NATIONAL STANDARD OF
THE PEOPLE'S REPUBLIC OF CHINA

中华人民共和国国家标准

GB/T 3620.1—2016

(replacing GB/T 3620.1—2007)

Designation and composition of titanium and titanium alloys

钛及钛合金牌号和化学成分

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1—2009.

This standard replaces GB/T 3620.1—2007 "Designation and composition of titanium and titanium alloys".

Compared with GB/T 3620.1—2007, the main technical changes are as follows:

a) The designations and chemical compositions of commercially pure titanium in GB/T 3620.1—1994 were restored;

b) The designations of commercially pure titanium were uniformly revised, with the letter "G" added after the commercially pure titanium designations;

c) The designations were listed and standardized separately according to the classification of titanium;

d) The editorial errors in the designations TA22-1, TA24, TC15 and TC17 were corrected;

e) The Si content in TA19 was revised;

f) Eight newly registered α-type and near-α-type alloy designations, TA29, TA30, TA31, TA32, TA33, TA34, TA35 and TA36, were added;

g) Six newly registered β-type and near-β-type alloy designations, TB12, TB13, TB14, TB15, TB16 and TB17, were added;

h) Six newly registered α-β-type alloy designations, TC27, TC28, TC29, TC30, TC31 and TC32, were added;

i) The designation rules for titanium alloys were added;

j) The implementation requirements for the designations and chemical compositions of commercially pure titanium were specified.

This standard is under the jurisdiction of the National Nonferrous Metals Standardization Technical Committee (SAC/TC 243).

The responsible drafting organizations of this standard are: Baoji Titanium Group Co., Ltd., Baoji Titanium Industry Co., Ltd., and China Nonferrous Metals Industry Standard Metrology and Quality Research Institute.

The participating drafting organizations of this standard are: Beijing Institute of Aeronautical Materials, Western Metal Materials Co., Ltd., Aerospace Research Institute of Materials and Processing Technology, No. 725 Research Institute of China Shipbuilding Industry Corporation, Chinalco Shenyang Nonferrous Metal Processing Co., Ltd., General Research Institute for Nonferrous Metals, Beijing, and Hunan Goldsky Titanium Industry Technology Co., Ltd.

The main drafters of this standard are: Wen Junning, Qiao Lu, Ma Zhongxian, Hu Zhijie, Chen Feng, Wang Jian, Li Xianjun, Liu Dongsheng, Zhang Yuwei, Qing Daga, and others.

The previous editions of the standard replaced by this standard are:

—GB/T 3620—1983, GB/T 3620.1—1994 and GB/T 3620.1—2007.

1 Scope

This standard specifies the designations and chemical compositions of titanium and titanium alloy products, etc.

This standard applies to various wrought products and semi-finished products (including ingots) of titanium and titanium alloys.

2 Normative References

The following documents contain provisions which, through normative reference in this standard, constitute indispensable provisions of this standard. For dated references, only the edition cited applies. For undated references, the latest edition (including all amendments) applies.

Standard No.	Title
GB/T 3620.2	Permissible deviations in chemical composition for wrought titanium and titanium alloy products
GB/T 4698 (all parts)	Methods for chemical analysis of titanium sponge, titanium and titanium alloys
GB/T 8170	Rules of rounding off for numerical values and expression and judgment of limiting values

3 Chemical Composition

3.1 Designation and Chemical Composition

3.1.1

The designations and chemical compositions of titanium and titanium alloy products shall conform to the provisions of Table 1, Table 2 and Table 3. Among them, Table 1 gives the designations and chemical compositions of commercially pure titanium and α-type and near-α-type titanium and titanium alloys; Table 2 gives the designations and chemical compositions of β-type and near-β-type titanium alloys; and Table 3 gives the designations and chemical compositions of α-β-type titanium alloys.

3.1.2

Where the purchaser has special requirements, they shall be agreed between the supplier and the purchaser and specified in the contract.

3.1.3

Where only an upper limit value is specified for the Si element in Table 1, Table 2 and Table 3, it shall be controlled as an impurity element.

3.2 Other Elements

3.2.1

"Other elements" refers to trace elements inherently present in the production process of titanium and titanium alloys, rather than elements added deliberately.

3.2.2

Other elements generally include: Al, V, Sn, Mo, Cr, Mn, Zr, Ni, Cu, Si and Y (the alloy elements contained in that designation shall be excluded). The Y content shall be not greater than 0.005 %. Where the user has other special requirements, they shall be agreed between the two parties and specified in the contract.

