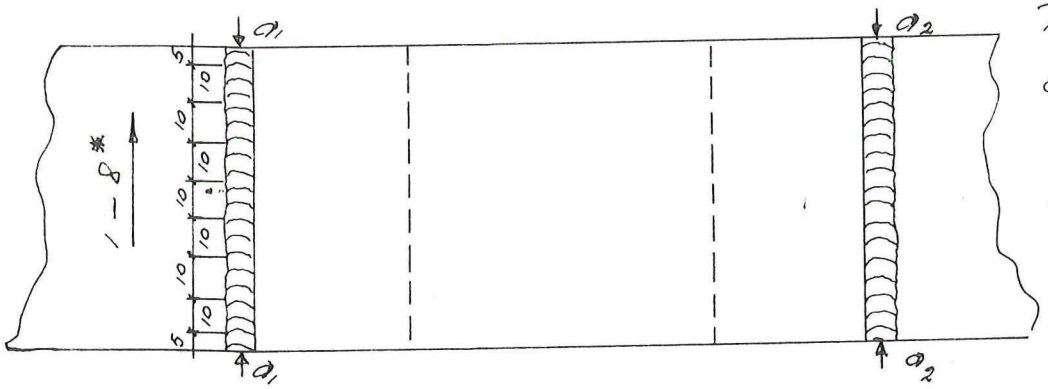
Rod type: Al Mg 5

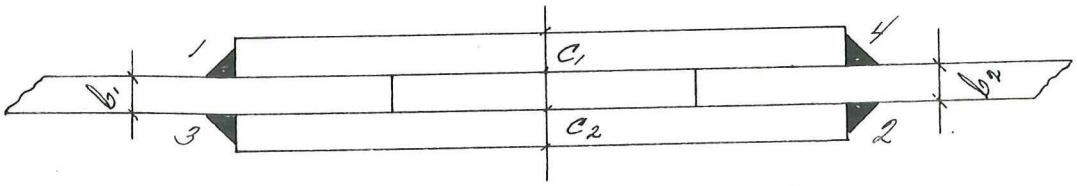
diam: 4 mm.

a_1 = 80,0 mm a_2 = 79,8 mm

b_1 = 19,6 " b_2 = 19,6 "

c_1 = 19,6 " c_2 = 19,8 "





* points at which the welds have been measured.

Weld №	weld thickness in 0,01 mm.								average 1 – 8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	778	769	759	760	742	722	741	740	751	80.0
2	748	772	755	740	783	757	783	745	760	79.8
3	752	766	720	740	740	743	710	675	731	80.0
4	758	771	705	718	755	735	778	783	750	79.8

Welding date: 10-12-69

Preheating: ± 280 °C

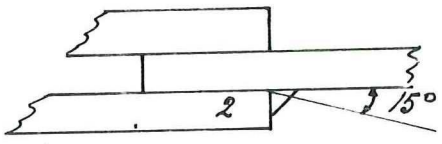
Argon supply: 10 l/min.

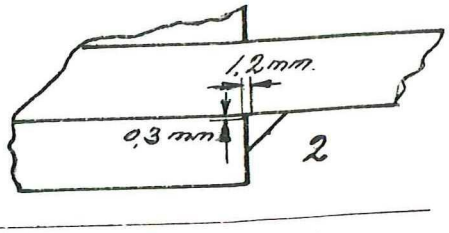
Welding current: 260 Amp

Welding sequence: 1, 2, 3, 4

Welding speed: 1 cm / 6 sec.

Broken welds, location of rupture surface:





