

INTERNATIONAL STANDARD

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Steel tubes — Continuous character marking and colour coding for material identification

*Tubes et éléments tubulaires en acier — Marquage par caractères et couleurs
codifiées pour identification des matériaux*



Reference number
ISO 9095 : 1990 (E)

Foreword

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International Standard ISO 9095 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*.

Annex A of this International Standard is for information only.

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International Organization for Standardization

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Introduction

This International Standard has been prepared to provide an additional identification system for use on steel pipe materials employed in the manufacture of piping systems where continuous marking along the entire length of the tube is a special requirement (as an alternative to the normal practice of marking at one end of the tube or on a label attached to the tube).

It requires that all tubes be continuously and clearly marked with the details required by the relevant product standard. A simple colour code, in the form of a stripe, is also used to identify different groups of materials. The colour coding can also be used to mark fittings and components. The material groups have been chosen to minimize the probability of failure if, by error, a different material within the same group were used instead of the specified material. The groups are defined according to their nominal chemical composition or specified mechanical properties.

The marking of materials during manufacture as specified in this International Standard does not affect in any way the use of colour coding for the identification of the contents of piping systems in service. Where confusion might occur, the user should ensure that the colour marking applied in accordance with this International Standard is obliterated after final inspection of the installation.

This International Standard forms a proposal to unify the different systems of continuous marking practised throughout the world.

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Steel tubes – Continuous character marking and colour coding for material identification

1 Scope

This International Standard specifies the requirements for the optional continuous character and colour marking of ferritic and austenitic steel tubes that are used in the fabrication of piping systems. The colour coding specified can also be used for the marking of fittings and components (see 6.2.3).

It covers specific requirements for definitive material identification by the use of printed characters which are applied repetitively (continuously) along the length of the tube, and for the colour coding of discrete groups of steels. The colour coding may be specified at the option of the purchaser and is intended for use only in conjunction with the definitive character marking requirements given in clause 5.

In the absence of a suitable International Standard defining colours suitable for use in colour coding, annex A makes reference to certain equivalent colour codes given in national standards which may be used.

It is recognized that this International Standard can only be applied by agreement between the parties concerned.

2 Information to be supplied by the purchaser

2.1 The purchaser shall state the following in the enquiry and order :

- a) the number of this International Standard;
- b) the number of the product standard and the steel grade required;
- c) the tube dimensions (e.g. outside diameter × thickness), in millimetres;
- d) the manufacturing process designation, where applicable;
- e) the test category, where applicable.

2.2 Since this International Standard provides for various options, the purchaser shall state on the enquiry and order all requirements concerning the following :

- a) the use of colour coding (see clause 6);
- b) the maximum lead, tin, zinc or copper content in the dried film (see 3.1);

- c) the use of a special protective coating (see 3.3);
- d) the use of additional marking (see 5.2.1.3).

If the purchaser does not specify any requirements the supplier shall supply in accordance with his/her normal practice for marking and protective coating provided that these conform with the requirements of this International Standard.

3 Marking materials

3.1 Quality of paint or ink

All paints and inks shall be as free as practicable from sulfur, halogens, lead, tin, zinc and copper. If specified by the purchaser, the dried film shall not contain more than 250 ppm of each of lead, tin, zinc or copper.

The quality of the paint or ink as applied shall be such that it shall have a life of at least one year in unheated storage under cover.

3.2 Colour

The colours used to designate the grade of material shall be as indicated in tables 3 and 4.

Annex A gives guidance on the definition of colours.

3.3 Compatibility with protective coating

The protective coating shall be compatible with the marking materials specified in this International Standard.

Where the purchaser specifies a protective coating other than the manufacturer's normal mill protection, it shall be the purchaser's responsibility to ensure compatibility with the marking material.

4 Responsibility for marking

4.1 Character marking

The character identification marking in accordance with clause 5 should normally be applied by the manufacturer. In other cases it shall be the responsibility of the supplier to ensure compliance with this International Standard on the basis of the certificate provided by the manufacturer according to the requirements in the product standard.