3.2.3

The supplier may not inspect other elements when the products leave the factory; where the user requires such inspection and it is specified in the contract, sampling inspection may be carried out.

3.3 Permissible Deviations in Composition

When the purchaser takes samples from the products for re-verification analysis of the chemical composition, the permissible deviations in composition shall conform to the provisions of GB/T 3620.2.

4 Chemical Composition Analysis and Analysis Report

4.1

The arbitration analysis of the chemical composition of titanium and titanium alloy products shall be carried out in accordance with GB/T 4698; routine inspection may be carried out by ICP or other approved methods.

4.2

Unless otherwise specified in the product standards, the supplier may take samples from the titanium and titanium alloy ingots (and the oxygen element from the finished products) for the chemical composition analysis of the products.

4.3

A second analysis of the chemical composition of titanium and titanium alloy products is permitted, and the result of the second analysis shall be taken as the final basis for judgment.

4.4

The significant figures of the analytical values in the chemical composition analysis report shall be consistent with those of the corresponding limiting values of the corresponding designation in this standard. The figures following the significant figures shall be rounded off in accordance with the rules specified in GB/T 8170.

5 Others

5.1

Annex A lists the designations and chemical compositions of titanium and titanium alloys deleted during the previous revisions of GB/T 3620.1.

5.2

The correspondence between the commercially pure titanium designations and the pure titanium designations in the ASTM standard system is given in Annex B.

5.3

Annex C gives the designation rules for titanium and titanium alloys.

5.4

See Annex D for the implementation notes on all the commercially pure titanium designations and chemical compositions involved in this standard and the relevant product standards.

Table 1 — Designations and chemical compositions of commercially pure titanium and α-type and near-α-type titanium and titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Mn	Fe	Ni	Cu	Zr	Nb	Mo	Ru	Pd	Sn	Ta	Nd	Fe	C	N	H	O	Other elements, single	Other elements, total
TA0	Commercially pure titanium	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.10	0.03	0.015	0.15	0.10	0.40
TA1	Ti-0.2Pd	Balance	—	—	—	—	—	—	—	—	—	—	—	0.12~0.25	—	—	—	0.25	0.10	0.03	0.015	0.20	0.10	0.40
TA2	Commercially pure titanium	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.10	0.05	0.015	0.25	0.10	0.40
TA3	Commercially pure titanium	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.40	0.10	0.05	0.015	0.30	0.10	0.40
TA1ELI	Commercially pure titanium (ELI)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.10	0.03	0.012	0.008	0.10	0.05	0.20
TA1G	Commercially pure titanium (G)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.20	0.08	0.03	0.015	0.18	0.10	0.40
TA1G-1	Commercially pure titanium (G-1)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.05	0.03	0.003	0.12	0.10	0.40
TA2ELI	Commercially pure titanium (ELI)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.20	0.05	0.03	0.008	0.10	0.05	0.20
TA2G	Commercially pure titanium (G)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.03	0.015	0.25	0.10	0.40
TA3ELI	Commercially pure	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.25	0.05	0.04	0.008	0.18	0.05	0.20

