

ICS 77.150.10
H 61

National Standard of the People's Republic of China

GB 5237.1—200×
replace GB 5237.1-2004

Aluminium alloy extruded profiles
for architecture
Part 1: Mill finish

Issued by General Administration of Quality Supervision, Inspection and Quarantine of
the People's Republic of China

State Administration of China for Standardization

This part was proposed by China Non-ferrous Metals Industry Association.

This part is under the jurisdiction of the State Administration of China for Standardization of Nonferrous Metals.

The departments with responsibility for this work are as follows: Guangdong Jianmei Aluminium Profile Factory Co., Ltd. 、 Fujian Nanping Aluminium Company Limited、 Fujian Minfa Aluminium Co., Ltd.、 Standard Research Division China Nonferrous Metals Standards and Metrology Research Institute and Guangdong Xingfa Alumimium Co., Ltd.

The departments taking part in this work are as follows: National Quality Supervision and Inspection Center for Nonferrous Metals、 Huanan Quality Supervision and Inspection Center for Nonferrous Metals、 Sichuang Guanghan Sanxing Alumimium Co., Ltd.、 Shanghai Zhedong Building Material Co., Ltd. and Guangya Aluminium Co., Ltd.

This part was drafted by Lu Jiyan、 Fan Shunke、 Dai Yuexing、 Zhu Yuhua、 He Zeji、 Huang Changyuan、 Chen Wensi、 He Yaozu and Zhang Zhongxing.

The former edition which replaced by this part is:

——GB/T 5237-1985、 GB/T 5237-1993 (The profiles without surface treatment) 、 GB/T 5237.1-2000、 GB 5237.1-2004。

Aluminium alloy extruded profiles for architecture

Part 1: Mill finish

1 Scope

This part specifies requirements, test methods, inspection rulers, packaging, marking, delivery, storage and contract information of aluminium alloy extruded profiles for architecture.

This part applies to aluminium-extruded profiles for architecture without any surface treatment (hereafter referred to "Profile").

This part is also applies to aluminium extruded tubes with similar use or aluminium extruded profiles for other ~~lines-industry~~.

2 Normative references

The following normative documents contain provision which, through reference in this text, constitute provisions of this national standard. For dated reference, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

GB/T 228-2002 Metallic material—Tensile testing at ambient temperature.

GB/T 3190 Wrought aluminium and aluminium alloys—Chemical composition limits

GB/T 3199 Wrought aluminium and aluminium alloy products packing, marking, transporting and storing.

GB/T 4340.1 Metallic materials—Vickers hardness test—Part 1: Test method

GB/T 16865 Test pieces for tensile test for wrought aluminium and magnesium alloys products.

GB/T 17432 Methods for sampling for analysing the chemical composition of wrought aluminium and aluminium alloy.

GB/T 20975 (all) Chemical analysis methods of aluminium and aluminium alloy.

YS/T 67 Wrought aluminium and aluminium alloys columniform ingots.

YS/T 420 Aluminium alloys Webster hardness standard test method.

YS/T 436 Architectural aluminium profile design

Terms and definitions

The terms and definitions shown below are applicable for this part.

4.4.1.1.4 The applicable tolerance class shall be agreed on between purchaser and supplier. However, when the profiles of alloy 6060-T5、6063-T5、6063A-T5、6463-T5、6463A-T5 relate to assembling, the tolerance on wall thickness shall apply to precision class or super-precision class in the Table 3.

4.4.1.1.5 In the case of the drawing is without indicating and the wall thickness shall be measured directly, the tolerance on wall thickness shall apply to ordinary class, unless otherwise apply to precision class or super-precision class when indicated in the drawing.

(修改4.4.1.1.5: Choose the precision class or the super-precision class when the allowable tolerance of wall thickness is indicated in the drawing, if not, the wall thickness which can be measured directly apply to the ordinary class.)

4.4.1.1.6 Tolerance between nominal wall thickness and the wall thickness of each surface with the same tolerance shall not exceed half of tolerance on wall thickness.

