



ISAN

INTERNATIONAL STANDARD
AUDIOVISUAL NUMBER

ISAN Check Characters Calculation

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Scope	This document gives a simplified description of the procedure for calculating the ISAN check character
Audience	All parties that wish to implement ISAN check digits computation
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1 Introduction

The **ISO 15706:2002** Standard specifies that the first check character for an ISAN shall be calculated over the first 16 hexadecimal digits of the ISAN according to a **MOD 37,36** system specified in accordance with **ISO 7064**.

The **ISO 15706-2** Standard extends ISAN over 24 digits and specifies that the second check character calculation shall be calculated over the 16 hexadecimal digits of its ISAN element and the 8 hexadecimal digits of its version segment according to a **MOD 37,36** system specified in accordance with **ISO 7064**.

2 First ISAN Check Character Calculation

The first check character of an ISAN shall be one alphanumeric character using Arabic numerals 0 through 9 and letters A through Z of the Latin alphabet. The check character shall be calculated over the first 16 hexadecimal digits according to the MOD 37, 36 systems specified in accordance with ISO 7064.

Whenever an ISAN (with or without its version extension) is displayed in human-readable form the first check character shall be added as the 17th character.

The following is a simplified description of the procedure for calculating the ISAN check character, using, as an example an ISAN without a Version segment: **ISAN B159-D8FA-0124-0000-K**

To verify the correctness of ISAN, convert the ISAN from hexadecimal to decimal values.

Here is the decimal representation:

ISAN	B	1	5	9	-	D	8	F	A	-	0	1	2	4	-	0	0	0	0	-	K
ISAN	11	1	5	9	-	13	8	15	10	-	0	1	2	4	-	0	0	0	0	-	20

Step 1: Take the first digit of the 16 digit ISAN character string and add it to 36. The sum of this addition will be the Intermediate Sum used in the next step.

Step 2 Take the Intermediate Sum and adjust it as follows:

- If the Intermediate sum is greater than or equal to 36, subtract 36 from it to create the Adjusted Intermediate Sum;
- If the Intermediate Sum is less than 36, use it without change as the Adjusted Intermediate Sum.
- If the Adjusted Intermediate result equals zero (after these two previous steps) use 36.

Step 3 Take the Adjusted Intermediate Sum and multiply it by 2 to arrive at a Product.

Step 4 Take the Product created in Step 3 and adjust it as follows:

- If the Product is greater than or equal to 37, subtract 37 from it. The remainder will be the Adjusted Product.
- If the Product is less than 37, use it without change as the Adjusted Product.

Step 5 Carry forward the Adjusted Product to the next step.

Step 6 Take the next digit (reading from left to right) of the 16 digit ISAN character string and add it to the Adjusted Product carried forward from the previous step. Repeat the steps outlined from C.2 through C.6 until all 16 digits of the ISAN have been processed and the Adjusted Product for the 16th digit has been determined.

Step 7 If the Adjusted Product for the 16th digit of the ISAN equals 1, use 0 for the check character. Otherwise, take the Adjusted Product for the 16th digit and subtract it from 37.

The remainder will be the check character for that ISAN.

3 Second Check Character Calculation

The second check character (that include the Version segment) of an ISAN shall be one alphanumeric character using Arabic numerals 0 through 9 and letters A through Z of the Latin alphabet. The check character for an ISAN as a whole (the 24 digits) shall be calculated over the 16 hexadecimal digits of its ISAN elements and the 8 hexadecimal digits of its version segment according to the MOD 37, 36 systems specified in accordance with ISO 7064.

Whenever an ISAN with its version extension is displayed in human-readable form its correct check character shall be added as the 26th character at the end of the ISAN with the version segment string. Note that the ISAN check character after the first 16 hexadecimal digits shall also be present in such cases, so the resulting string of 26 characters incorporates two check characters: one as the 17th character and one as the 26th character.

Validation of an ISAN with its Version segment being entered into or retrieved from a database or other machine-readable format by a human **shall require both correct check characters** (for the ISAN root element and for the version segment character string) to be verified or presented.

The procedure to compute the second check digit is similar as for the first check digit.

Annex 1 - Procedure ISAN Check Character Calculation

The table below shows the steps in calculating the check character for the ISAN: **ISAN B159-D8FA-0124-0000-K**

Step	ISAN digits (processed from left to right)	Add (+) (Use 36 for the first step; for subsequent steps, use the Adjusted Product from the previous step)	Intermediate Sum	Adjusted Intermediate Sum (If Intermediate Sum was greater or equal to 36, adjust by subtracting 36. If adjusted sum equals zero, put 36)	x 2	Product	Adjusted Product (If the Product was greater or equal to 37, adjust by subtracting 37)
1.	11	+ 36	= 47	11	x 2	= 22	22
2.	1	+ 22	= 23	23	x 2	= 46	9
3.	5	+ 9	= 14	14	x 2	= 28	28
4.	9	+ 28	= 37	1	x 2	= 2	2
5.	13	+ 2	= 15	15	x 2	= 30	30
6.	8	+ 30	= 38	2	x 2	= 4	4
7.	15	+ 4	= 19	19	x 2	= 38	1
8.	10	+ 1	= 11	11	x 2	= 22	22
9.	0	+ 22	= 22	22	x 2	= 44	7
10.	1	+ 7	= 8	8	x 2	= 16	16
11.	2	+ 16	= 18	18	x 2	= 36	36
12.	4	+ 36	= 40	4	x 2	= 8	8
13.	0	+ 8	= 8	8	x 2	= 16	16
14.	0	+ 16	= 16	16	x 2	= 32	32
15.	0	+ 32	= 32	32	x 2	= 64	27
16.	0	+ 27	= 27	27	x 2	= 54	17
17.	37 minus 17 = 20 (20->K) Therefore the 16 digit ISAN character string ISAN B159-D8FA-0124-0000 has the check character K and the complete 17 digit ISAN is ISAN B159-D8FA-0124-0000-K .						