Designation	Nominal chemical composition	Ti	Al	Si	V	Mn	Fe	Ni	Cu	Zr	Nb	Mo	Ru	Pd	Sn	Ta	Nd	Fe	C	N	H	O	Other elements, single	Other elements, total
	titanium (ELI)																							
TA3G-8	Commercially pure titanium (G-8)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.015	0.35	0.10	0.40
TA4ELI	Commercially pure titanium (ELI)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.05	0.05	0.008	0.25	0.05	0.20
TA4G	Commercially pure titanium (G)	Balance	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.50	0.08	0.05	0.015	0.40	0.10	0.40
TA5	Ti-4Al-0.5Mn	Balance	3.3~4.7	—	—	1.2~1.8	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.04	0.015	0.15	0.10	0.40
TA6	Ti-5Al	Balance	4.0~5.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.015	0.15	0.10	0.40
TA7	Ti-5Al-2.5Sn	Balance	4.5~5.5	—	—	—	—	—	—	—	—	—	—	—	2.0~3.0	—	—	0.50	0.08	0.05	0.015	0.20	0.10	0.40
TA7ELI	Ti-5Al-2.5Sn (ELI)	Balance	4.5~5.5	—	—	—	—	—	—	—	—	—	—	—	2.0~3.0	—	—	0.20	0.05	0.035	0.012	0.12	0.05	0.30
TA8	Ti-0.05Pd	Balance	—	—	—	—	—	—	—	—	—	—	—	0.04~0.08	—	—	—	0.30	0.08	0.03	0.015	0.25	0.10	0.40
TA8-1	Ti-0.05Pd	Balance	—	—	—	—	—	—	—	—	—	—	—	0.04~0.08	—	—	—	0.20	0.08	0.03	0.015	0.18	0.10	0.40
TA9	Ti-0.2Pd	Balance	—	—	—	—	—	—	—	—	—	—	—	0.12~0.25	—	—	—	0.30	0.08	0.03	0.015	0.25	0.10	0.40
TA9-1	Ti-0.2Pd	Balance	—	—	—	—	—	—	—	—	—	—	—	0.12~0.25	—	—	—	0.20	0.08	0.03	0.015	0.18	0.10	0.40
TA10	Ti-0.3Mo-0.8Ni	Balance	—	—	—	—	—	0.2~0.4	—	—	0.6~0.9	—	—	—	—	—	—	0.30	0.08	0.05	0.015	0.12	0.10	0.30
TA11	Ti-8Al-1Mo-1V	Balance	7.35~8.35	—	0.75~1.25	—	—	—	—	—	—	0.75~1.25	—	—	—	—	—	0.25	0.08	0.05	0.0125	0.15	0.10	0.40
TA12	Ti-5.5Al-4Sn-4Zr-0.7Mo-0.4Nb-0.25Si	Balance	4.8~5.8	0.2~0.35	—	—	—	—	—	1.5~2.5	—	0.75~1.25	—	—	3.7~4.7	—	0.6~1.2	0.25	0.08	0.04	0.0125	0.15	0.10	0.30
TA12-1	Ti-5.5Al-4Sn-4Zr-1.5Mo-0.4Nb-0.25Si	Balance	4.8~5.8	0.2~0.35	—	—	—	—	—	1.5~2.5	—	1.0~2.0	—	—	3.7~4.7	—	0.6~1.2	0.20	0.08	0.05	0.010	0.20	0.10	0.30
TA13	Ti-2.5Cu	Balance	—	—	—	—	—	—	2.0~3.0	—	—	—	—	—	—	—	—	0.20	0.08	0.05	0.0125	0.20	0.10	0.30
TA14	Ti-2.5Al-4Zr-2Mo-2Sn-0.5Si	Balance	2.0~3.0	—	—	—	—	—	—	4.0~6.0	—	0.8~1.2	—	—	0.52~1.50	—	—	0.25	0.08	0.05	0.015	0.15	0.10	0.30
TA15	Ti-6.5Al-1Mo-1V-2Zr	Balance	5.5~7.1	—	0.8~2.5	—	—	—	—	1.5~2.5	—	0.8~2.5	—	—	—	—	—	0.25	0.08	0.05	0.015	0.12	0.10	0.30
TA15-1	Ti-2.5Al-1.5Mo-1V-1.5Zr	Balance	2.0~3.5	—	0.5~1.5	—	—	—	—	1.0~2.0	—	0.5~1.5	—	—	—	—	—	0.25	0.05	0.05	0.0125	0.15	0.10	0.30
TA15-2	Ti-4Al-1.5Mo-1V-1.5Zr	Balance	3.5~4.5	≤0.10	—	—	—	—	—	1.0~2.0	—	0.5~1.5	—	—	—	—	—	0.15	0.05	0.04	0.003	0.12	0.10	0.30
TA16	Ti-2Al-2.5Zr	Balance	1.8~2.5	≤0.12	—	—	—	—	—	2.0~3.0	—	—	—	—	—	—	—	0.25	0.08	0.04	0.006	0.15	0.10	0.30
TA17	Ti-4Al-2V	Balance	3.5~4.5	≤0.15	1.5~3.0	—	—	—	—	—	—	—	—	—	—	—	—	0.25	0.08	0.05	0.015	0.15	0.10	0.30
TA18	Ti-3Al-2.5V	Balance	2.0~3.5	—	1.5~3.0	—	—	—	—	—	—	—	—	—	—	—	—	0.25	0.05	0.05	0.0125	0.15	0.10	0.30
TA19	Ti-6Al-2Sn-4Zr-2Mo-0.08Si	Balance	5.5~6.75	0.08~0.15	—	—	—	—	—	3.6~4.4	—	1.5~2.5	—	—	1.5~2.5	—	—	0.25	0.08	0.05	0.015	0.12	0.10	0.30
TA20	Ti-4Al-3V-1.5Zr	Balance	3.5~4.5	≤0.10	2.5~3.5	—	—	—	—	1.0~2.0	—	—	—	—	—	—	—	0.10	0.05	0.05	0.012	0.12	0.10	0.30

