

**NEW EDITIONS OF THE STEEL AND STEEL CASTING  
DESIGNATION STANDARDS**

**Mirsada Oruč, Raza Sunulahpašić, Almaida Gigović-Gekić, Sulejman Muhamedagić**  
**University of Zenica, Faculty of Metallurgy and Technology**  
**Travnička cesta 1, Zenica**  
**Bosnia and Herzegovina**

**Keywords:** steel standards, steel marking, new edition of standards

**ABSTRACT**

*The great development of the industry has caused the need for systematization in the classification of raw materials and finished products. For this reason, all industrialized countries have their own standards, so called national standards or norms for production and delivery. With the unification of European countries, and also for the import and export of products and raw materials, the so called-European standard or EN (euro norm) took the primacy. Thus, the designation of steel according to the EN standard has been taken into consideration, and as a standard for designation of steel and therefore steel casting in our country, the designation according to EN standards has been taken over by some of the methods of takeover. Thus, the European standards with the prefix BAS become Bosnian standards.*

*Standards for designation of steel and steel products are basic for metallurgy and metal industry and are very often in B&H they are translated versions of European standards.*

*However, any change or revision of the European standard requires the same for the BAS standards, and in this paper will be presented the latest changes to the EN and BAS standards related to the "Designation system for steels", i.e. changes will be shown for the basic standards, respectively EN 10027-1 and 10027-2 or BAS EN 10027-1 and BAS EN 10027-2.*

**1. INTRODUCTION**

Standard is a general and reusable document, adopted by consensus and approved by a recognized body, containing the rules, guidelines or characteristics of the activity or its results and aimed at achieving the optimum degree of regulation in a given area [1]. The B&H standard BAS can be prepared on the basis of, or accepting, in full an international standard, a European standard or other documents in the field of standardization. Bosnia and Herzegovina, as a state, has accepted the EN standards in its entirety (from cover to cover), and the letter designation of the Bosnian-Herzegovinian standards indicates (that BAS EN).

Until 2007, Bosnia and Herzegovina, for the designation of steel and steel casting, existed the so-called steel marking system, which included 2 standards and one report [2]:

- Standard BAS EN 10027-1: 2001 (Designation systems for steel - Part 1: Steel names, principal symbols) that is identical to standard EN 10027-1: 1992,
- Standard BAS EN 10027-2: 2001 (Designation systems for steels - Part 2: Steel numbers) which is identical to EN 10027-2: 1992 and

- Signature BAS CR 10260: 2001 (Designation Systems for steel - Additional Symbols) identical to CR 10260: 1998.

Standards BAS EN 10027 - 1 and BAS EN 10027 – 2 are translation of the English version of the European standard and have the status of the Bosnian-Herzegovinian standard. Report BAS CR 10260:1998 is a translation of the English version of the CEN (European Committee for Standardization) report CR 10260:1998 and has the status of the Bosnian-Herzegovinian report.

So the two parts of the EN 10027 standard with the CR 10260 report represent a complete steel designation system according to European standards, and if required by the national CEN standards, which if they wish to submit a request for that.

However, at certain time intervals, all these standards are changing or supplementing, and the new editions of European standards are adopted by our country through the Technical Committee BAS/TC4, and through the publication of new versions of the standard adopts the resulting changes as well as new versions of standards. Thus, in 2005, as a result of changes, the EN 10027-1 came out, which also included the report CR 10260, which supplement was a for EN 10027-1 and EN 10027-2. It contained additional symbols along with the principal symbols of the steel designation according to EN 10027-1 and certain additional symbols with the numbered steel designation according to EN10027-2, thus providing a fully abbreviated marking of steel or steel products.

This standard was adopted as a Bosnian-Herzegovinian standard, BAS EN 10027-1:2007 in 2007, and published without translation.

## **2. STANDARDS FOR DESIGNATION OF STEEL AND STEEL CASTING**

### **2.1. New edition of EN 10027-2**

This European standard specifies the numbering system of designation, specify the numbers of steel, and for marking the quality of steel. It refers to the structure of the numbering of the steel and the organization for its registration, allocation and advertising. Such steel numbers are complementary to steel names set out in EN 10027-1. This European standard applies to steels specified in European standards. The application is optional for national steels and own steels [3]. Although the area of application of the system is limited to steel, it is structured in the way to be capable of being expanded and include other industrially produced materials.

New version of standard EN 10027-2: Designation systems for steels - Part 2: Steel numbers are in the form of a pre-draft (pn BAS EN 10027-2: 2016) discussed at the BAS/TC4 Technical Committee at the end of 2016, and changes in the relationship on BAS EN 10027-2: 2001. The new version of the Bosnian standard is identical to the European standard EN 10027-2: 2015 (it replaces standard EN 10027-2: 1992) and has the mark BAS EN 10027-2: 2017 and was published on May 4, 2017.