4.2 Colour coding

Where colour coding is specified it shall be in accordance with clause 6 and shall be applied by the supplier.

4.3 Maintenance of marking

It is the responsibility of the final supplier to ensure that items are supplied with the marking in good condition.

5 Character marking

5.1 General

This clause covers the definitive marking of material by means of printed characters. It shall be used in conjunction with the general requirements given in clauses 1 to 4.

5.2 Specific requirements

5.2.1 Tubes shall be marked with printed characters which define the product standard to which they are supplied and all details specified in the product standard.

5.2.1.1 The following minimum details shall be marked together with any additional requirements specified in the product standard :

- a) manufacturer's and/or supplier's symbol;
- b) outside diameter and thickness, in millimetres;
- c) number of the product standard;
- d) steel grade;
- e) manufacturing process designation (if specified);
- f) test category (if specified).

NOTE — By agreement with the purchaser, the manufacturer's/supplier's symbol may be applied in one place only using an alternative method of marking.

5.2.1.2 The marking details shall be applied in the sequence given in 5.2.1.1 unless the product standard requires a special sequence. In this event the requirement of the product standard shall take precedence.

5.2.1.3 Any additional marking agreed shall be appended to the details required in 5.2.1.1.

5.2.2 For ferritic steel tubes represented by the steel groups listed in table 3, the printed characters shall be white.

For austenitic steel tubes represented by the steel groups listed in table 4, the printed characters shall be black.

5.2.3 The details shall be printed repetitively (continuously) along the full length of the tube commencing not more than 300 mm from one end. Each marking sequence shall occupy a maximum length of 700 mm and shall be repeated at intervals not exceeding 750 mm (see clause 7).

However, in all cases, agreement is necessary between the purchaser and the manufacturer to take into account the marking facilities of the manufacturer.

Examples of tube markings are given in clause 7.

5.3 Size of characters

The height of all printed characters shall be as specified in table 1.

Table 1 — Size of characters

Dimensions in millimetres

Outside diameter of tube, <i>D</i>	Minimum height of characters
<i>D</i> < 18 and finned tubes	Method of marking to be agreed between the purchaser and the supplier
18 < <i>D</i> < 38	6
38 < <i>D</i> < 120	9
<i>D</i> > 120	15

6 Colour coding

6.1 General

This clause covers the marking by means of colour stripes to identify discrete groups of ferritic and austenitic steels. This colour coding is applied only when specified by the purchaser in the enquiry and order.

Colour coding shall be used only in conjunction with continuous character marking according to the requirements of clause 5 and the general requirements of clauses 1 to 4.

6.2 Specific requirements

6.2.1 Items in materials which fall into one of the groups listed in tables 3 and 4 shall be coded with the appropriate colour as detailed in 6.2.2 and 6.2.3.

6.2.2 The colour appropriate to the material group (see tables 3 and 4) shall be applied as a full-length stripe located in approximately the same quadrant as the character marking required by 5.2 (see 7.2 for an example). The width of the stripe shall be as specified in table 2.

Table 2 – Width of colour stripe for tubes

Dimensions in millimetres

Outside diameter of tube, D	Minimum width of stripe
$D < 18$ and certain finned tubes	Method of coding to be agreed between the purchaser and the supplier
$18 < D < 38$	9
$38 < D < 120$	12
$D > 120$	18

6.2.3 If fittings and components are to be colour coded they should be marked with the colour appropriate to their steel group (see table 3 for ferritic steels and table 4 for austenitic steels).

Whenever practicable, the marking shall be applied as a stripe along the length of the component.