Table 3 Allowable tolerance on wall thickness

Classification	Nominal wall thickness mm	Tolerance on wall thickness for circumscribing circle CD /mm a. b. c. d					
		100 max.		Over 100 up to and incl.250		Over 250 up to and incl.350	
		A	B、C	A	B、C	A	B、C
Ordinary class	1.50 max.	0.15	0.23	0.20	0.30	0.38	0.45
	Over 1.50 up to and incl.3.00	0.15	0.25	0.23	0.38	0.54	0.57
	Over 3.00 up to and incl.6.00	0.18	0.30	0.27	0.45	0.57	0.60
	Over 6.00 up to and incl.10.00	0.20	0.60	0.30	0.90	0.62	1.20
	Over 10.00 up to and incl.15.00	0.20	-	0.30	-	0.62	-
	Over 15.00 up to and incl.20.00	0.23	-	0.35	-	0.65	-
	Over 20.00 up to and incl.30.00	0.25	-	0.38	-	0.69	-
	Over 30.00 up to and incl.40.00	0.30	-	0.45	-	0.72	-
Precision class	1.50 max.	0.13	0.21	0.15	0.23	0.30	0.35
	Over 1.50 up to and incl.3.00	0.13	0.21	0.15	0.25	0.36	0.38
	Over 3.00 up to and incl.6.00	0.15	0.26	0.18	0.30	0.38	0.45
	Over 6.00 up to and incl.10.00	0.17	0.51	0.20	0.60	0.41	0.90
	Over 10.00 up to and incl.15.00	0.17	-	0.20	-	0.41	-
	Over 15.00 up to and incl.20.00	0.20	-	0.23	-	0.43	-
	Over 20.00 up to and incl.30.00	0.21	-	0.25	-	0.46	-
	Over 30.00 up to and incl.40.00	0.26	-	0.30	-	0.48	-
Super-precision class	1.50 max.	0.09	0.10	0.10	0.12	0.15	0.25

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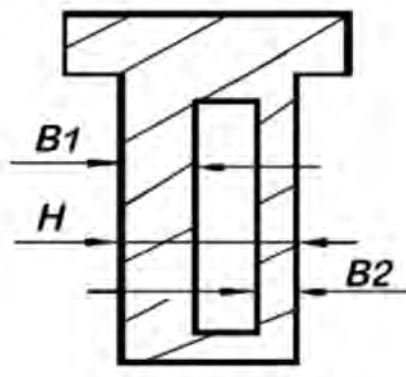