Notes:

1. The designations TA0, TA1, TA2 and TA3 are completely identical to those in GB/T 3620.1—1994.

2. For the TA7ELI designation, the total mass fraction of impurity Fe plus O shall be not greater than 0.32 %.

Table 1 (continued) — Designations and chemical compositions of α-type and near-α-type titanium and titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Mn	Fe	Ni	Cu	Zr	Nb	Mo	Ru	Pd	Sn	Ta	Nd	Fe	C	N	H	O	Other elements, single	Other elements, total
TA21	Ti-1Al-1Mn	Balance	0.4~1.5	≤0.12	—	0.5~1.3	—	—	—	—	—	—	—	—	—	—	—	0.30	0.10	0.05	0.012	0.15	0.10	0.30
TA22	Ti-3Al-1Mo-1Ni-1V	Balance	2.0~3.5	≤0.15	—	—	—	0.3~1.0	—	0.8~2.0	—	0.5~1.5	—	—	—	—	—	0.20	0.10	0.05	0.015	0.15	0.10	0.30
TA22-1	Ti-2.5Al-1Mo-1Ni-1V	Balance	2.0~3.0	≤0.12	—	—	—	0.3~0.8	—	0.5~1.0	—	0.2~0.8	—	—	—	—	—	0.20	0.10	0.04	0.008	0.10	0.10	0.30
TA23	Ti-2.5Al-2Zr-Fe	Balance	2.0~3.0	≤0.15	—	—	0.8~1.2	—	—	1.7~2.3	—	—	—	—	—	—	—	—	0.10	0.04	0.010	0.15	0.10	0.30
TA23-1	Ti-2.5Al-2Zr-Fe	Balance	2.0~3.0	≤0.10	—	—	0.8~1.1	—	—	1.7~2.3	—	—	—	—	—	—	—	—	0.10	0.04	0.008	0.10	0.10	0.30
TA24	Ti-3Al-2.5V	Balance	2.0~3.8	≤0.15	—	—	—	—	—	1.0~3.0	—	1.0~2.5	—	—	—	—	—	0.30	0.10	0.05	0.015	0.15	0.10	0.30
TA24-1	Ti-3Al-2.5V	Balance	2.5~3.5	≤0.04	—	—	—	—	—	1.0~3.0	—	1.0~2.0	—	—	—	—	—	0.15	0.10	0.04	0.010	0.10	0.10	0.30
TA25	Ti-3Al-2.5V-0.05Pd	Balance	2.5~3.5	—	2.0~3.0	—	—	—	—	—	—	—	—	0.04~0.08	—	—	—	0.25	0.08	0.03	0.015	0.15	0.10	0.40
TA26	Ti-3Al-2.5V-0.08Ru	Balance	2.5~3.5	—	2.0~3.0	—	—	—	—	—	—	0.08~0.14	—	—	—	—	—	0.25	0.08	0.03	0.015	0.15	0.10	0.40
TA27	Ti-0.10Ru	Balance	—	—	—	—	—	—	—	—	—	0.08~0.14	—	—	—	—	—	0.30	0.08	0.03	0.015	0.25	0.10	0.40
TA27-1	Ti-0.10Ru	Balance	—	—	—	—	—	—	—	—	—	0.08~0.14	—	—	—	—	—	0.20	0.08	0.03	0.015	0.18	0.10	0.40
TA28	Ti-3Al	Balance	2.0~3.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.015	0.15	0.10	0.40
TA29	Ti-5.8Al-4Sn-3.5Zr-0.7Nb-0.5Mo-0.4Ta-0.4Si-0.06C	Balance	5.4~6.2	0.2~0.4	—	—	≤0.15	—	—	3.7~4.3	0.5~0.9	—	—	—	—	1.3~1.7	—	0.05	0.04~0.08	—	0.010	0.10	0.10	0.20
TA30	Ti-5.5Al-4.5Sn-2Zr-1Nb-1Mo-0.3Si	Balance	4.75~6.0	0.2~0.4	—	—	≤0.25	—	—	2.4~3.2	0.7~1.3	0.7~1.3	—	—	3.0~3.8	—	—	0.15	0.10	0.04	0.012	0.15	0.10	0.30
TA31	Ti-6Al-3Nb-2.5Mo	Balance	5.5~6.5	≤0.15	—	—	—	—	—	1.5~2.5	2.5~3.5	0.6~1.5	—	—	—	—	—	0.25	0.10	0.05	0.015	0.15	0.10	0.30
TA32	Ti-5.5Al-4.5Sn-2Zr-1Mo-0.5Nb-0.7Ta-0.3Si	Balance	5.0~6.0	0.2~0.4	—	—	≤0.15	—	—	2.5~3.5	0.2~0.7	0.3~1.5	—	—	3.0~4.0	0.2~0.7	—	0.25	0.10	0.05	0.012	0.15	0.10	0.30
TA33	Ti-5.8Al-4Sn-3.5Zr-0.7Nb-0.5Mo-1.1Ta-0.4Si-0.06C	Balance	5.4~6.2	0.2~0.4	—	—	≤0.15	—	—	2.5~4.0	0.2~0.7	0.2~1.0	—	—	3.0~4.5	0.7~1.5	—	0.25	0.04~0.08	—	0.012	0.15	0.10	0.30
TA34	Ti-2Al-1.5Zr-1Mo	Balance	1.8~3.0	—	—	—	—	—	—	3.0~4.5	—	0.5~1.5	—	—	—	—	—	0.25	0.05	0.035	0.008	0.10	0.10	0.25
TA35	Ti-6Al-2Sn-4Zr-2Nb-0.1Mo-0.2Si	Balance	5.2~6.8	0.05~0.2	—	—	≤0.25	—	—	3.5~4.5	1.5~2.5	0.3~1.3	—	—	1.5~2.5	—	—	0.20	0.10	0.05	0.015	0.15	0.10	0.30
TA36	Ti-1Al-1Fe	Balance	0.7~1.3	—	—	—	1.0~1.4	—	—	—	—	—	—	—	—	—	—	0.20	0.10	0.05	0.015	0.15	0.10	0.30

