DK 620.2:311.1:699.2/.8 GERMAN STANDARDS July 1963

MATERIAL TYPE NUMBERS

Principle groups 2 and 3: non-ferrous metals DIN 17007
Sheet 4

1. RANGE OF VALIDITY

The framework laid down in DIN 17007, sheet 1 is applicable to the formation of material type numbers for non-ferrous metals (NF-metals)
The present standard is applicable to all pure metals with the exception of iron; it is also applicable to such alloys in which iron does not represent the largest individual constituent.

2. MATERIAL PRINCIPLE GROUPS

The material type numbers of NF-metals have the following principle group numbers in the first position

2 for heavy metals excepting iron,
3 for light metals.

3. GRADE NUMBERS

The second to fifth digit of the material type number indicate the composition. By means of principle group numbers 2 and 3 a material type number range of 2,0000. XX to 3,9999. XX is given for NF-metals. This range is sub-divided in accordance with Table 1 into the various base metals in accordance with the number of purity grades and alloys per base metal which are presently available and which can be expected to be developed in the foreseeable future.

The material type number ranges for material groups of individual base metals can be seen from Table 2.

It is left to the Technical Standards Committee for Non-ferrous Metals (FNNE) to introduce a more extensive system for the grade numbers within the material number ranges shown in Tables 1 and 2 for a base metal and its alloys. This can also take into account aspects other than the composition (e.g. the casting method or the semi-finished form).

4. SUFFIX NUMBERS

With NF-metals the sixth and seventh position of the material type number show only the condition.
The suffix numbers are unified for all NF-metals decimally
In accordance with their relationship the conditions are arranged in 10 groups, see Table 3. The use of the suffix numbers to show the condition is also to be such that the work processes at the end of manufacture by means of which the state is attained, are also included. Finer differences in the effect of the treatment on the mechanical characteristics (e.g. strength values) only take second place. Important information concerning the use of the suffix numbers is given in a series of foot notes in Table 3.

5. ALLOCATION AND APPLICATION OF THE MATERIAL TYPE NUMBERS FOR NF-METALS

Material type numbers in accordance with this standard are only allocated for NF-metals dealt with in DIN standards and for those for which the inclusion in DIN standards is

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1 = sub-division of the grade classes for the numbering of pig iron, master alloys and cast iron

2 = pig iron *) 3 = general grades 4 = for steel production 5 = for casting production

6 = special pig irons 7 = master alloys 8 = (deoxidation and alloy media including ferro-alloys)

9 = specular cast iron 10 = cast iron with lamellar graphite 11 = cast iron

12 = cast iron with globular graphite 13 = malleable cast iron 14 = special cast iron

15 = unalloyed 16 = alloyed 17 = other 18 = *) a system of grade classes for pig iron has not yet been defined.

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3.2. The last two places of the grade number are purely count numbers which make no inferences with respect to the alloy content.

3.3. The material type numbers are laid down by the following bodies:

a) for pig iron and specular pig iron by the Technical Standards Committee for Iron and Steel,

b) for master alloys, i.e. deoxidation media, alloyers, ferro-alloys, by the Working Committee for FerroAlloys within the DNA,

c) for cast iron by the Technical Standards Committee - Founding.

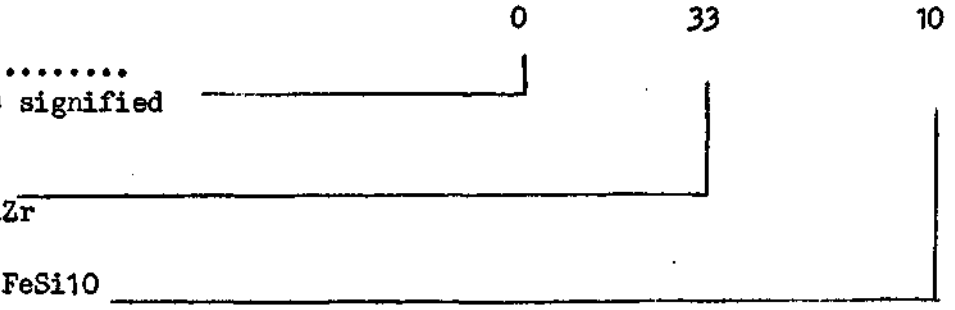
4. SUFFIX NUMBERS

4.1. Due to the fundamental differences in manufacture and application of the material groups contained in this principle group, the suffix numbers are given unified significance in accordance with the grade number range.