Figure 3

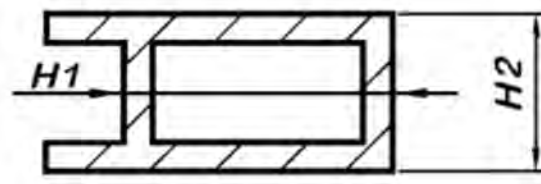


Figure 4

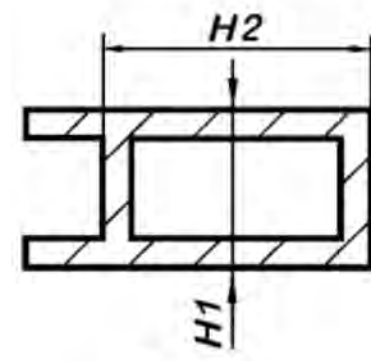


Figure 5

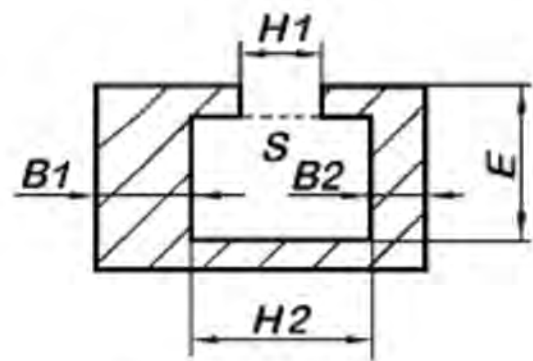


Figure 6

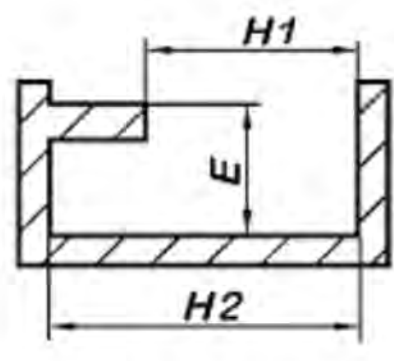


Figure 7

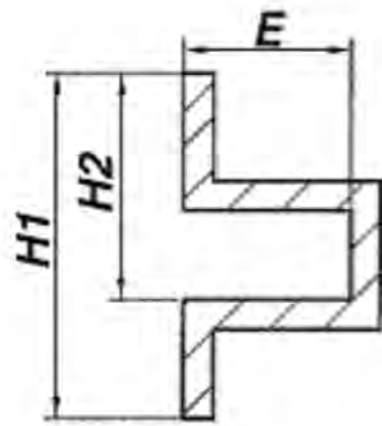


Figure 8

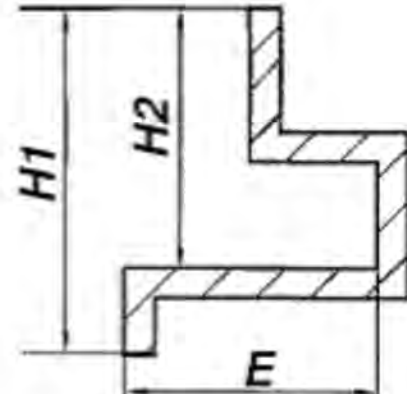


Figure 9

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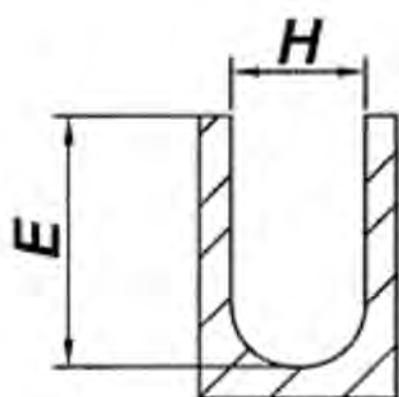


Figure 10

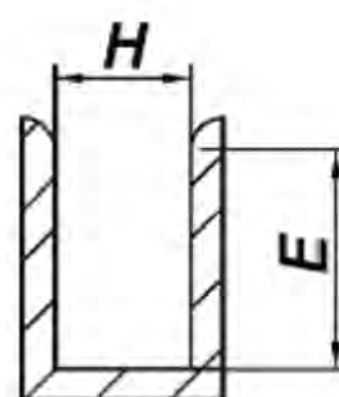


Figure 11

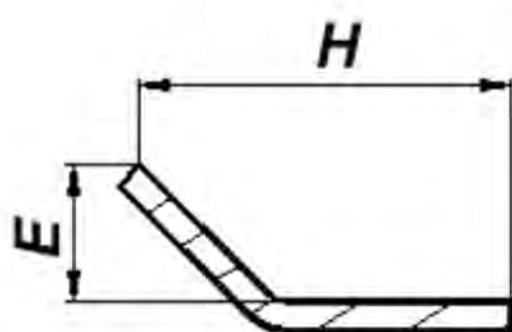


Figure 12

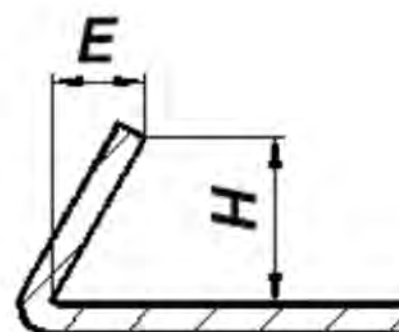


Figure 13

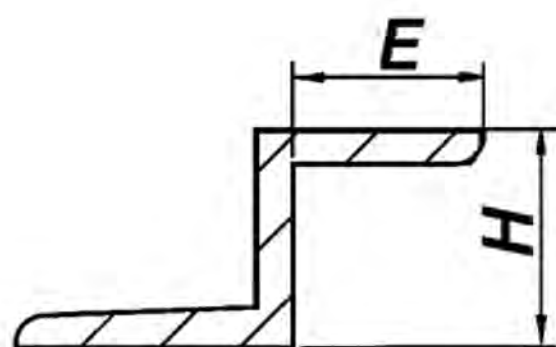


Figure 14

Table 4 Tolerance for All dimensions except wall thickness (H) (Ordinary class) Unit:mm