Changes that relate to the previous version of the standard are not large and refer to the following [4]:

- The text under item 4.3 was changed. (4 Principles) with the most important difference that the revised steel sheet is published on the Internet and that the steel numbers deleted in accordance with the procedure must not be re-assigned to future new steel grades, with the note that deleted steel can be received from the European Registration Office.
- The steel numbers presented in accordance with this system has a fixed number of marks (Chapter 5). They are more acceptable for data processing than the steel marks given in accordance with EN 10027-1. The Technical Committee of the ECISS (European Committee for Standardization of Iron and Steel) is responsible for the allocation of steel

numerical marks specified in European standards (A.6 to A.9). Competent national authorities are responsible for national steel types.

- Changes related to item number 5 are: for the allocating new steel numbers with a 4 digit sequential number it shall be ensured that the 1<sup>st</sup> two digits of the sequential number are completely field (e.g. 1.xx99) before allocating the last two digits of the sequential number (e.g. 1.xx9901).

Other changes in the new standard are more linguistic. The standard was published on April 5, 2017, following the usual procedure as a Bosnian-Herzegovinian, as BAS EN 10027-2: 2016 [2].

## 2.2. Standard BAS EN 10027-1 and new edition of EN 10027-1

After revision of the standard EN 10027-2, which is the second part of the European standard "Designation systems for steel", which is the first part of standard EN 10027-1 "Designation system for steel-Part1: Steel names, principal symbols, which is also revised, in B&H is the audit phase to be completed by end of 2017.

This standard, i.e. EN 10027-1: 1992 published as a Bosnian standard BAS EN 10027-1: 2001 was included in the audit in 2005 together with the report CR 10260: 1988, i.e. Bosnian-Herzegovinian Report BAS CR 10260: 2001, (Designation systems for steel - Additional Symbols), which previously been separated as the Report, and was published as BAS EN 10027-1: 2007.

The previous translated version of the standard BAS EN 10027-1: 2001 consisted of seven points (items). This part of the European standard provides rules for designation of steel using letters and numbers symbols in relation to application and main characteristics, e.g. mechanical, physical, chemical characteristics which ensures the shortened identification of steel. In order to avoid ambiguity, it is necessary to supplement the main symbols established by this European standard with additional symbols, which identify additional characteristics of steel or steel products, e.g. suitability for use at high or low temperatures, state of the surface, state of treatment, de-oxidation. These additional symbols are covered by circular information (IC 101). The standard consisted of 7 points and Item 7. (Standards BAS EN 10027-1: 2001) is the most extensive and includes the following [4]:

- The initial symbol for steel castings (G),
- Steels designated according to their application and mechanical or physical properties (group 1),
- Steels designated according to chemical composition (group 2), which includes 4 subgroups: Non-alloy steels (except free-cutting steels) with an average content of manganese < 1%; Non-alloy steels with an average content of manganese  $\geq 1\%$ , Non-alloy free-cutting steels and alloy steels (except high speed steels) where the content, by weight, of every alloying element is < 5%; Alloyed steels (except high speed) where the content, by weight, of at least one alloying element is  $\geq 5\%$ ; Alloy steels (except high speed steels) where the content by weight of least one alloying element is  $\geq 5\%$  and High speed steels.

- Standard, i.e. Report BAS CR 10260: 2001 consisted of 6 points.

*Item 6.* (Additional symbols) is the most significant and consists of:

*Sub-item 6.1.* Steel names, may have additional symbols added in accordance with a points 6.3. and 6.4. (15 tables),

*Sub-item 6.2.* Steel numbers may have additional symbols added which shall be selected from Tables 1, 2 and 3. These symbols shall be separated from the steel number by the plus sign (+). (Tables 1, 2 and 3 are: Table 1: Symbols indicating special requirements; Table 2: Symbols indicating type of coating; Table 3: Symbols indicating treatment condition),

*Sub-item 6.3.* Steels designated according to their application and mechanical or physical properties,

*Sub-item 6.4.* Steels designated according to chemical composition.

After this edition, the second edition of the standard is followed in 2007 and the standard is identical to the European standard EN 10027-1: 2005 and replace the standards BAS EN 10027-1: 2001 and BAS CR 10260: 2001. This European standard applies to the steel listed in European Standards (EN), Technical Specifications (TS), Technical Reports (TR) and national standards of CEN members. The rules, given in the standard can also be applied to non-standardized steel [5].

### **2.2.1. Changes of the new edition of EN 10027-1**

New edition of standard pn BAS EN 10027-1: 2017 Designation systems for steels - Part 1: Steel names are identical to European standard EN 10027-1: 2016. This standard replaces standard BAS EN10027-1: 2007.

This new standard is more extensive than the previous standard BAS EN 10027-1: 2001 because was haw mention before, it incorporates the previous standard BAS EN 10027-1 and the report BAS CR 10260, and there are no major changes compared to BAS EN 10027-1: 2007 (English version).

The European version of EN10027-1: 2016 consists of 7 points and 18 tables. The first three points represent the usual allegations for standards, and the other points include the following [6]:

*Item 4.* Principles, consist of the following subheading: A unique steel name; Formulation of steel names; Allocation of steel names; Consultation;

*Item 5.* Reference to product standards;

*Item 6.* Classification of steel names;

*Item 7.* Structure of steel names includes 4 sub-items:

7.1. Principal symbols,

7.2. Additional symbols,

7.3. Steel designated according to their application and mechanical or physical properties and

7.4. Steels designated according to chemical composition.

*Sub-item 7.1.* Principal symbols are assigned to the steel according to Sub-items 7.3 and 7.4. and if it is a steel sheet, its marking as indicated in Tables 1 to 15 is preceded by the letter **G** and when the steel is produced by powder metallurgy, its mark is preceded by the letter **PM** (Tables 14 and 15).

*Sub-item 7.2.* Additional symbols may be added to the principal symbols in accordance with sub-clauses 7.3. and 7.4. and they are divided into two groups (group 1 and group 2, which is used only in combination with group 1). Further additional symbols for steel products must be accompanied by additional symbols of group 1 and group 2 and shall be selected in accordance with sub-items 7.3 and 7.4. (Tables 16, 17 and 18) and are separated from the previous symbol by the plus sign (+).

*Sub-item 7.3.* the marking of steel according to this paragraph must be carried out in accordance with from Table 1 to Table 11 [Structural steels, Steels for pressure purposes, Steels for line pipes, Steels for engineering, Steels for reinforced concrete, Steels for prestressing concrete, Steels for or in the form of a rails, Flat products for cold forming

(except those in Table 9), High strength steel flat products for cold forming, Tin mill products (steel products for packing), Electrical steels],

*Sub-item 7.4.* where designation of steel according to their chemical composition shall be made in accordance with the tables from Table 12 to Table 15. [Non-alloy steels (except free cutting steels) with an average content of Mn < 1%; Non-alloy steels with an average content of Mn ≥ 1%; Non-alloy free-cutting steels and alloy steels (except high speed steels) where the content, by weight, of every average alloying element < 5%; Stainless steels and other alloyed steels (except high speed steels) where the average content by weight of at least one alloying element is ≥ 5%; High speed steels]. The new edition of the Bosnian-Herzegovinian Standard BAS EN 10027-1: 2018 is the translated version of standard EN 10027-1: 2016.

Examples of the designation of some steel according to EN 10027-1: 2016 are given in Table 1.

*Table 1. Steel marks according to standards [6]*

Steel	Standard	Steel name according to EN 10027-1
Structural steels	EN 100025-2	S235JR; S355J2; S355K2
Steels for engineering	EN 10296-1	E355K2
Electrical steels	EN 10106	M400-50A
High speed steels	EN ISO 4957	HS2-9-1-8; HS6-5-2; HS6-5-2C

### 3. CONCLUSIONS

Standards revisions take place over certain periods of time and when it is needed in shorter time intervals, i.e. when a change is important and requires quick adoption. The standards for marking steel and steel casting are the basic standards related to the metallurgy and metal industry.

Their alignment and application enable business, data exchange and, most important, mutual understanding between the contracting authority and the manufacturer. Knowing the designation of steel and steel casting gives complete insight into the type and class, and often the state of delivery and the mode of production. In addition, the mark also gives an insight into what characteristics steel or steel casting should possess and what it is intended for.

All changes in labeling are regulated by standards, and our country has committed itself to monitoring and adopting these changes through its standardization bodies. These two standards, i.e. BAS EN 10027-1 and BAS EN 10027-2 got new editions by downloading and translation versions of European standards.

### 4. LITERATURE

- [1] Zakon o Standardizaciji Bosne i Hercegovine, [www.bas.gov.ba/images/upload/pdf/institut/zakoni/zakon\\_o\\_standardizaciji\\_bs.pdf](http://www.bas.gov.ba/images/upload/pdf/institut/zakoni/zakon_o_standardizaciji_bs.pdf) [20.12. 2017.],
- [2] Oruč M., Begovac F., Vitez I., Sunulahpašić R.: Čelik i čelični liv- podjela i označavanje, FMM, Univerzitet u Zenici, 2008.,
- [3] BAS EN 10027-2:2017, Sistemi označavanja čelika – Dio 2: Brojčane oznake, Institut za standardizaciju BiH, [www.bas.gov.ba/standard/?natstandard\\_document\\_id=303088](http://www.bas.gov.ba/standard/?natstandard_document_id=303088) [04.05.2017.],
- [4] BAS EN 10027-2:2001, Sistemi označavanja čelika-Dio 2: Brojčane oznake.,
- [5] BAS EN 10027-1: 2007, Sistemi označavanja za čelike - Dio 1: Nazivi čelika.,
- [6] EN 10027-1: 2016, Designation systems for steels - Part 1: Steel names.