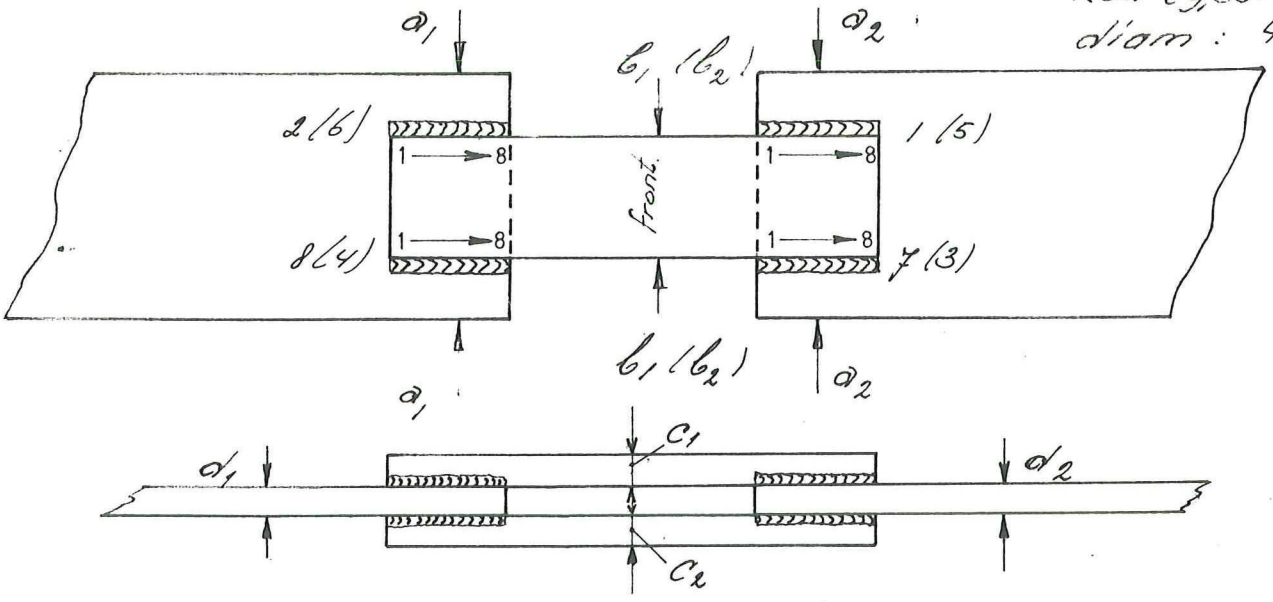
Testing date: 11-3-70

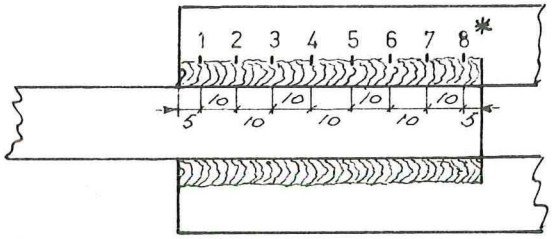
Max load: 22.9 tf. Number of fillets broken: 1 (№ 2)

Remarks:

Type: Bm' No: 2 Annex. N° 24

Material: Al Zn Mg.
Rod type: Al. Mg 5
diam: 4 mm.





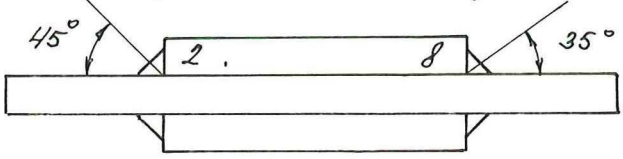
a_1 = 160.0 mm a_2 = 160,0 mm
b_1 = 80,1 " b_2 = 80,0 "
c_1 = 19,5 " c_2 = 19,5 "
d_1 = 19,7 " d_2 = 19,8 "

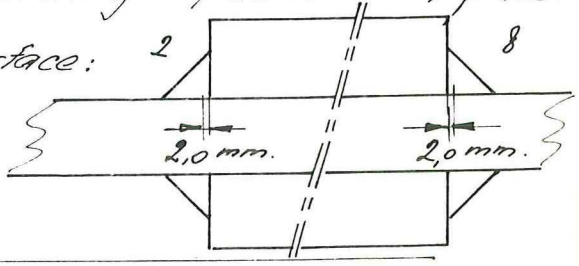
* points at which the welds have been measured.

Weld N°	weld thickness in 0.01 mm.								Average 1 – 8	Weld length in mm.	
	1	2	3	4	5	6	7	8			
1	703	672	668	717	728	750	750	722	714	80,0	
2	741	716	715	725	760	737	725	730	731	80.0	
3	690	686	706	707	743	707	734	725	712	80,6	
4	780	746	752	748	724	725	744	752	746	82.3	
5	700	740	733	749	743	744	749	775	742	79,5	
6	757	754	776	776	766	754	779	766	766	79.6	
7	738	730	728	735	763	748	703	755	738	81,4	
8	760	745	707	722	743.	717	738	712	731	82,3	

Welding date: 11-12-'69
Welding current: 230 Amp.
Preheating: ± 250 °C
Welding sequence: 1,2,3 etc.
Argon supply: 12 l/min.
Welding speed: 1cm/7 sec.

