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**Welding — Guidelines for a metallic  
materials grouping system**

*Soudage — Lignes directrices pour un système de groupement des  
matériaux métalliques*

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Published in Switzerland

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 15608 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding*, in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/TR 15608:2000), which has been technically revised.

## Introduction

Requests for official interpretations of any aspect of this Technical Report should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at [www.iso.org](http://www.iso.org).

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# Welding — Guidelines for a metallic materials grouping system

## 1 Scope

This Technical Report provides a uniform system for grouping of materials for welding purposes. It may also apply to other purposes such as heat treatment, forming, non-destructive testing.

This Technical Report covers grouping systems for the following standardized materials:

- steel;
- aluminium and its alloys;
- nickel and its alloys;
- copper and its alloys;
- titanium and its alloys;
- zirconium and its alloys;
- cast iron.

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## 2 Grouping system for steels

Steels are grouped as shown in Table 1. Only those elements that are specified in material standards or specifications are considered. The figures given in groups 1 and 11 refer to the ladle analysis of the materials. The figures given in groups 4 to 10 are based on the elemental content used in the designation of the alloys.

Table 1 — Grouping system for steels

Group	Sub-group	Type of steel
1		Steels with a specified minimum yield strength $R_{eH} \leq 460 \text{ N/mm}^2$ <sup>a</sup> and with analysis in %: $C \leq 0,25$ $Si \leq 0,60$ $Mn \leq 1,8$ $Mo \leq 0,70$ <sup>b</sup> $S \leq 0,045$ $P \leq 0,045$ $Cu \leq 0,40$ <sup>b</sup> $Ni \leq 0,5$ <sup>b</sup> $Cr \leq 0,3$ (0,4 for castings) <sup>b</sup> $Nb \leq 0,06$ $V \leq 0,1$ <sup>b</sup> $Ti \leq 0,05$
	1.1	Steels with a specified minimum yield strength $R_{eH} \leq 275 \text{ N/mm}^2$
	1.2	Steels with a specified minimum yield strength $275 \text{ N/mm}^2 < R_{eH} \leq 360 \text{ N/mm}^2$
	1.3	Normalized fine-grain steels with a specified minimum yield strength $R_{eH} > 360 \text{ N/mm}^2$
	1.4	Steels with improved atmospheric corrosion resistance whose analysis may exceed the requirements for the individual elements as indicated in group 1
2		Thermomechanically treated fine-grain steels and cast steels with a specified minimum yield strength $R_{eH} > 360 \text{ N/mm}^2$
	2.1	Thermomechanically treated fine-grain steels and cast steels with a specified minimum yield strength $360 \text{ N/mm}^2 < R_{eH} \leq 460 \text{ N/mm}^2$
	2.2	Thermomechanically treated fine-grain steels and cast steels with a specified minimum yield strength $R_{eH} > 460 \text{ N/mm}^2$
3		Quenched and tempered and precipitation-hardened fine-grain steels except stainless steels with a specified minimum yield strength $R_{eH} > 360 \text{ N/mm}^2$
	3.1	Quenched and tempered fine-grain steels with a specified minimum yield strength $360 \text{ N/mm}^2 < R_{eH} \leq 690 \text{ N/mm}^2$
	3.2	Quenched and tempered fine-grain steels with a specified minimum yield strength $R_{eH} > 690 \text{ N/mm}^2$
	3.3	Precipitation-hardened fine-grain steels except stainless steels
4		Low vanadium alloyed Cr-Mo-(Ni) steels with $Mo \leq 0,7 \%$ and $V \leq 0,1 \%$
	4.1	Steels with $Cr \leq 0,3 \%$ and $Ni \leq 0,7 \%$
	4.2	Steels with $Cr \leq 0,7 \%$ and $Ni \leq 1,5 \%$
5		Cr-Mo steels free of vanadium with $C \leq 0,35 \%$
	5.1	Steels with $0,75 \% \leq Cr \leq 1,5 \%$ and $Mo \leq 0,7 \%$
	5.2	Steels with $1,5 \% < Cr \leq 3,5 \%$ and $0,7 \% < Mo \leq 1,2 \%$
	5.3	Steels with $3,5 \% < Cr \leq 7,0 \%$ and $0,4 \% < Mo \leq 0,7 \%$
	5.4	Steels with $7,0 \% < Cr \leq 10,0 \%$ and $0,7 \% < Mo \leq 1,2 \%$



Table 1 (continued)

Group	Sub-group	Type of steel
6		High vanadium alloyed Cr-Mo-(Ni) steels
	6.1	Steels with $0,3 \% \leq \text{Cr} \leq 0,75 \%$ , $\text{Mo} \leq 0,7 \%$ and $\text{V} \leq 0,35 \%$
	6.2	Steels with $0,75 \% < \text{Cr} \leq 3,5 \%$ , $0,7 \% < \text{Mo} \leq 1,2 \%$ and $\text{V} \leq 0,35 \%$
	6.3	Steels with $3,5 \% < \text{Cr} \leq 7,0 \%$ , $\text{Mo} \leq 0,7 \%$ and $0,45 \% \leq \text{V} \leq 0,55 \%$
	6.4	Steels with $7,0 \% < \text{Cr} \leq 12,5 \%$ , $0,7 \% < \text{Mo} \leq 1,2 \%$ and $\text{V} \leq 0,35 \%$
7		Ferritic, martensitic or precipitation-hardened stainless steels with $\text{C} \leq 0,35 \%$ and $10,5 \% \leq \text{Cr} \leq 30 \%$
	7.1	Ferritic stainless steels
	7.2	Martensitic stainless steels
	7.3	Precipitation-hardened stainless steels
8		Austenitic stainless steels, $\text{Ni} \leq 31 \%$
	8.1	Austenitic stainless steels with $\text{Cr} \leq 19 \%$
	8.2	Austenitic stainless steels with $\text{Cr} > 19 \%$
	8.3	Manganese austenitic stainless steels with $4 \% < \text{Mn} \leq 12 \%$
9		Nickel alloy steels with $\text{Ni} \leq 10,0 \%$
	9.1	Nickel alloy steels with $\text{Ni} \leq 3,0 \%$
	9.2	Nickel alloy steels with $3,0 \% < \text{Ni} \leq 8,0 \%$
	9.3	Nickel alloy steels with $8,0 \% < \text{Ni} \leq 10,0 \%$
10		Austenitic ferritic stainless steels (duplex)
	10.1	Austenitic ferritic stainless steels with $\text{Cr} \leq 24 \%$
	10.2	Austenitic ferritic stainless steels with $\text{Cr} > 24 \%$
11		Steels covered by group 1 <sup>c</sup> except $0,25 \% < \text{C} \leq 0,85 \%$
	11.1	Steels as indicated in group 11 with $0,25 \% < \text{C} \leq 0,35 \%$
	11.2	Steels as indicated in group 11 with $0,35 \% < \text{C} \leq 0,5 \%$
	11.3	Steels as indicated in group 11 with $0,5 \% < \text{C} \leq 0,85 \%$
NOTE	Based on the actual product analysis, group 2 steels may be considered as group 1 steels.	
<sup>a</sup>	In accordance with the specification of the steel product standards, $R_{eH}$ may be replaced by $R_{p0,2}$ or $R_{t0,5}$ .	
<sup>b</sup>	A higher value is accepted provided that $\text{Cr} + \text{Mo} + \text{Ni} + \text{Cu} + \text{V} \leq 0,75 \%$ .	
<sup>c</sup>	A higher value is accepted provided that $\text{Cr} + \text{Mo} + \text{Ni} + \text{Cu} + \text{V} \leq 1 \%$ .	