Table 2 — Designations and chemical compositions of β-type and near-β-type titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Cr	Fe	Zr	Nb	Mo	Pd	Sn	Fe	C	N	H	O	Other elements, single	Other elements, total
TB2	Ti-5Mo-5V-8Cr-3Al	Balance	2.5~3.5	—	4.7~5.7	7.5~8.5	—	—	—	4.7~5.7	—	—	—	0.05	0.04	0.015	0.15	0.10	0.40
TB3	Ti-3.5Al-10Mo-8V-1Fe	Balance	2.7~3.7	—	7.5~8.5	—	0.8~1.2	—	—	9.5~11.0	—	—	—	0.05	0.04	0.015	0.15	0.10	0.40
TB4	Ti-4Al-7Mo-10V-2Fe-1Zr	Balance	3.0~4.5	—	9.0~10.5	—	1.5~2.5	0.5~1.5	—	6.0~7.8	—	—	—	0.05	0.04	0.015	0.20	0.10	0.40

Table 2 (continued) — Designations and chemical compositions of β-type and near-β-type titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Cr	Fe	Zr	Nb	Mo	Pd	Sn	Fe	C	N	H	O	Other elements, single	Other elements, total
TB5	Ti-15V-3Al-3Cr-3Sn	Balance	2.5~3.5	—	14.0~16.0	2.5~3.5	—	—	—	—	—	2.5~3.5	0.25	0.05	0.05	0.015	0.15	0.10	0.30
TB6	Ti-10V-2Fe-3Al	Balance	2.6~3.4	—	9.0~11.0	—	1.6~2.2	—	—	—	—	—	—	0.05	0.05	0.025	0.13	0.10	0.30
TB7	Ti-32Mo	Balance	—	—	—	—	—	—	—	30.0~34.0	—	—	0.30	0.08	0.05	0.015	0.20	0.10	0.40
TB8	Ti-15Mo-2.7Nb-3Al-0.2Si	Balance	2.7~3.4	0.15~0.25	—	—	—	—	2.4~3.2	14.0~16.0	—	—	0.40	0.05	0.05	0.015	0.17	0.10	0.40
TB9	Ti-3Al-8V-6Cr-4Mo-4Zr	Balance	3.0~4.0	—	7.5~8.5	5.5~6.5	—	3.5~4.5	—	3.5~4.5	≤0.10	—	0.30	0.05	0.03	0.030	0.14	0.10	0.40
TB10	Ti-5Mo-5V-8Cr-3Al	Balance	2.5~3.5	—	4.5~5.5	1.5~2.5	—	—	—	4.5~5.5	—	—	0.30	0.05	0.04	0.015	0.15	0.10	0.40
TB11	Ti-15Mo	Balance	—	—	—	—	—	—	—	14.0~16.0	—	—	0.10	0.10	0.05	0.015	0.20	0.10	0.40
TB12	Ti-25V-15Cr-0.2Si	Balance	—	0.2~0.5	24.0~28.0	13.0~17.0	—	—	—	—	—	—	0.25	0.10	0.03	0.015	0.15	0.10	0.30
TB13	Ti-4Al-2V	Balance	3.0~4.5	—	20.0~23.0	—	—	—	—	—	—	—	0.15	0.05	0.03	0.010	0.18	0.10	0.40
TB14	Ti-45Nb	Balance	—	≤0.03	—	≤0.02	—	—	42.0~47.0	—	—	—	0.03	0.04	0.03	0.0035	0.16	0.10	0.30
TB15	Ti-4Al-5V-6Cr-5Mo	Balance	3.5~4.5	—	4.5~5.5	5.0~6.5	—	—	—	4.5~5.5	—	—	0.30	0.10	0.05	0.015	0.15	0.10	0.30
TB16	Ti-3Al-5V-6Cr-5Mo	Balance	2.5~3.5	—	4.5~5.7	5.5~6.5	—	—	—	4.5~5.7	—	—	0.30	0.05	0.04	0.015	0.15	0.10	0.40