Broken welds, location of rupture surface:





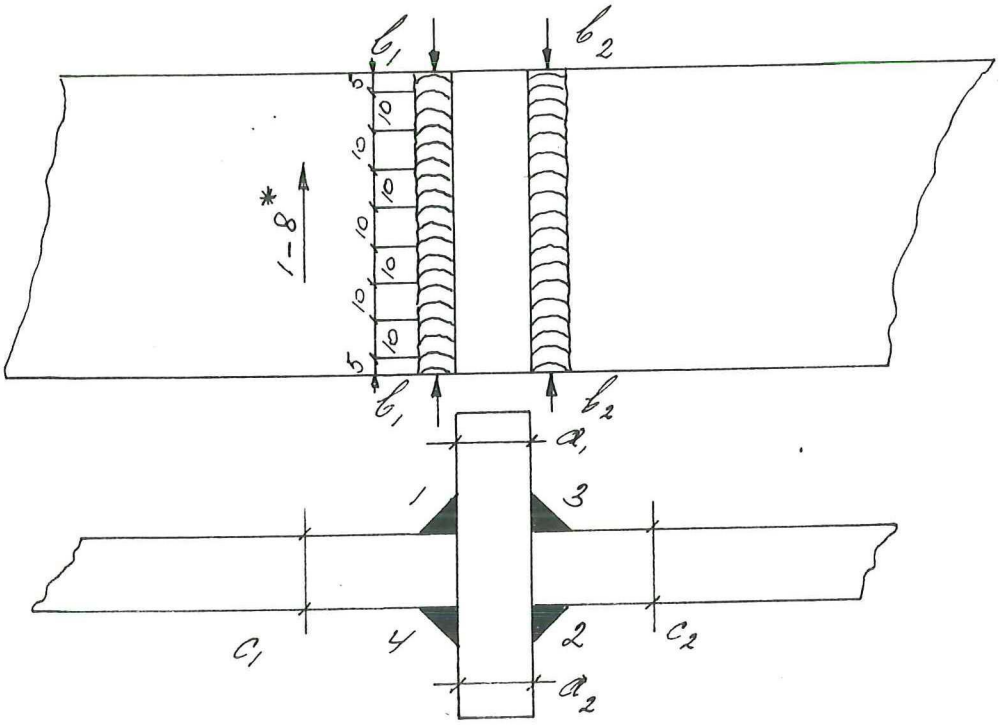
Testing date: 6-3-70
Max. load: 29,4 tf. Number of fillets broken: 2 (N° 2 N° 8)
Remarks:

Type : D' № : 1 Annex № 25

Material: Al. Zn Mg.

Rod type: Al Mg 5

diam: 4 mm.



a_1 = 19,8 mm a_2 = 19,8 mm

b_1 = 80.0 " b_2 = 80.0 "

c_1 = 19,6 " c_2 = 19,8 "

* points at which the welds have been measured.

Weld. №	weld thickness in 0.01 mm.								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	825	729	750	716	766	797	688	687	746	80,0
2	776	683	661	685	697	700	764	792	720	80.0
3	765	732	735	701	700	751	740	792	740	80.0
4	736	752	880	888	836	792	870	857	826	80.0

Welding date: 12-12-69

Preheating: ± 250 °C

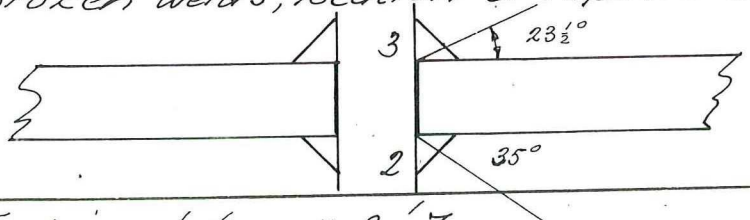
argon supply: 12 l/min

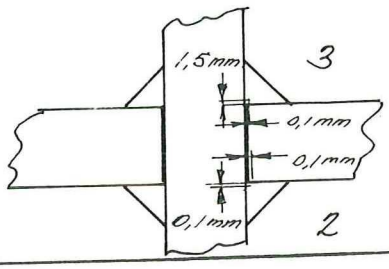
Welding current: 240 Amp

Welding sequence: 1,2,3,4.

Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:





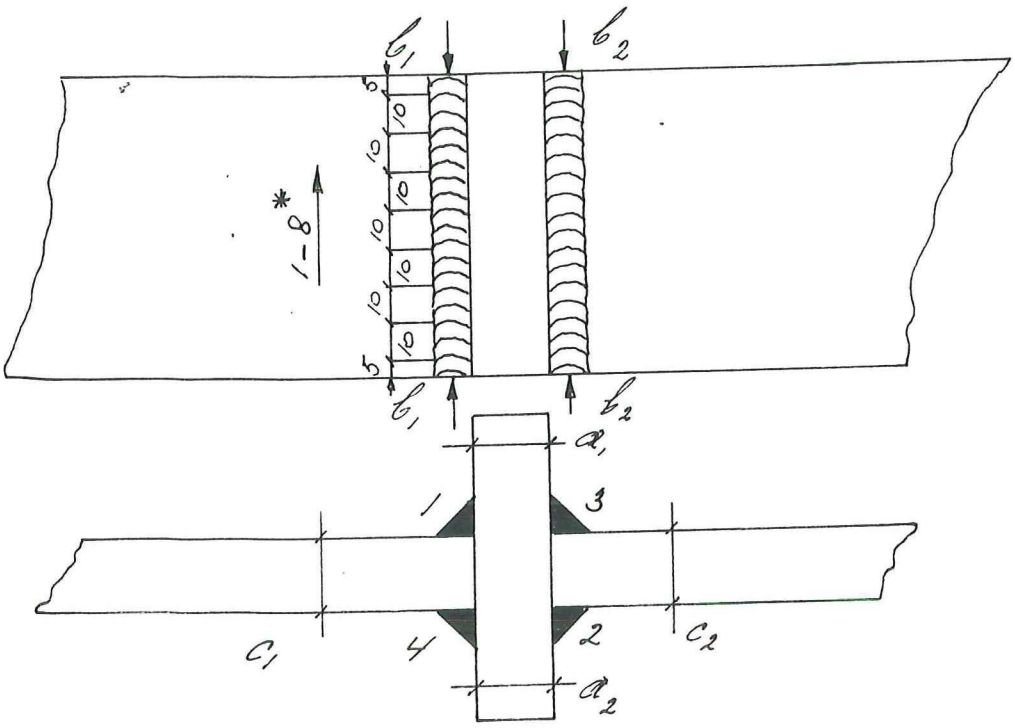
Testing date: 11-3-70

Max. load: 18,0 tf. Number of fillets broken: 2 (№ 2 № 3)

Remarks:

Type : D' № : 2 Annex № 26

Material: Al. Zn. Mg.
Rod type: Al. Mg 5
diam: 4 mm.



a_1 = 19,9 mm a_2 = 19,9
b_1 = 79,9 . b_2 = 79,9
c_1 = 19,9 . c_2 = 19,9

* points at which the welds have been measured.

Weld. №	weld thickness in 0.01 mm.								Average 1–8	Weld length mm
	1	2	3	4	5	6	7	8		
1	760	740	732	673	728	673	694	763	720	79.9
2	711	716	737	771	742	747	732	778	742	79.9
3	852	776	745	728	806	782	783	823	787	79.9
4	839	855	855	779	755	780	735	865	808	79.9

Welding date: 12-12-69

Preheating: ± 250 °C

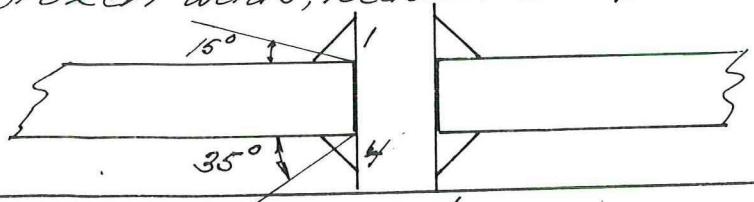
argon supply: 12 l/min

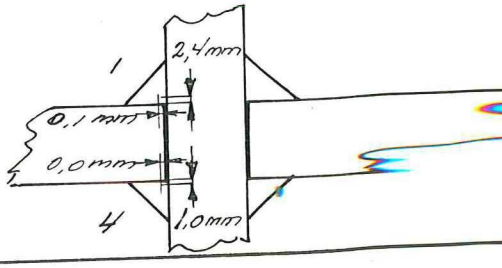
Welding current: 240 Amp

Welding sequence: 1, 2, 3, 4.

Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:





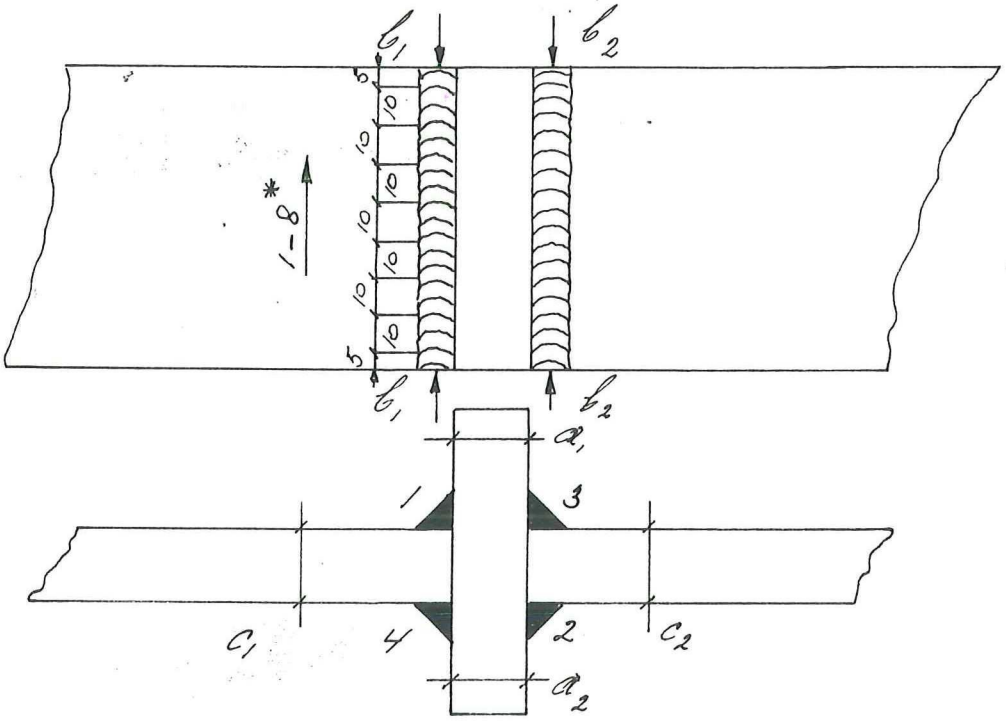
Testing date: 11-3-70

Max. load: 17.8 tf Number of fillets broken: 2 (№ 1

Remarks:

Type : D' N°: 2 Annex N° 26

Material: Al. Zn. Mg.
Rod type: Al Mg 5
diam: 4 mm.



a_1 = 19,9 mm a_2 = 19,9 mm
b_1 = 79,9 " b_2 = 79,9 "
c_1 = 19,9 " c_2 = 19,7 "

* points at which the welds have been measured.

Weld. N°	weld thickness in 0.01 mm.								Average	Weld length mm
	1	2	3	4	5	6	7	8	1–8	
1	760	740	732	673	728	675	694	763	720	79.9
2	711	716	737	771	742	747	732	778	741	79.9
3	852	776	745	728	806	782	783	823	787	79.9
4	839	855	855	779	755	780	735	865	808	79.9

Welding date: 12-12-69

Preheating: ± 250 °C

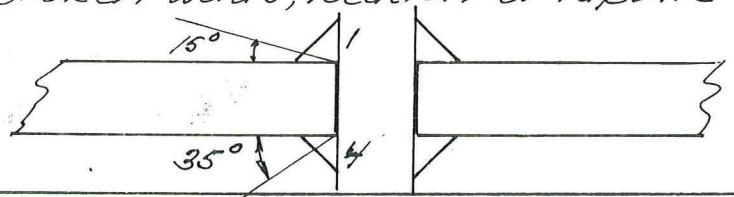
argon supply: 12 l/min

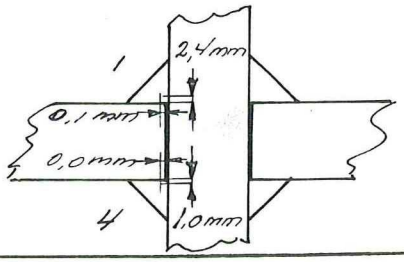
Welding current: 240 Amp

Welding sequence: 1,2,3,4.