4.2. Suffix numbers will be laid down at a later date.

5. EXAMPLES FOR THE SIGNIFICANCE OF A MATERIAL TYPE NUMBER

Example 1

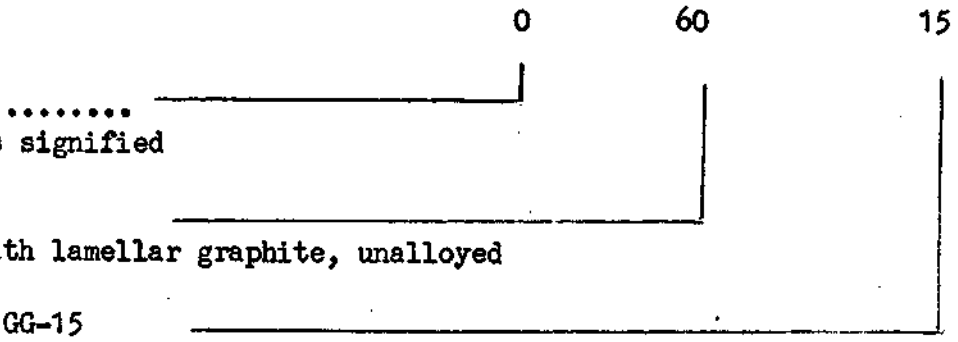


In the material type number .....
the following information is signified

Principle group
Grade class for FeSi,Si,FeSiZr

Count number, laid down for FeSi10
in accordance with DIN 17560

Example 2



In the material type number .....
the following information is signified

Principle group
Grade class for cast iron with lamellar graphite, unalloyed

Count number, laid down for GG-15
in accordance with DIN 1691

Continuation page 2

Technical Standards Committee for Iron and Steel
within the German Standards Committee (DNA)
Working Committee - Ferro-alloys within DNA
Technical Standards Committee - Founding within DNA
Numbering Technique Committee within DNA

Table 2. Principle group and grade numbers for base metals and their alloys

Material type number ranges	Material group
COPPER AND COPPER ALLOYS	
2.000 to 2.0199	Pure copper
2.0200 to 2.0449	Brass (CuZn-alloy)
2.0450 to 2.0599	High strength brass
2.0600 to 2.0699	Reserve
2.0700 to 2.0799	German silver (CuNiZn-alloy)
2.0800 to 2.0899	CuNi-alloys
2.0900 to 2.0999	CuAl-alloys
2.1000 to 2.1159	CuSn-alloys
2.1160 to 2.1189	CuPb-alloys
2.1190 to 2.1199	Reserve
2.1200 to 2.1219	CuAg-alloys
2.1220 to 2.1229	CuAu-alloys
2.1230 to 2.1239	Reserve
2.1240 to 2.1259	CuBe-alloys
2.1260 to 2.1279	CuCd-alloys
2.1280 to 2.1289	CuCo-alloys
2.1290 to 2.1299	CuCr-alloys
2.1300 to 2.1309	Reserve
2.1310 to 2.1319	CuFe-alloys
2.1320 to 2.1349	CuMg-alloys
2.1350 to 2.1389	CuMn-alloys
2.1390 to 2.1399	CuO-alloys
2.1400 to 2.1459	Reserve
2.1460 to 2.1469	CuP-alloys
2.1470 to 2.1479	CuPd-alloys
2.1480 to 2.1489	CuPt-alloys
2.1490 to 2.1499	Reserve
2.1500 to 2.1509	CuSe-alloy
2.1510 to 2.1539	CuSi-alloys
2.1540 to 2.1549	CuTe-alloys
2.1550 to 2.1559	Reserve
2.1560 to 2.1579	CuTi-alloys
2.1580 to 2.1599	CuZr-alloys
2.1600 to 2.1799	Reserve
ZINC, CADMIUM AND THEIR ALLOYS	
2.2000 to 2.2099	Pure zinc
2.2100 to 2.2199	Zinc alloys
2.2200 to 2.2299	Zinc plate and strip
2.2300 to 2.2399	Solder with zinc base
2.2400 to 2.2499	Cadmium, cadmium alloys and solder with a cadmium base