TB17	Ti-6.5Mo-2.5Cr-2.5V-2Nb-1.5Zr-1Al	Balance	0.5~1.5	—	1.0~3.0	2.0~3.5	—	0.5~2.5	1.5~3.0	5.0~7.5	—	0.5~2.5	0.15	0.08	0.05	0.015	0.13	0.10	0.40

Note: For the TB14 titanium alloy, the mass fraction of Mg shall be not greater than 0.01 %, and the mass fraction of Mn shall be not greater than 0.01 %.

Table 3 — Designations and chemical compositions of α-β-type titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Cr	Mn	Fe	Cu	Zr	Nb	Mo	Ru	Pd	Sn	Ta	W	Fe	C	N	H	O	Other elements, single	Other elements, total
TC1	Ti-2Al-1.5Mn	Balance	1.0~2.5	—	—	—	0.7~2.0	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.012	0.15	0.10	1.00
TC2	Ti-4Al-1.5Mn	Balance	3.5~5.0	—	—	—	0.8~2.0	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.012	0.15	0.10	1.00
TC3	Ti-5Al-4V	Balance	4.5~6.0	—	3.5~4.5	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.005	0.15	0.10	1.00
TC4	Ti-6Al-4V	Balance	5.50~6.75	—	3.5~4.5	—	—	—	—	—	—	—	—	—	—	—	—	0.30	0.08	0.05	0.005	0.20	0.10	1.00
TC4ELI	Ti-6Al-4V ELI	Balance	5.5~6.5	—	3.5~4.5	—	—	—	—	—	—	—	—	—	—	—	—	0.25	0.08	0.03	0.012	0.13	0.10	1.00
TC6	Ti-6Al-1.5Cr-2.5Mo-0.5Fe-0.3Si	Balance	5.5~7.0	0.15~0.40	0.8~2.3	—	—	0.2~0.7	—	—	—	2.0~3.0	—	—	—	—	—	—	0.08	0.05	0.005	0.18	0.10	1.00
TC8	Ti-6.5Al-3.5Mo-0.25Si	Balance	5.8~6.5	0.20~0.35	—	—	—	—	—	—	—	2.8~3.8	—	—	—	—	—	0.40	0.08	0.05	0.005	0.15	0.10	1.00
TC9	Ti-6.5Al-3.5Mo-2.5Sn-0.3Si	Balance	5.8~6.8	0.20~0.35	—	—	—	—	—	—	—	2.8~3.8	—	—	1.8~2.8	—	—	0.40	0.08	0.05	0.005	0.15	0.10	1.00
TC10	Ti-6Al-6V-2Sn-0.5Cu-0.5Fe	Balance	5.5~6.5	—	5.5~6.5	—	—	0.35~1.00	0.35~1.00	—	—	—	—	—	1.5~2.5	—	—	—	0.08	0.04	0.005	0.20	0.10	1.00
TC11	Ti-6.5Al-3.5Mo-1.5Zr-0.3Si	Balance	5.8~7.0	0.20~0.35	—	—	—	—	—	0.8~2.0	—	2.8~3.8	—	—	—	—	—	0.25	0.08	0.05	0.012	0.15	0.10	1.00
TC12	Ti-5Al-4Mo-4Cr-2Zr-2Sn-1Nb	Balance	4.5~5.5	—	—	3.5~4.5	—	—	—	1.5~3.0	0.5~1.5	3.5~4.5	—	—	1.5~2.5	—	—	0.30	0.08	0.05	0.005	0.20	0.10	1.00
TC15	Ti-5Al-2.5Fe	Balance	4.5~5.5	—	—	—	—	2.0~3.0	—	—	—	—	—	—	—	—	—	—	0.08	0.05	0.003	0.20	0.10	1.00
TC16	Ti-3Al-5Mo-4.5V	Balance	2.8~3.8	0.15	4.0~5.0	—	—	—	—	—	—	4.5~5.5	—	—	—	—	—	0.25	0.08	0.05	0.012	0.15	0.10	1.00