Welding speed: 1 cm/6 sec.

Broken welds, location of rupture surface:





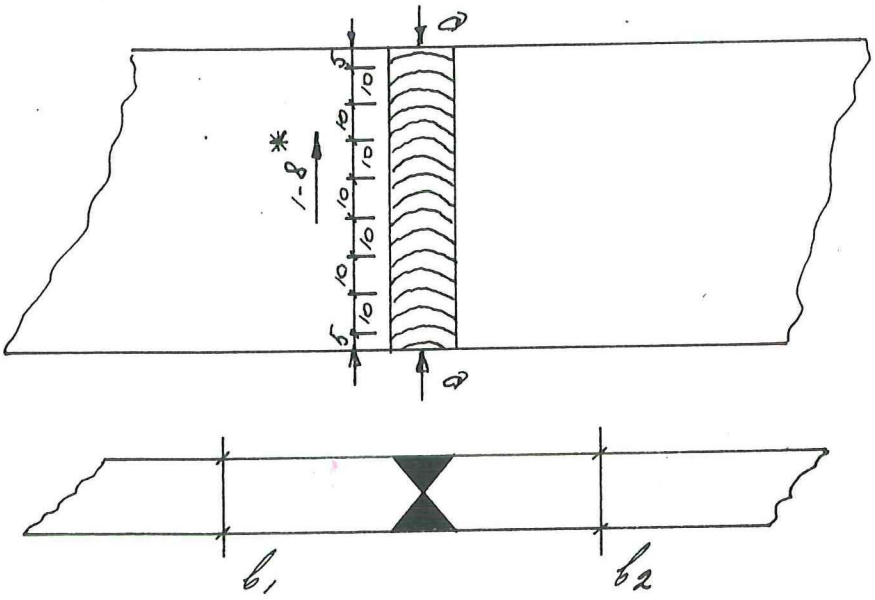
Testing date: 11-3-70

Max. load: 17.8 tf Number of fillets broken: 2 (N° 1 N° 4)

Remarks:

Type : E' N° 1 Annex. N° 27

Material: Al. Zn. Mg.
Rod type: Al Mg 5
diam: 4 mm.



a = 79,8 mm
b_1 = 19,8 " b_2 = 19,8 mm

* points at which the welds have been measured.

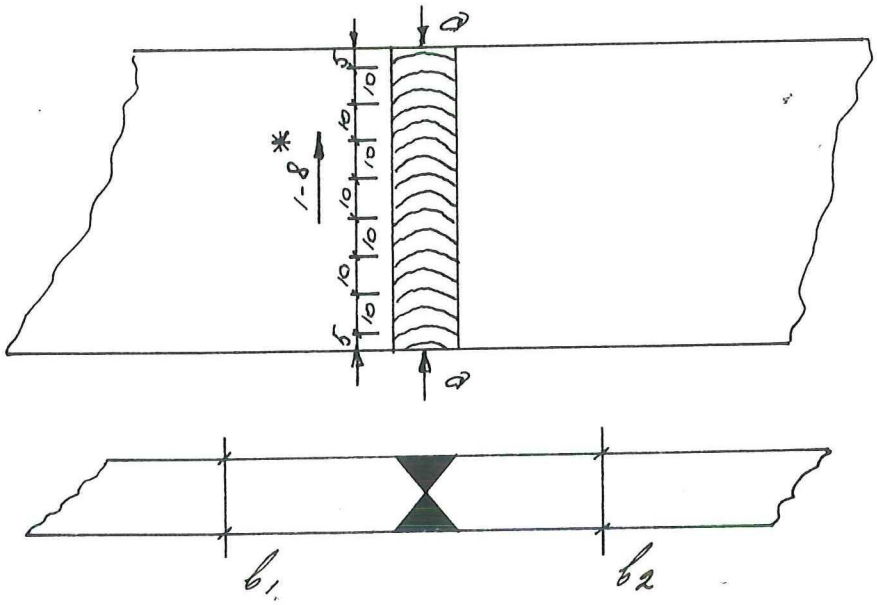
Weld N°	weld thickness in 0,01 mm.								average 1 – 8	Weld length mm
	1	2	3	4	5	6	7	8		
1	134	104	84	88	94	70	71	72	90	79,8
2	130	115	155	131	75	96	96	129	116	79,8.

