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# International Standard



# 5454

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Ferrotitanium — Specification and conditions of delivery

*Ferro-titane — Spécifications et conditions de livraison*

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**Descriptors :** ferroalloys, ferrotitanium, specifications, delivery conditions, chemical composition.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5454 was developed by Technical Committee ISO/TC 132, *Ferroalloys*, and was circulated to the member bodies in November 1979.

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It has been approved by the member bodies of the following countries :

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Austria	Italy	Sweden
Brazil	Japan	United Kingdom
Canada	Norway	USA
Czechoslovakia	Poland	USSR
France	Portugal	Yugoslavia
Germany, F.R.	Romania	

No member body expressed disapproval of the document.

# Ferrotitanium — Specification and conditions of delivery

## 1 Scope and field of application

This International Standard specifies requirements and conditions of delivery for ferrotitanium usually supplied for steel-making and foundry use.

## 2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate — Nominal sizes of apertures.*

ISO 3713, *Ferroalloys — Sampling and preparation of samples — General rules.*<sup>1)</sup>

## 3 Definition

**3.1 ferrotitanium** : A master alloy of iron and titanium with a minimum titanium content of 20,0 % by mass, and a maximum titanium content of 75,0 % by mass, obtained by reduction or remelting.

## 4 Information for ordering

Orders for ferrotitanium shall include the following information.

- a) Quantity.
- b) Constitution of consignment.
- c) Chemical composition in accordance with the designations given in table 1.
- d) Particle size ranges in accordance with the classes given in table 2.
- e) Necessary requirements for analysis reports, packing, etc., as appropriate.

## 5 Requirements

### 5.1 Constitution of consignment

Ferrotitanium shall be delivered in consignments constituted by one of the following methods.

#### 5.1.1 Tapped lot method

A consignment constituted by the tapped lot method consists of a ferrotitanium mass of one melt (or one part of a continuous tap).

#### 5.1.2 Graded lot method

A consignment constituted by the graded lot method consists of a number of melts (or parts of continuous taps) of one ferrotitanium designation.

The titanium content of the melts (or parts of continuous taps) constituting the consignment shall not differ from each other by more than 3 % absolute.

#### 5.1.3 Blended lot method

A consignment constituted by the blended lot method consists of a number of melts (or parts of continuous taps) of one ferrotitanium designation, which have been crushed to a particle size less than 50 mm and thoroughly mixed.

The content of the main constituent of the melts (or parts of continuous taps) constituting the consignment may vary between the minimum and maximum limits specified for the appropriate ferrotitanium designation.

### 5.2 Chemical composition

**5.2.1** The chemical composition of ferrotitanium shall be as specified in table 1. The limits stated correspond to particle size ranges in classes 1 to 4 in accordance with table 2.

1) At present at the stage of draft.

**5.2.2** The chemical compositions given in table 1 show only the main constituent elements and usual impurities. If the purchaser requires closer ranges for the main element contents and/or different limits for specified elements and/or limits for non-specified elements, this shall be agreed upon between supplier and purchaser.

**5.2.3** The chemical compositions given in table 1 are subject to the precision of the methods of sampling and analysis for ferrotitanium (see clause 6).

### 5.3 Particle size ranges

**5.3.1** Ferrotitanium is supplied in lumps or as crushed and screened particles. The particle size ranges and tolerances shall be in accordance with table 2. The undersize values shall be valid at the point of delivery to the purchaser.<sup>1)</sup>

The particle sizes specified refer to screening on a steel sieve with square openings; see ISO 565.

**5.3.2** If the purchaser requires particle size ranges and/or tolerances other than those given in table 2, these shall be agreed upon between supplier and purchaser.

### 5.4 Extraneous contamination

The material shall be as free as possible from extraneous contamination.

## 6 Testing

### 6.1 Sampling for chemical analysis and sieve analysis

**6.1.1** Sampling for chemical analysis and sieve analysis<sup>2)</sup> shall preferably be carried out by the method specified in ISO 3713, but other methods of sampling having similar precision may also be used.