Table 3 (continued) — Designations and chemical compositions of α-β-type titanium alloys

Chemical composition (mass fraction)/% — Main components

Designation	Nominal chemical composition	Ti	Al	Si	V	Cr	Mn	Fe	Cu	Zr	Nb	Mo	Ru	Pd	Sn	Ta	W	Fe	C	N	H	O	Other elements, single	Other elements, total
TC17	Ti-5Al-2Sn-2Zr-4Mo-4Cr	Balance	4.5~5.5	—	—	3.5~4.5	—	—	—	1.5~2.5	—	3.5~4.5	—	—	1.5~2.5	—	—	0.25	0.05	0.05	0.0125	0.08~0.13	0.10	0.30
TC18	Ti-5Al-5Mo-5V-1Cr-1Fe	Balance	4.4~5.7	—	4.0~5.5	0.5~1.5	—	0.5~1.5	—	≤0.30	—	4.0~5.5	—	—	—	—	—	—	0.08	0.05	0.015	0.18	0.10	0.30
TC19	Ti-6Al-2Sn-4Zr-6Mo	Balance	5.5~6.5	—	—	—	—	—	—	3.5~4.5	—	5.5~6.5	—	—	1.75~2.25	—	—	0.15	0.04	0.04	0.0125	0.15	0.10	0.40
TC20	Ti-6Al-7Nb	Balance	5.5~6.5	—	—	—	—	—	—	—	6.5~7.5	—	—	—	—	≤0.5	—	0.25	0.08	0.05	0.009	0.20	0.10	0.40
TC21	Ti-6Al-2Mo-1.5Nb-1Zr-2Sn-1.5Cr	Balance	5.5~6.8	—	—	0.9~2.0	—	—	—	1.6~2.5	1.7~2.3	2.2~3.3	—	—	1.6~2.5	—	—	0.15	0.08	0.05	0.015	0.15	0.10	0.40
TC22	Ti-6Al-4V-0.05Pd	Balance	5.50~6.75	—	3.5~4.5	—	—	—	—	—	—	—	—	0.04~0.08	—	—	—	0.40	0.08	0.05	0.015	0.20	0.10	0.40
TC23	Ti-6Al-4V-0.1Ru	Balance	5.50~6.75	—	3.5~4.5	—	—	—	—	—	—	0.08~0.14	—	—	—	—	—	0.25	0.08	0.05	0.015	0.13	0.10	0.40
TC24	Ti-4.5Al-3V-2Mo-2Fe	Balance	4.0~5.0	—	2.5~3.5	—	—	1.7~2.3	—	—	—	1.8~2.2	—	—	—	—	—	—	0.05	0.05	0.010	0.15	0.10	0.40
TC25	Ti-6.5Al-3.5Mo-1.5Zr-0.3Si	Balance	6.0~7.0	0.2~0.5	—	—	—	—	—	0.8~2.5	—	1.5~2.5	—	—	0.8~2.5	—	0.5~1.5	0.15	0.10	0.04	0.012	0.15	0.10	0.30
TC26	Ti-13Nb-13Zr	Balance	—	—	—	—	—	—	—	12.5~14.0	12.5~14.0	—	—	—	—	—	—	0.25	0.08	0.05	0.012	0.15	0.10	0.40
TC27	Ti-5Al-4V-0.6Mo-0.2Nb-1Fe	Balance	4.5~5.5	—	3.5~4.5	—	—	0.5~1.5	—	—	1.5~2.5	0.5~1.5	—	—	—	—	—	—	0.05	0.05	0.015	0.13	0.10	0.30
TC28	Ti-6.5Al-1Mo-1Fe	Balance	5.0~8.0	—	—	—	—	0.5~2.0	—	—	—	0.2~2.0	—	—	—	—	—	—	0.10	—	0.015	0.15	0.10	0.40
TC29	Ti-4.5Al-7Mo-2Fe	Balance	4.0~5.5	≤0.5	—	—	—	0.8~3.0	—	—	—	6.0~8.0	—	—	—	—	—	—	0.10	—	0.015	0.15	0.10	0.40
TC30	Ti-5Al-4Mo-4V	Balance	4.5~6.3	≤0.15	0.9~1.9	—	—	—	≤0.30	—	—	2.5~3.8	—	—	—	—	—	0.30	0.10	0.05	0.015	0.15	0.10	0.30
TC31	Ti-6.5Al-3Mo-1Zr-2Nb-1W-0.2Si	Balance	6.0~7.0	0.1~0.4	—	—	—	—	—	2.5~3.2	1.0~3.2	1.0~3.2	—	—	2.5~3.2	—	0.3~1.2	0.25	0.10	0.05	0.015	0.15	0.10	0.30
TC32	Ti-5Al-4Mo-4Cr-2Zr-1Sn	Balance	4.5~5.5	0.1~0.5	—	2.5~3.5	—	—	—	0.5~1.5	—	2.5~3.5	—	—	—	—	—	0.30	0.08	0.05	0.0125	0.20	0.10	0.40