In the case of fine zinc the number in the 4th and 5th place is identical with the number of the "nines" in the short symbol. In the case of commercial zinc the 4th and 5th place signifies the degree of purity in accordance with spoken usage. In the case of zinc alloys the previously used commercial designations are shown in the 4th, 5th and 6th place

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already foreseen. Material type numbers for NF-metals are exclusively allocated through the office of the Technical Standards Committee for Non-ferrous metals (FNNE), Cologne, Friesenplatz 16, in agreement with its working committee "material type numbers".

6. WRITTEN REPRESENTATION OF THE MATERIAL TYPE NUMBERS

The material type numbers are to be written down without abbreviation, i.e. for the identification of the composition, the principle group and grade numbers and , where details can be given concerning the condition, the suffix numbers.

Table 1. Division of principle groups 2 and 3 in accordance with NF-base metals

Material type number ranges	NF-base metals
2,0000 to 2,1799	Cu
2,1800 to 2,1999	Reserve
2,2000 to 2,2499	Zn, Cd
2,2500 to 2,2999	Reserve
2,3000 to 2,3499	Pb
2,3500 to 2,3999	Sn
2,4000 to 2,4999	Ni, Co
2,5000 to 2,5999	Precious metals
2,6000 to 2,6999	High melting point metals
2,7000 to 2,9999	Reserve
3,0000 to 3,4999	Al
3,5000 to 3,5999	Mg
3,6000 to 3,6999	Reserve
3,7000 to 3,7999	Ti
3,8000 to 3,9999	Reserve

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Technical Standards Committee for Non-ferrous Metals (FNNE) within the German Standards Committee (DNA)

Material Type Numbers Committee within DNA

Table 2 (continuation)