**6.1.2** Sampling is usually carried out at the supplier's stockyard, unless otherwise agreed. Wherever sampling is carried out, representatives of both supplier and purchaser may be present.

**6.1.3** If required, arbitration sampling shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser. Sampling shall be carried out by the method specified in ISO 3713, but other methods of sampling having similar precision may be agreed upon between supplier, purchaser and arbitrator.

The sample obtained by arbitration shall be accepted by both parties.

### 6.2 Analysis

**6.2.1** The chemical analysis of ferrotitanium will form the subject of a future International Standard, and shall preferably be carried out by the method to be standardized, but other methods of chemical analysis having similar precision may also be used.

**6.2.2** Ferrotitanium shall be furnished with an analysis certificate, established by the supplier, for the titanium content and, if agreed, the contents of other elements either specified in table 1 or additionally agreed and, upon request of the purchaser, with a sample representative of the consignment.

**6.2.3** In case of dispute, one of the following two procedures may be used.

#### 6.2.3.1 Contradictory analysis

The chemical analysis shall be carried out on the same sample and preferably by the method to be standardized. Other methods of chemical analysis having similar precision may be used, but shall be agreed upon between supplier and purchaser.

If the difference between the results of the two analyses is within  $x$  %<sup>3)</sup>, the mean value shall apply. If the difference exceeds  $x$  %, then, provided that no other agreement is reached, arbitration analysis shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser.

1) The point of delivery is defined as that point where the responsibility for the consignment passes from supplier to purchaser. If neither the supplier nor the purchaser is responsible for the transportation, then the point at which the values become valid shall be agreed upon.

2) Sieve analysis of ferroalloys will form the subject of ISO 4551.

3) The value of  $x$  will be specified later. In the meantime, the value should be agreed upon between purchaser and supplier.

### 6.2.3.2 Arbitration analysis

Arbitration analysis shall preferably be carried out by the method to be standardized. Other methods of chemical analysis having similar precision may be used, but shall be agreed upon between supplier, purchaser and arbitrator.

The arbitrator's result is final, provided it is within the two

disputed values or not more than  $y\%$ <sup>1)</sup> outside one of these values.

## 7 Despatch and storage

Ferrotitanium shall be packed, stored and transported according to international regulations.<sup>2)</sup>

**Table 1 – Chemical composition**

Designation	Chemical composition, %							
	Ti	Al max.	Si max.	Mn max.	C max.	P max.	S max.	V max.
FeTi30Al6	20,0 to 35,0	6,0	4,0	—	0,15	0,10	0,06	—
FeTi30Al10	20,0 to 35,0	10,0	8,0	—	0,20	0,10	0,07	—
FeTi40Al6	35,0 to 50,0	6,0	4,5	1,5	0,10	0,10	0,06	—
FeTi40Al8	35,0 to 50,0	8,0	5,0	1,5	0,10	0,05	0,05	—
FeTi40Al10	35,0 to 50,0	10,0	8,0	1,5	0,20	0,10	0,07	—
FeTi70	65,0 to 75,0	0,5	0,10	0,20	0,20	0,03	0,03	0,50
FeTi70Al2	65,0 to 75,0	2,0	0,25	1,0	0,20	0,04	0,04	1,5
FeTi70Al5	65,0 to 75,0	5,0	0,50 <sup>1)</sup>	1,0	0,30	0,05	0,04	—

1) Other limits may be agreed upon between supplier and purchaser.

NOTE — The tin content should be controlled.

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**Table 2 – Particle size**

Class	Particle size range mm	Undersize, max. % by mass	Oversize, max. % by mass
1	3,15 to 200	8	10 No piece to exceed $1,15 \times$ the maximum limit of the size range specified in two or three directions.
2	3,15 to 100	8	
3	3,15 to 50	8	
4	3,15 to 25	10	
5	3,15 to 10	15	
6	up to 6,3	—	
7	up to 3,15	—	

1) This value, as an overall precision, will be specified as  $\beta_{SDM}$ .

2) Examples of appropriate international regulations are :

- a) RID : Règlement International concernant le transport des marchandises dangereuses par chemin de fer, Annexe C.
- b) International maritime dangerous goods code.

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