Annex A (Normative) — Designations and chemical compositions of titanium and titanium alloys deleted during the previous revisions of GB/T 3620.1

Annex A lists the designations and chemical compositions of titanium and titanium alloys that were deleted during the revisions of GB/T 3620.1 (from GB/T 3620—1983, GB/T 3620.1—1994 and GB/T 3620.1—2007), together with the designation and chemical composition correspondence for reference in the inspection, acceptance and arbitration of existing stocks.

Annex B (Informative) — Correspondence between the commercially pure titanium designations and the pure titanium designations in the ASTM standard system

Annex B gives the correspondence between the commercially pure titanium designations in this standard and the pure titanium designations in the ASTM standard system (e.g. ASTM B265, B348, B381, etc.). The correspondence is based on the comparison of the limiting values of the impurity elements (Fe, C, N, H, O) of the respective designations.

Annex C (Normative) — Designation rules for titanium and titanium alloys

Annex C specifies the designation rules for titanium and titanium alloys. The designation of a titanium or titanium alloy consists of the letter "T" followed by a letter indicating the type of the alloy and an Arabic numeral indicating the registration number:

a) TA — α-type and near-α-type titanium alloys (including commercially pure titanium);

b) TB — β-type and near-β-type titanium alloys;

c) TC — α-β-type titanium alloys.

For the designations of the same nominal chemical composition with different impurity levels, the suffix "ELI" (extra low interstitial) is added; for the variants of a designation, the suffixes "-1", "-2", etc. are added. For the commercially pure titanium designations, the letter "G" (grade) is added after the designation; the variants of the commercially pure titanium designations are distinguished by the suffixes "-1", "-8", etc.

Annex D (Informative) — Implementation notes on the designations and chemical compositions of commercially pure titanium

Annex D gives the implementation notes on all the commercially pure titanium designations and chemical compositions involved in this standard and the relevant product standards, including the implementation of the designations and chemical composition requirements of commercially pure titanium in the corresponding product standards (such as plates, sheets, strips, foils, bars, wire, tubes, forgings and castings), so as to ensure the consistency of the designations and chemical compositions among the relevant standards.