

Transformed

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION
R 683 / X

HEAT-TREATED STEELS, ALLOY STEELS
AND FREE-CUTTING STEELS

PART 10
WROUGHT NITRIDING STEELS

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 683/X, *Heat-treated steels, alloy steels and free-cutting steels – Part 10 : Wrought nitriding steels*, was drawn up by Technical Committee ISO/TC 17, *Steel*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1365, which was circulated to all the ISO Member Bodies for enquiry in December 1967. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	India	Spain
Austria	Israel	Sweden
Belgium	Italy	Switzerland
Canada	Japan	Thailand
Colombia	Korea, Rep. of	Turkey
Czechoslovakia	Netherlands	U.A.R.
Denmark	New Zealand	United Kingdom
Finland	Norway	U.S.A.
France	Poland	U.S.S.R.
Germany	Romania	
Hungary	South Africa, Rep. of	

The following Member Body opposed the approval of the Draft :

Brazil

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

HEAT-TREATED STEELS, ALLOY STEELS AND FREE-CUTTING STEELS

PART 10

WROUGHT NITRIDING STEELS

1. SCOPE

- 1.1 This ISO Recommendation covers four grades of wrought chromium-molybdenum steels, chromium-molybdenum-vanadium steels and chromium-molybdenum-aluminium steels, listed in Table 2, usually intended for use in the quenched and tempered and subsequently nitrided condition.
- 1.2 This ISO Recommendation comprises the four series of steels listed in Table 2.

2. REQUIREMENTS

2.1 Production processes

Unless otherwise agreed in the order, the processes used in making the steel and the product are left to the discretion of the manufacturer, but the steel should be killed. When he so requests, the user should be informed what steelmaking process is being used.

2.2 Chemical composition and mechanical properties

- 2.2.1 The steels covered by this ISO Recommendation should be ordered and delivered in accordance with Table 1.

TABLE 1 – Types of condition of delivery

Requirements	Types of condition of delivery*						
	1	1(c)	3	3(c)	4	4(c)	5
Chemical composition	X	X	X	X	X	X	X
Hardness in the annealed condition	—	X	—	X	—	X	—
Mechanical properties of							
— quenched and tempered test bars of 16 mm diameter	—	—	X	X	—	—	—
— quenched and tempered ruling sections	—	—	—	—	X	X	—
— quenched and tempered product in final dimensions	—	—	—	—	—	—	X

* The numbers indicating the types of condition of delivery follow a co-ordinated series of numbers throughout all relevant ISO Recommendations.

The type of condition of delivery according to Table 1 should be stated at the time of enquiry and order.

2.2.2 The chemical composition expressed by the cast analysis should be in accordance with Table 2.

TABLE 2 – Types of steel and chemical composition guaranteed
(applicable to cast analysis)*

Type of steel	C %	Si %	Mn %	P % max.	S %** max.	Al %	Cr %	Mo %	Ni % max.	V %
1	0.28 to 0.35	0.15 to 0.40	0.40 to 0.70	0.030	0.035	—	2.80 to 3.30	0.30 to 0.50	0.30	—
2	0.35 to 0.42	0.15 to 0.40	0.40 to 0.70	0.030	0.035	—	3.00 to 3.50	0.80 to 1.10	—	0.15 to 0.25
3	0.30 to 0.37	0.20 to 0.50	0.50 to 0.80	0.030	0.035	0.80 to 1.20	1.00 to 1.30	0.15 to 0.25	—	—
4	0.38 to 0.45	0.20 to 0.50	0.50 to 0.80	0.030	0.035	0.80 to 1.20	1.50 to 1.80	0.25 to 0.40	—	—

* Elements not quoted in Table 2 should not be intentionally added to the steel without the agreement of the purchaser, other than for the purpose of finishing the heat. All reasonable precautions should be taken to prevent the addition, from scrap or other materials used in manufacture, of such elements which affect the mechanical properties and applicability.

** By agreement between the purchaser and manufacturer, the steel may be ordered with an upper limit of sulphur less than 0.035 %.

2.2.2.1 If ordered to type of condition of delivery 1 or 1(c) (see Table 1), the following permissible deviations between the values specified in Table 2 and the product analysis of products up to 160 mm (6.3 in) diameter should apply. Above 160 mm (6.3 in) diameter, the permissible deviations should be stated at the time of enquiry and order.

TABLE 3 – Permissible deviations between specified analysis and product analysis

Type of steel	Permissible deviations*									
	C %	Si %	Mn %	P %	S %	Al %	Cr %	Mo %	Ni %	V %
1	± 0.01	± 0.03	± 0.04	+ 0.005	+ 0.005	—	± 0.10	± 0.03	+ 0.03	—
2	± 0.02	± 0.03	± 0.04	+ 0.005	+ 0.005	—	± 0.10	± 0.03	—	± 0.02
3	± 0.02	± 0.03	± 0.04	+ 0.005	+ 0.005	± 0.10	± 0.05	± 0.02	—	—
4	± 0.02	± 0.03	± 0.04	+ 0.005	+ 0.005	± 0.10	± 0.05	± 0.02	—	—

* ± means that in one cast the deviation may occur over the upper value or under the lower value of the specified range in Table 2 but not both at the same time.