Table 3 – Colours used for colour coding and material identification of ferritic steels

Reference	Steel group	Colours ¹⁾	
		Identification characters	Identification stripe (see 6.2.2 and 6.2.3)
3.0	Carbon and carbon-manganese steels with minimum specified tensile strengths up to and including 435 N/mm ²	White	White
3.1	Carbon and carbon-manganese steels with minimum specified tensile strengths greater than 435 N/mm ²	White	Yellow
3.2	All ferritic steels with specified low temperature properties	White	Light green
3.3	Carbon-molybdenum steels with molybdenum content up to and including 0,7 %	White	Red-violet
3.4	Chromium-molybdenum steels with chromium content up to and including 2 %	White	Red
3.5	Chromium-molybdenum steels with chromium content over 2 % and up to and including 4 %	White	Light blue
3.6	0,5 % chromium – 0,5 % molybdenum – 0,25 % vanadium steel	White	Brown
3.7	Chromium-molybdenum steels with chromium content over 4 % and up to and including 10 %	White	Olive green
3.8	Chromium-(molybdenum/vanadium) steels with chromium content over 10 % and up to and including 14 %, with or without molybdenum and/or vanadium	White	Orange

1) For the definition of colours see annex A.

Table 4 – Colours used for colour coding and material identification of austenitic steels

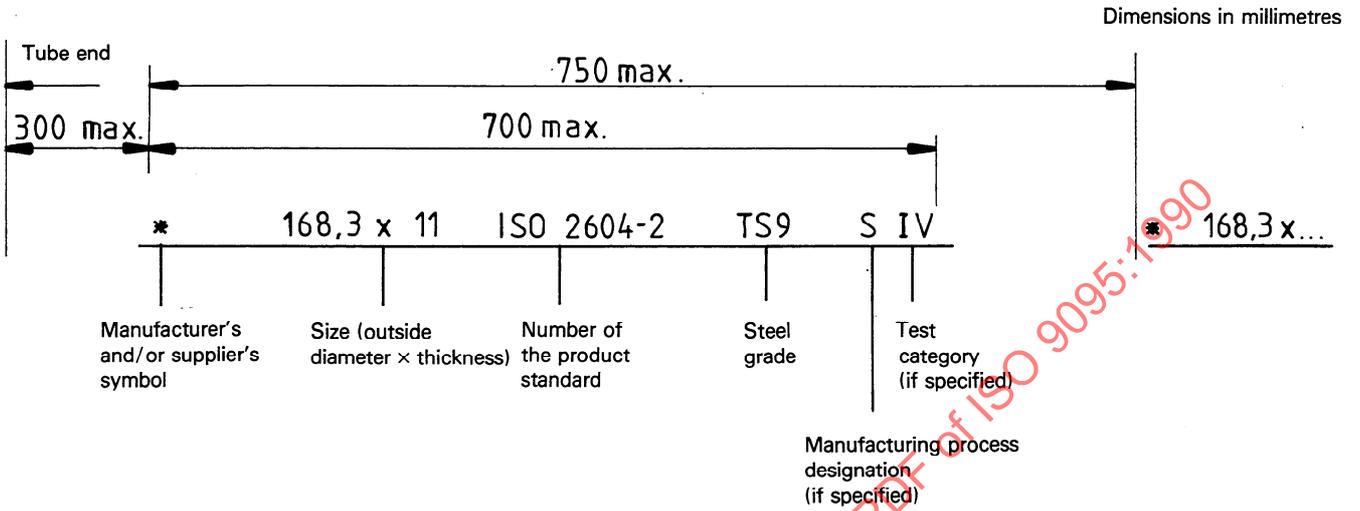
Reference	Steel group	Colours ¹⁾	
		Identification characters	Identification stripe (see 6.2.2 and 6.2.3)
4.0	16 % to 20 % chromium – 8 % to 14 % nickel	Black	Light blue
4.1	16 % to 20 % chromium – 8 % to 14 % nickel at 0,03 % max. carbon	Black	Red
4.2	16 % to 20 % chromium – 8 % to 14 % nickel with titanium or niobium	Black	Yellow
4.3	16 % to 20 % chromium – 8 % to 16 % nickel – 2 % to 4 % molybdenum	Black	Light green
4.4	16 % to 20 % chromium – 8 % to 16 % nickel – 2 % to 4 % molybdenum 0,03 % max. carbon	Black	Brown
4.5	16 % to 20 % chromium – 8 % to 14 % nickel – 2 % to 4 % molybdenum with titanium	Black	Red-violet

1) For the definition of colours see annex A.