Welding date: 10-12-'69
Preheating: ± 280 °C
Argon supply: 10 l/min
Welding current: 240/250 Amp
Welding sequence: —
Welding speed: 1cm/6 sec.
Broken welds, location of rupture surface:

Testing date: 23-3-'70
Max load: 35,2 tf Number of fillets broken: 0 (Material).
Remarks:

Type : E' N° 2 Annex. N° 28

Material: Al. Zn Mg.
Rod type: Al Mg 5
diam: 4 mm.



a = 79.9 mm
b_1 = 19.8 " b_2 = 19.8 mm

* points at which the welds have been measured.

Weld N°	weld thickness in 0.01 mm.								Overage 1 – 8	Weld length mm
	1	2	3	4	5	6	7	8		
1	62	64	84	73	88	90	108	78	81	79.9
2	132	109	123	93	127	132	87	107	114	79.9

Welding date: 10-12-69
Preheating: ± 280 °C
Argon supply: 10 l/min
Welding current: 240/250 Amp
Welding sequence: —
Welding speed: 1 cm/6 sec.
Broken welds, location of rupture surface:

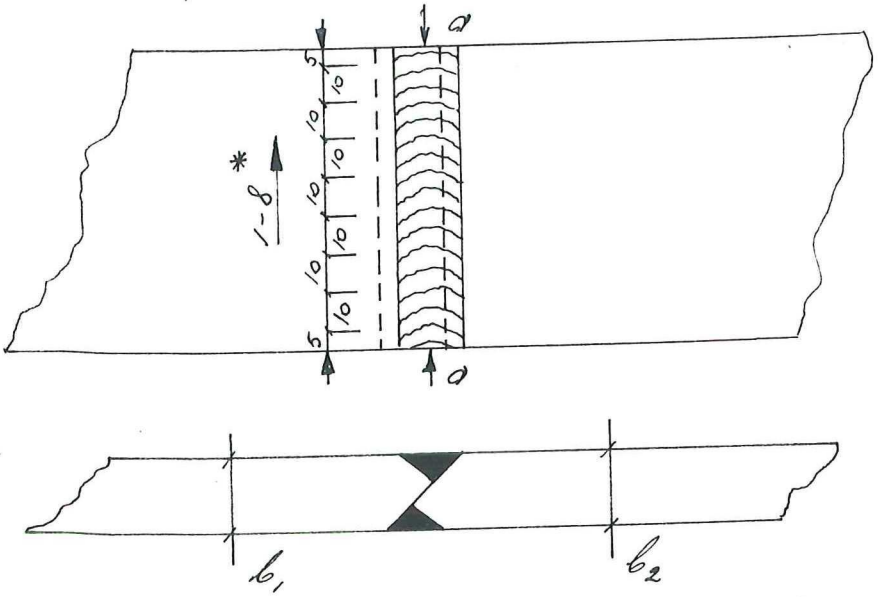
Testing date: 23-3-70
Max load: 35,6 tf Number of fillets broken: 0 (Material.)
Remarks:

Type : F' № 1 Annex № 29

Material : Al Mg.

Rod type : Al Mg

diam : 4 mm.



a = 79.9 mm

b_1 = 19.8 " b_2 = 19.8

* points at which the welds have been measured.

Weld. №	weld thickness in 0.01 mm.								Average 1–8	Weld length mm.
	1	2	3	4	5	6	7	8		
1	88	64	70	82	54	82	87	105	79	79.9
2	157	130	125	152	147	152	171	173	151	79.9

Welding date: 10-12-'69

Preheating: ± 280 °C

Argon supply: 10 l/min

Welding current: 220 Amp.

Welding sequence: —

Welding speed: 1 cm / 6 sec.

Broken welds. location of rupture surface:

Testing date: 11-3-'70

Max. load: 25,6 tf Number of fillets broken: 2.

Remarks: