

Convergent Software & ISO 28560-2 Conformance Document

The bit and byte ordering discussed in the ISO 28560-2 Guidelines for development of ISO 28560-2 conformant devices (direct link: http://biblstandard.dk/rfid/docs/conformance_28560-2.pdf) explains that there is a complex relationship between the various components between the application (for example the Library Management System) and the RFID tag. Different devices and software have a responsibility to support the handling of bit strings in a consistent manner. The presentation from the encoding process and to the decoding process is defined in ISO 28560-2 and again in the conformance document. The air interface transmissions are also clearly defined in ISO/IEC 15693.3. These bit sequence differ from the presentation defined for the presentation for ISO 28560-2.

Convergent Software Limited products differ in their functions based on the tools that are inherent to the product. The table below shows our present range of products and the modular tools that are incorporated in the product as a licensed component.

Convergent Software Limited ISO 28560-2 products	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
Integration software (for vendors) This particular product integrates directly with our Data Protocol Processor supporting ISO 28560-2, and requires specific interfaces to the vendor's RFID Library system application	●	●	●	●	●
Benchmark development software (for vendors)	●	●	●	●	
ISO 28560-2 Planning and modelling software (no hardware component)	●	●			
ISO 28560-2 Quality Control software (no hardware component)	●		●		

The tools are described more fully on our website:

<http://www.convergent-software.co.uk/libraries.htm>

Here is a brief description of each:

- The *Template Builder* ensures that all the basic rules for the data elements for ISO 28560-2 are followed.
- The *RFID Data Builder* links to our embedded Data Protocol Processor (DPP) to ensure that encoding is properly executed with the real or simulated tag.
- The *RFID Data Doctor* is currently unique in the RFID world in that it can diagnose encoding errors and inefficiencies.
- The *RFID Data Decoder* is a streamlined version of the RFID Data Doctor for use as a standard decoder. It still detects errors, but does not attempt to identify a possible cause.
- The *RFID Data Editor* is used to add additional data elements, to delete them, or modify the associated data of a previously encoded data element, while maintaining the integrity of the encoding rules.

Note that the current version of the tools and API are based on our core Data Protocol Processor (DPP). The DPP is a decoding and encoding “engine” that includes no communication with tags or devices. CSL is currently developing device integration to extend functionality.

The following tables show how each of the inherent modules supports the requirements set out in the ISO 28560-2 conformance document.

ISO 28560-2 Conformance 3.1 System Support Using ISO/IEC 18000-3 Mode 1 RFID Tags	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
Support for the bit and byte order defined in the conformance document	N/A	YES	YES	YES	YES
Support one or more block sizes (within the specified range of 1 to 32 bytes per block) by declaring specific block sizes that are supported.	1-32	1-32	1-32	1-32	1-32
Support one or more memory sizes by declaring specific memory encoding capacity or the minimum and maximum capacity supported.	YES	YES	YES	YES	YES
Support the writing of the AFI using specified air interface commands. Declare whether AFI locking is supported.	N/A	YES Note ¹	N/A	YES Note ¹	YES Note ¹
Support the writing of the hard-coded DSFID using specified air interface commands. Declare whether DSFID locking is supported.	N/A	YES Note ¹	N/A	YES Note ¹	YES Note ¹
Support RFID tags that can only encode the soft-coded DSFID (where this has to be encoded to precede the encoded data).	YES	YES	YES	YES	YES
AFI =C2hex	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹
AFI =07hex	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹
Other AFI as non-compliant	YES	N/A	YES	N/A	YES
DSFID = 06hex	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹	YES Note ¹
During the decoding procedure, a DSFID other than that declared by ISO 28560-2 shall be processed as non-compliant and belonging to a different application or encoding. Optionally, provide or report a message for tags with such a DSFID.	N/A	N/A	YES	YES	YES
Support the encoding of a soft-coded DSFID, where a separate DSFID memory and commands are not supported by the RFID tag.	YES	YES	N/A	YES	YES
Declare whether the encoding process is capable of selectively locking the soft-coded DSFID if used on the tag and specified to be locked by the user.	N/A	YES	N/A	YES	YES Note ¹

¹ With device-integrated version (coming soon)