Material type number ranges	Material group
ALUMINIUM AND ALUMINIUM ALLOYS [4]	
3.0000 to 3.0099	Al-alloy with other additives [5]
3.0100 to 3.0499	Pure aluminium
3.0500 to 3.0599	Al-alloy with Mn,Cr
3.0600 to 3.0699	Al-alloy with Pb, Sb, Sn, Bi, Cd, Ca
3.0700 to 3.0799	Al-alloy with Ni, Co
3.0800 to 3.0899	Al-alloy with Ti, B, Be, Zr
3.0900 to 3.0999	Al-alloy with Fe
3.1000 to 3.1099	AlCu-alloy with other additives [5]
3.1100 to 3.1199	AlCu-alloy binary
3.1200 to 3.1299	AlCu-alloy with Si
3.1300 to 3.1399	AlCu-alloywith Mg
3.1400 to 3.1499	AlCu-alloy with Zn
3.1500 to 3.1599	AlCu-alloy with Mn, Cr
3.1600 to 3.1699	AlCu-alloy with Pb, Sb, Sn, Cd, Bi, Ca
3.1700 to 3.1799	AlCu-alloy with Ni, Co
3.1800 to 3.1899	AlCu-alloy with Ti, B, Be, Zr
3.1900 to 3.1999	AlCu-alloy with Fe
3.2000 to 3.2099	AlSi-alloy with other additives [5]
3.2100 to 3.2199	AlSi-alloy with Cu
3.2200 to 3.2299	AlSi-alloy binary
3.2300 to 3.2399	AlSi-alloy with Mg
3.2400 to 3.2499	AlSi-alloy with Zn
3.2500 to 3.2599	AlSi-alloy with Mn, Cr
3.2600 to 3.2699	AlSi-alloy with Pb, Sb, Sn, Cd, Bi, Ca
3.2700 to 3.2799	AlSi-alloy with Ni, Co
3.2800 to 3.2899	AlSi-alloy with Ti, B, Be, Zr
3.2900 to 3.2999	AlSi-alloy with Fe
3.3000 to3.3099	AlMg-alloy with other additives [5]
3.3100 to 3.3199	AlMg-alloy with Cu
3.3200 to 3.3299	AlMg-alloy with Si
3.3300 to 3.3399	AlMg-alloy binary
3.3400 to 3.3499	AlMg-alloy with Zn
3.3500 to 3.3599	AlMg-alloy with Mn, Cr
3.3600 to 3.3699	AlMg-alloy with Pb, Sb, Sn, Cd, Bi, Ca
3.3700 to 3.3799	AlMg-alloy with Ni, Co
3.3800 to 3.3899	AlMg-alloy with Ti, B,Be, Zr
3.3900 to 3.3999	AlMg-alloy with Fe
3.4000 to 3.4099	AlZn-alloy with other additives [5]
3.4100 to 3.4199	AlZn-alloy with Cu
3.4200 to 3.4299	AlZn-alloy with Si
3.4300 to 3.4399	AlZn-alloy with Mg
3.4400 to 3.4499	AlZn-alloy binary
3.4500 to 3.4599	AlZn-alloy with Mn, Cr
3.4600 to 3.4699	AlZn-alloy with Pb, Sb, Sn, Cd, Bi, Ca
3.4700 to 3.4799	AlZn-alloy with Ni, Co
3.4800 to 3.4899	AlZn-alloy with Ti, B, Be, Zr
3.4900 to 3.4999	AlZn-alloy with Fe

e.g. 2.2141.05 = Z 410 as a die casting. A similar system is also in existence with the solders having Zn and Cd base.

Material type number ranges	Material group
LEAD AND LEAD ALLOYS	
2.3000 to 2.3099	Pure lead
2.3100 to 2.3199	Lead and lead alloys for cable sheathing
2.3200 to 2.3299	Hard lead
2.3300 to 2.3399	Complex alloys
2.3400 to 2.3449	Soft solder having a lead base
2.3450 to 2.3499	Reserve
TIN AND TIN ALLOYS	
2.3500 to 2.3509	Pure tin
2.3510 to 2.3609	Reserve
2.3610 to 2.3699	SnPb-soft solder
2.3700 to 2.3709	Reserve
2.3710 to 2.3739	SnPbSb-die casting alloys
2.3740 to 2.3769	SnSbCu-die casting alloys
2.3770 to 2.3789	SnSbCu-bearing metals
2.3790 to 2.3809	Reserve
2.3810 to 2.3899	Other Sn-alloys
2.3900 to 2.3999	Reserve
NICKEL, COBALT AND THEIR ALLOYS	
2.4000 to 2.4099	Pure nickel and pure cobalt
2.4100 to 2.4299	Ni and Co-alloys, moderately alloyed [1]
2.4300 to 2.4349	Ni and Co-alloys, high alloyed [2]
2.4350 to 2.4449	NiCu-alloys (and CoCu-alloys)
2.4450 to 2.4599	NiFe-alloys (and CoFe-alloys)
2.4600 to 2.4999	Ni-alloys with Co,Cr and Mo (and Co-alloys with Cr, Ni and Mo) [3]
MAGNESIUM AND MAGNESIUM ALLOYS	
3.5000 to 3.5009	Pure magnesium
3.5010 to 3.5099	Magnesium master alloys
3.5100 to 3.5199	Mg-alloys with rare earth metals; Th, Zn and Zr
3.5200 to 3.5209	MgMn-alloys
3.5210 to 3.5299	Reserve
3.5300 to 3.5999	MgAlZn-alloys (and others)

In the case of the MgAlZn-alloys the material number is where possible so chosen that in the 3rd and 4th place the numbers of the normal commercial designation appear, e.g.: G-MgAl8Zn1 in accordance with DIN 1729, sheet 2 = AZ 81, material number 3.5812.XX

1) With alloy contents up to 10%
2) With alloy contents in excess of 10%, insofar as these are not covered elsewhere in the material type number range 2.4350 to 2.4999.
3) These material type numbers were defined only in agreement with the FNA Iron and Steel (FES).

Table 3. (continuation)

Decimal 5: solution heat treated [9], cold post-treated

.50 solution heat treated, cold post-treated [12]
.51 solution heat treated and cold-stored for age hardening, straightened [13]
.52 solution heat treated and cold-stored for age hardening, straightened [13], variants
.53 solution heat treated, strain hardened [14] [15]
.54 solution heat treated, strain-hardened to quarter hard
.55 solution heat treated, strain-hardened to half hard
.56 solution heat treated, strain hardened to hard
.57 reserve
.58 reserve
.59 special cases

Decimal 6: quench age-hardened, without mechanical post-treatment

.60 solution heat treated, quench age-hardened [16]
.61 solution heat treated, quench age-hardened [15]
.62 solution heat treated, quench age-hardened [15], variants
.63 reserve
.64 reserve
.65 reserve
.66 quench age-hardened without special solution heat treatment
.67 quench age-hardened without special solution heat treatment, variants
.68 quench age-hardened following incomplete solution heat treatment (e.g. by means of casting or press heat)
.69 special cases

Decimal 7: quench age-hardened, cold post-treatment

.70 solution heat treated, cold post-treated, quench age-hardened [17]
.71 solution heat treated, straightened, quench age-hardened [15][17]
.72 solution heat treated, straightened, quench age-hardened [15][17], variants
.73 solution heat treated, strain hardened [14], quench age-hardened [17]
.74 solution heat treated, strain hardened to ¼ - hard, quench age-hardened [17]
.75 solution heat treated, strain hardened to half hard, quench age-hardened [17]
.76 solution heat treated, strain hardened to hard, quench age-hardened [17]
.77 solution heat treated, strain hardened [14], quench age-hardened, strain hardened
.78 incompletely solution heat treated (e.g. by means of the casting or press heat) where necessary quenched, age-hardened, strain hardened
.79 special cases

Decimal 8: stress relieved, without prior strain hardening

.80 reserve
.81 sand casting, stress-releived
.82 permanent mould casting, stress-relieved
.83 centrifugal casting, stress-relieved
.84 continuous casting, stress-relieved
.85 pressure die casting, stress-relieved
.86 reserve
.87 hot rolled, stress-relieved/hot drawn, stress-relieved
.88 (continuous) pressed, stress-relieved/hot-forged, stress-relieved
.89 special cases

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Decimal 9: special treatments (e.g. stabilisation annealing)

.90	reserve
.91	sand casting, specially treated
.92	permanent mould casting, specially treated
.93	centrifugal casting, specially treated
.94	reserve
.95	pressure die casting, specially treated
.96	sintered metal, specially treated
.97	wrought semi-finished, specially treated
.98	wrought semi-finished, specially treated
.99	special cases

6) Including cold sizing
7) Including the condition designated as "Harden" (sheet metal, DIN 1745)
8) Including the intermediate hardening which is achieved by partial thermal softening (as a final work process)
9) Following solution heat treatment there always follows one more or less rapid cooling
10) Variants of solution heat treatment not for the purpose of subsequent precipitation hardening but solely for the attainment of an even structure (e.g. G-AlMg 10ho, here by means of interrupted quenching)
11) Variants of solution heat treatment, in particular for the improvement of elasticity by the suitable alteration of the form of precipitated structure constituents (e.g. G-AlSi12g)
12) Type and degree of hardening of the cold post-treatment subject to confirmation.
13) The straightening can take place before, during or following the cold-storage
14) Without prescribed degree of hardness
15) With or without prior cold-storage
16) only for materials for which storage at room temperature before commencement of quench age-hardening does not result in a change in the mechanical characteristics
17) Straightening or strengthening before or after the quench age-hardening