Diameter of circumscribed circle	Dimension of H	Metallic part where 75% or more is metal. Tolerance for H $g, h, \pm$	Metallic part where less than 75% is metal. Tolerance for distance between H and roof of leg E $a, b, c, d, e, f, \pm$					
			Over 6 up to and incl. 15	Over 15 up to and incl. 30	Over 30 up to and incl. 60	Over 60 up to and incl. 100	Over 100 up to and incl. 150	Over 150 up to and incl. 200
			Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
100 max.	3.00 max.	0.15	0.25	0.30	—	—	—	—
	Over 3.00 up to and incl. 10.00	0.18	0.30	0.36	0.41	—	—	—
	Over 10.00 up to and incl. 15.00	0.20	0.36	0.41	0.46	0.51	—	—
	Over 15.00 up to and incl. 30.00	0.23	0.41	0.46	0.51	0.56	—	—
	Over 30.00 up to and incl. 45.00	0.30	0.53	0.58	0.66	0.76	—	—
	Over 45.00 up to and incl. 60.00	0.36	0.61	0.66	0.79	0.91	—	—
	Over 60.00 up to and incl. 100.00	0.61	0.86	0.97	1.22	1.45	—	—
Over 100 up to and incl. 250	3.00 max.	0.23	0.33	0.38	—	—	—	—
	Over 3.00 up to and incl. 10.00	0.27	0.39	0.45	0.51	—	—	—
	Over 10.00 up to and incl. 15.00	0.30	0.47	0.51	0.58	0.61	—	—
	Over 15.00 up to and incl. 30.00	0.35	0.53	0.58	0.64	0.67	—	—
	Over 30.00 up to and incl. 45.00	0.45	0.69	0.73	0.83	0.91	1.00	—
	Over 45.00 up to and incl. 60.00	0.54	0.79	0.83	0.99	1.10	1.20	1.40
	Over 60.00 up to and incl. 90.00	0.92	1.10	1.20	1.50	1.70	2.00	2.30
	Over 90.00 up to and incl. 120.00	0.92	1.10	1.20	1.50	1.70	2.00	2.30
	Over 120.00 up to and incl. 150.00	1.30	1.50	1.60	2.00	2.40	2.80	3.20
	Over 150.00 up to and incl. 200.00	1.70	1.80	2.00	2.60	3.00	3.60	4.10
	Over 200.00 up to and incl. 250.00	2.10	2.10	2.40	3.20	3.70	4.30	4.90
Over 250 up to and incl. 350	3.00 max.	0.54	0.64	0.69	—	—	—	—
	Over 3.00 up to and incl. 10.00	0.57	0.67	0.76	0.89	—	—	—
	Over 10.00 up to and incl. 15.00	0.62	0.71	0.82	0.95	1.50	—	—
	Over 15.00 up to and incl. 30.00	0.65	0.78	0.93	1.30	1.70	—	—
	Over 30.00 up to and incl. 45.00	0.72	0.85	1.20	1.90	2.30	3.00	—
	Over 45.00 up to and incl. 60.00	0.92	1.20	1.50	2.20	2.60	3.30	4.60

Diameter of circumscribed circle	Dimension of H	Metallic part where 75% or more is metal. Tolerance for H ^{g, h} , ±	Metallic part where less than 75% is metal. Tolerance for distance between H and roof of leg E ^{a, b, c, d, e, f} , ±					
			Over 6 up to and incl. 15	Over 15 up to and incl. 30	Over 30 up to and incl. 60	Over 60 up to and incl. 100	Over 100 up to and incl. 150	Over 150 up to and incl. 200
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Over 60.00 up to and incl. 90.00	1.30	1.60	1.80	2.50	2.90	3.60	4.90
	Over 90.00 up to and incl. 120.00	1.30	1.60	1.80	2.50	2.90	3.60	4.90
	Over 120.00 up to and incl. 150.00	1.70	1.90	2.20	2.90	3.20	3.80	5.20
	Over 50.00 up to and incl. 200.00	2.10	2.30	2.50	3.20	3.50	4.10	5.40
	Over 200.00 up to and incl. 250.00	2.40	2.60	2.90	3.50	3.80	4.40	5.70
	Over 250.00 up to and incl. 300.00	2.80	3.00	3.20	3.80	4.10	4.70	6.00
	Over 300.00 up to and incl. 350.00	3.20	3.30	3.60	4.10	4.40	5.00	6.20

- a When tolerance is restricted to only (+) or (-) side, double the numerals in the table.
- b No value in the table means no tolerance required.
- c Apply Column 3 to Column 8 to the tolerance for dimension of H (or H1 or H2) of Figure 8 to Figure 14, depending on distance E.
- d Apply column 3 to column 8 to the dimensional tolerances for the H1 of Figure 6 and Figure 7, depending on both specified dimension H2 and E.
- e In the case of profiles shown in Figure 3, when H contains a space and the metal is less than 75%, the tolerance shall apply Column 3.
- f In the case of Figure 4 and Figure 5, the tolerance for dimension of H1 shall apply Column 3, which corresponds to H2; when this value is smaller than the value in Column 2, apply Column 2 depending on H1.
- g In the case of Figure 3, when H contains a space, if its 75% or more is metal, the tolerance shall apply Column 2.
- h In the case of dimensions including the opening of shapes shown in Figure 8 and Figure 9, even if metal part is 75% or more, don't apply Column 2 to the dimensional tolerances at H1 or H2, but apply from Column 3 to Column 8 to it depending on E.

Table 5 Tolerance for All dimensions except wall thickness (H) Precision class Unit:mm

Diameter of circumscribed circle	Dimension of H	Metallic part where 75% or more is metal Tolerance for H g, h, ±	Metallic part where less than 75% is metal Tolerance for distance between H and roof of leg E ^{a, b, c, d, e, f,} ±					
			Over 6 up to and incl. 15	Over 15 up to and incl. 30	Over 30 up to and incl. 60	Over 60 up to and incl. 100	Over 100 up to and incl. 150	Over 150 up to and incl. 200
			Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
100 max.	3.00 max.	0.13	0.21	0.25	–	–	–	–
	Over 3.00 up to and incl. 10.00	0.15	0.26	0.31	0.35	–	–	–
	Over 10.00 up to and incl. 15.00	0.17	0.31	0.35	0.39	0.43	–	–
	Over 15.00 up to and incl. 30.00	0.21	0.35	0.39	0.43	0.48	–	–
	Over 30.00 up to and incl. 45.00	0.26	0.45	0.49	0.56	0.65	–	–
	Over 45.00 up to and incl. 60.00	0.31	0.52	0.56	0.67	0.77	–	–
	Over 60.00 up to and incl. 100.00	0.52	0.73	0.82	1.04	1.23	–	–
Over 100 up to and incl. 250	3.00 max.	0.15	0.25	0.30	–	–	–	–
	Over 3.00 up to and incl. 10.00	0.18	0.30	0.36	0.41	–	–	–
	Over 10.00 up to and incl. 15.00	0.20	0.36	0.41	0.46	0.51	–	–
	Over 15.00 up to and incl. 30.00	0.23	0.41	0.46	0.51	0.56	–	–
	Over 30.00 up to and incl. 45.00	0.30	0.53	0.58	0.66	0.76	0.89	–
	Over 45.00 up to and incl. 60.00	0.36	0.61	0.66	0.79	0.91	1.07	1.27
	Over 60.00 up to and incl. 90.00	0.61	0.86	0.97	1.22	1.45	1.73	2.03
	Over 90.00 up to and incl. 120.00	0.61	0.86	0.97	1.22	1.45	1.73	2.03
	Over 120.00 up to and incl. 150.00	0.86	1.12	1.27	1.63	1.98	2.39	2.79
	Over 150.00 up to and incl. 200.00	1.12	1.37	1.57	2.08	2.51	3.05	3.56
	Over 200.00 up to and incl. 250.00	1.37	1.63	1.88	2.54	3.05	3.68	4.32
Over 250 up to and incl. 350	3.00 max.	0.36	0.46	0.51	–	–	–	–
	Over 3.00 up to and incl. 10.00	0.38	0.48	0.56	0.71	–	–	–
	Over 10.00 up to and incl. 15.00	0.41	0.51	0.61	0.76	1.27	–	–
	Over 15.00 up to and incl. 30.00	0.43	0.56	0.69	1.02	1.52	–	–
	Over 30.00 up to and incl. 45.00	0.48	0.61	0.86	1.52	2.03	2.54	–

Unit:mm

Unit:mm

The tolerances for **Strangeness straightness** shall follow Table 10. Unless otherwise stated in drawings or contracts, the tolerances for **straightness** of alloy 6060-T5、6063-T5、6063A-T5、6463-T5、6463A-T5 shall apply to precision class and others shall apply to ordinary class.

Table10 Tolerance for Strangeness Unit:mm

Diameter of circumscribed	Minimum wall thickness	Tolerance max.					
		Ordinary class		Precision class		Super-precision class	
		Per any 300mm length h_c	Per whole length h_i	Per any 300mm length h_c	Per whole length h_i	Per any 300mm length h_c	Per whole length h_i
38 max.	≤ 2.4	1.5	$4 \times L$	1.3	$3 \times L$	0.3	$0.6 \times L$
	> 2.4	0.5	$2 \times L$	0.3	$1 \times L$	0.3	$0.6 \times L$
Over 38	—	0.5	$1.5 \times L$	0.3	$0.8 \times L$	0.3	$0.5 \times L$

4.4.3 Twist

The tolerance for twist is applicable to the profile with 7m or less length, and followed Table 11; when the length is over 7m, follow the agreement between purchaser and supplier. Unless otherwise stated in drawings or contracts, the tolerances for **twist** of alloy 6060-T5、 6063-T5、 6063A-T5、 6463-T5、 6463A-T5 shall apply to precision class and others shall apply to ordinary class.

Table 11 Tolerance for twist

Class	Width (W) mm	Twist tolerance for length (L) /mm					
		1m max.	Over 1m up to and incl. 2m	Over 2m up to and incl. 3m	Over 3m up to and incl. 4m	Over 4m up to and incl. 5m	Over 5m up to and incl. 7m
		max.					
Ordinary class	25.00 max.	1.30	2.00	2.30	3.10	3.30	3.90
	Over 25.00 up to and incl. 50.00	1.80	2.60	3.90	4.20	4.70	5.50
	Over 50.00 up to and incl. 75.00	2.10	3.40	5.20	5.80	6.30	6.80
	Over 75.00 up to and incl. 100.00	2.30	3.50	6.20	6.60	7.00	7.40
	Over 100.00 up to and incl. 125.00	3.00	4.50	7.80	8.20	8.40	8.60
	Over 125.00 up to and incl. 150.00	3.60	5.50	9.80	9.90	10.10	10.30
	Over 150.00 up to and incl. 200.00	4.40	6.60	11.70	11.90	12.10	12.30
	Over 200.00 up to and incl. 350.00	5.50	8.20	15.60	15.80	16.00	16.20
Precision class	25.00 max.	1.20	1.80	2.10	2.60	2.60	3.00

4.6.2 The surface of profile allows slight dents, collision, scratches. The allowance depth for dents and die lines shall follow Table 13 and Table 14 respectively.

Unit:mm

Temper	Depth max.	
	Exposed surface	Non-exposed surface
T5	0.03	0.07
T4、T6	0.06	0.10

Unit: mm

Temper	Depth max.
6005, 6061	0.06
6060, 6063, 6063A, 6463, 6463A	0.03

4.6.3 Partial distortion shall be allowed on profile's cutting ends, but not exceed 10mm in its longitudinal length.

5 Test methods

5.1 Chemical composition

The chemical composition of profile shall be carried out by the chemical analysis method and instrument analysis method and so on. In case of dispute, the method of analysis shall be carried out by the method specified in GB/T 6987. Sampling shall be in accordance with GB/T 17432.

5.2 Mechanical property

Tension test shall be carried out in accordance with GB/T 228-2002. The **percentage elongation rate** after **breaking fracture** shall be arbitrated in accordance with Clause 11.1 in GB/T 228-2002; the Vickers hardness test shall be carried out by the method specified in GB/T 4340.1; the Webster hardness test shall be carried out by the method specified in YS/T 420.

5.3 Tolerance for dimensions

5.3.1 Wall thickness, all dimensions except wall thickness, angularity, corner radii and fillet radii.

It shall be measured by calipers, micrometers, compasses, clearance gauge steel tapers or other special instruments of suitable accuracy.

5.3.2 Contour

the 300mm straight ruler along the length of profile's surface, measuring the maximum deviation between the profile and the straight ruler, and the value(h_s) is per any 300mm length.

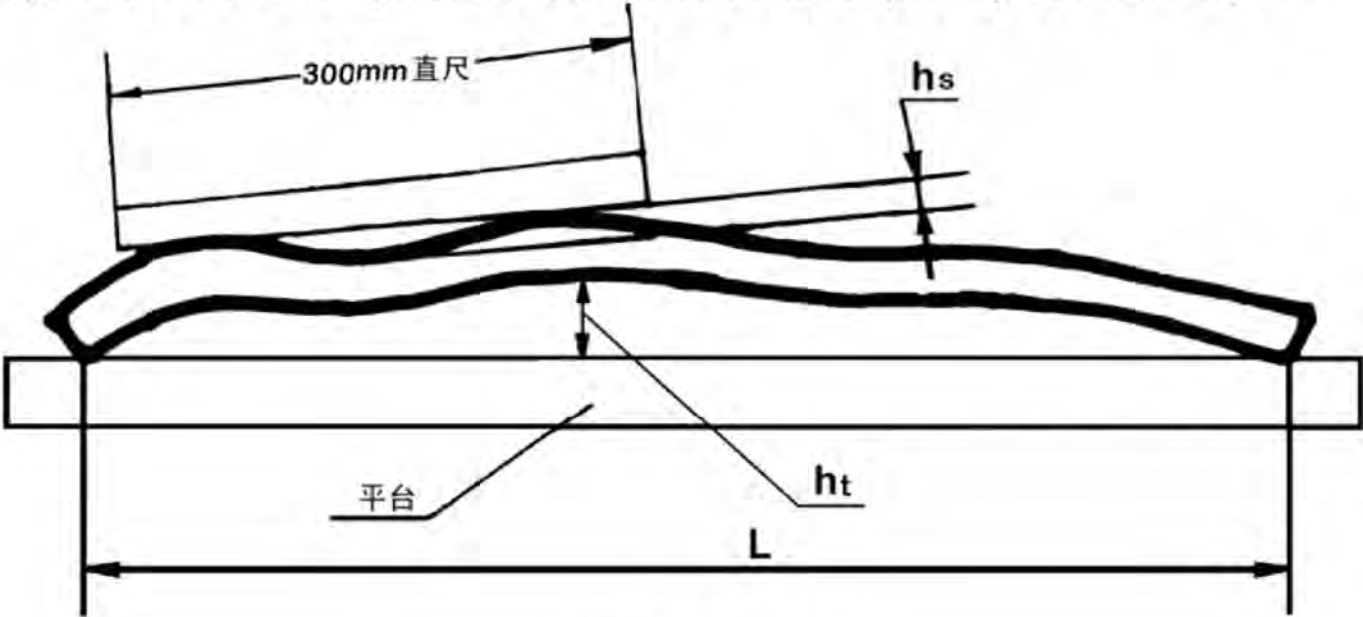


图 18 Figure 18

5.3.5 Twist

Twist shall be measured as shown in Figure 19 by placing the profile on a flat surface and making its end stick to the flat surface, the profile resting under its own mass and measuring the deviation ($T1$, $T2$) between two chipping ends which are from the flat surface. The difference **value** between $T2$ and $T1$ **is** the twist of the profile.

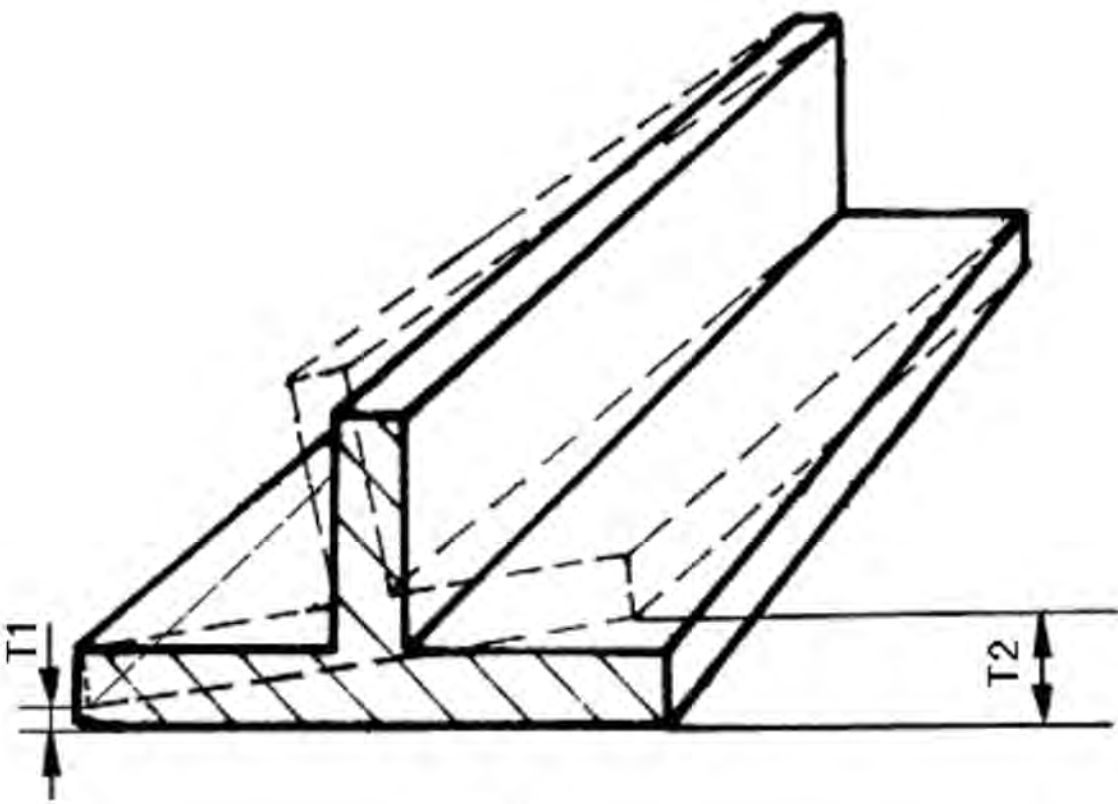


图 19

5.3.6 Length and squareness of cut ends

It shall be measured by measuring instruments or special instruments of suitable accuracy.

6.5 Judgment for test result and solution

6.5.1 If the chemical composition fails, this lot shall be rejected.

6.5.2 If the tolerance of dimension fails, this lot shall be rejected. But allow checking every piece and delivering the qualified ones.

6.5.3 If the quality of appearance fails, this lot shall be rejected.

6.5.4 When any specimen failed in the mechanical property test, it is permissible to take twice number of test pieces (including the previous failed pieces) from the lot (bath) and retest. If the retest result is acceptance, the whole lot shall be passed. If any specimen failed in the retest, the whole lot shall be rejected, or shall be reheated and be resampled.

7 Marking, packing, delivery and storage

7.1 The label(or certificate) should have the following contents on the qualified profiles:

- a) Supplier' s name and address
- b) Inspection stamp from the supplier' s quality control department
- c) Alloy and temper
- d) Product' s name and specification
- e) Production date and lot number
- f) Number of this part
- g) Production license number and QC marking

7.2 The marking for package carton of profiles shall comply with GB/T 3199.

7.3 Packaging, delivery, storage of profiles shall be in accordance with GB/T 3199 when profiles are not oiled. The method of packaging shall be stated in the contract.

7.4 Every lot of profiles shall be attached with quality certificate required by this standard, with the following content:

- a) Supplier' s name
- b) Product' s name
- c) Alloy and temper
- d) Specification
- e) Weight or pieces
- f) Lot' s number or production date
- g) Mechanical properties report
- h) Number of this lot
- i) Inspection stamp from the supplier' s technology supervisor department
- j) Production license number

8 Contract (or order) information

Contract or order for material to this specification shall be included as follows:

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- a) Name of product
- b) Alloy、temper
- c) Specification
- d) Tolerance class
- e) Weight or pieces
- f) The number of this standard
- g) **other** Special requirements

40 p.	2 p.	3 p.	3 p.	2 p.	2 p.	2 p.	
GB/T英文 版/English/翻译国	GB/T 12542-2020 英文版/English/翻	GBT 5620-2020英 文版/English/翻译	TCATSI 02 007- 2020英文	GB/T 39132-2020 英文版翻译 English	GB/T 39086-2020 英文版/翻	GB/T 24549-2020 英文版翻译English	GBT 38775.1 《电动汽车无

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