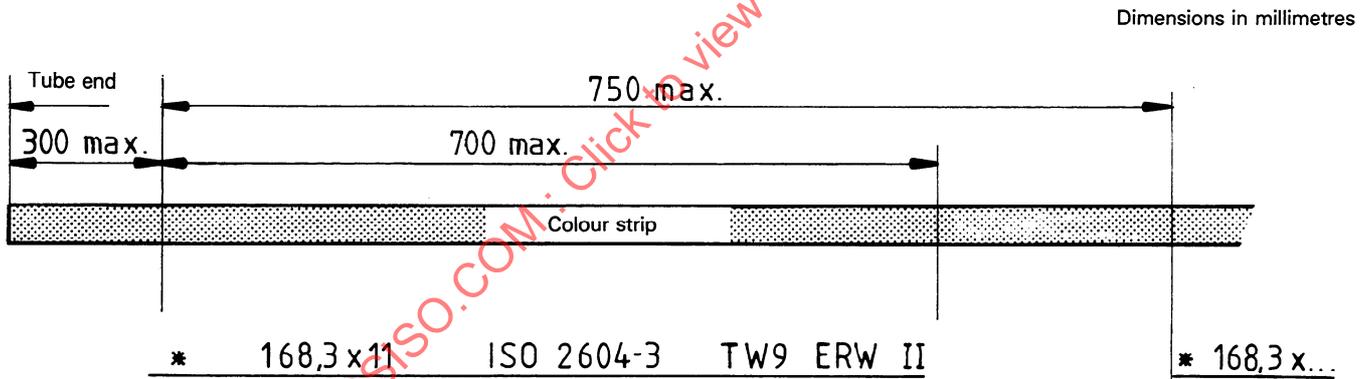
7 Examples

NOTE — The length in which the character marking is accommodated and the interval of repetition may be exceeded (see 5.2).

7.1 Character marking (see 5.2)



7.2 Character marking with colour coding stripe (see 6.2)



Annex A (informative)

Colours for continuous character marking and colour coding of steel tubes for material identification

Ferritic steels	Austenitic steels	Colour	Equivalent colour codes in the following national standards ¹⁾		
			BS 4800	NF X08-002	RAL F3
Character marking					
White —	— Black		00E55 00E53	665 603	9010 9011
Colour coding					
Steel group reference in					
Table 3	Table 4				
3.0	—	White	00E55	665	9010
3.1	4.2	Yellow	10E53	305	1018
3.2	4.3	Light green	14E51	455	6019
3.3	4.5	Red-violet	02C39	950	4002
3.4	4.1	Red	04E53	801	3000
3.5	4.0	Light blue	20E51	570	5012
3.5	4.4	Brown	06C39	030	8024
3.7	—	Olive green	12D45	466	6025
3.8	—	Orange	06E51	130	2003
<p>1) In the absence of an International Standard defining a suitable range of colours, reference is made to the colour charts given in the following national standards and it should be near as practical as possible to these charts :</p> <p>BS 4800 : 1981, <i>Specification for paint colours for building purposes.</i></p> <p>NF X08-002 : 1983, <i>Limited collection of colours — Designation and catalogue of CCR colours — Secondary standards.</i></p> <p>RAL F3, <i>General Chart — Survey of colours of colour register RAL 840 HR colour specimens with gloss finish and F81 road traffic colours.</i></p> <p>The colours used for the continuous character marking and colour coding according to this International Standard should be as close as practicable to the colours given in these charts.</p>					