ISO 28560-2 Conformance 3.2 The Data Encoding Process	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
Declare whether the encoding process is capable of encoding a soft-coded DSFID, where a separate DSFID memory and commands are not supported by the RFID tag.	YES	YES	N/A	YES	YES
Fully comply with all ISO 28560-1 data elements.	YES	YES	N/A	YES	YES
Support the selection of a sub-set of data elements to comply with a national data model, with further selection (or de-selection) of optional data elements.	YES	YES	N/A	YES	YES
Enable the sequence of data objects to be defined by the library for a given scenario, so that the most important data objects are encoded in the lowest numbered memory blocks.	YES	YES Note ²	N/A	YES Note ³	YES
Support variable length data input where this is permitted by ISO 28560-1 and 28560-2.	YES	YES	N/A	YES	YES
Validate input data objects to comply with ISO 28560-1.	YES	YES	N/A	YES	YES
Automatically construct the OID Index (Content Parameter) if called for by the application and encode this in the correct second position as defined in ISO 28560-2.	YES	YES	N/A	YES Note ⁴	YES
Prevent changes in the encoded data that would breach the ISO 28560-2 standard, specifically: <ul style="list-style-type: none"> Avoid the removal of Relative-OID 1 (Primary Item Identifier); Avoid a change from position 1 of Relative-OID 1 (Primary Item Identifier); If encoded, avoid a change from position 2 of Relative-OID 2 (Content Parameter - OID Index). 	YES	YES	N/A	YES	YES
Encode data to the ISO/IEC 15962 rules called out in ISO 28560-2.	N/A	YES	N/A	YES	YES
Exclude ISO/IEC 15962 encoding rules not specified in ISO 28560-2, for example access methods [encoding schemes] not referred to in ISO 28560-2.	N/A	YES	N/A	YES	YES

² The Data Builder automatically complies with the sequence of the template that is being used, but if data is not entered into a field then that data element is omitted and the sequence adjusted accordingly. In addition, the Data Builder controls the block alignment by inserting pad bytes as necessary where a data element is locked.

³ The Data Editor retains the encoded sequence on the tag with two exceptions: new data is encoded after any existing encoded data; if modified data is longer, then this is encoded at the end.

⁴ The Data Editor can update the OID index if (a) it is not locked and (b) any new data element can be declared within the size of the presently encoded OID Index.

ISO 28560-2 Conformance 3.2 The Data Encoding Process	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
Encode data to the specific ISO 28560-2 rules, for example the ISIL, OID index (Content Parameter), and Set Information.	N/A	YES	N/A	YES	YES
Correctly format the encoding when a data set is specified by the user to be locked, including the implications for adjacent data sets.	N/A	YES	N/A	YES	YES
Provide or record a message when the intended encoding exceeds the memory capacity of the RFID tag.	N/A	YES	N/A	YES	YES
Encode data such that a potential data overflow issue is resolved without permitting the partial programming of any data element on the tag.	N/A	YES	N/A	YES	YES
Optionally, provide or report messages for any input errors.	N/A	YES	N/A	YES	YES

ISO 28560-2 Conformance 3.3 The Data Decoding Process	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
Declare whether the decoding process is capable of decoding a soft-coded DSFID, where a separate DSFID memory and commands are not supported by the RFID tag.	N/A	N/A	YES	YES	YES
Declare whether the decoding process supports the selective reading of a sequence of blocks across the air interface (typically for fast reading operations) where all the data sets might not be included in the air interface transmission. In this case ensure that any truncated and incomplete data set, either at the beginning and / or end of the transmission, is ignored and not treated as errors.	N/A	N/A	YES Note ⁵	YES Note ⁵	YES Note ⁵
Decode data to the ISO/IEC 15962 rules called out in ISO 28560-2.	N/A	N/A	YES	YES	YES
Decode data to the specific ISO 28560-2 rules, for example the ISIL, OID index and Set Information.	N/A	N/A	YES	YES	YES
Correctly decode a data set specified by the user to be locked.	N/A	N/A	YES	YES	YES
Any Relative-OID that is not defined in ISO 28560-2 or by extensions agreed by the relevant ISO committee shall not be decoded and interpreted.	N/A	N/A	YES	YES	YES
Any RFID tag with data using ISO/IEC 15962 encoding rules not specified in ISO 28560-2 (for example access methods [encoding schemes] not referred to in ISO 28560-2) shall be treated as non-compliant and not be processed as a properly encoded tag. The tag should be rejected.	N/A	N/A	YES	YES	YES

⁵ The Data Doctor, Data Editor, and API are designed to decode a sequence of blocks starting with the lowest addressable block, which contains part or all of the Primary Item Identifier. As the number of blocks being transferred across the air interface is increased, then the OID Index and other subsequent data elements can be decoded. From an operational perspective, reading the Primary Item Identifier is highly efficient for many transactions. Reading this and the OID index is another useful selective read.

ISO 28560-2 Conformance 3.4 The Editing Process	Tools				API
	Template Builder	Data Builder	Data Decoder & Data Doctor	Data Editor	
System features that support editing shall identify all existing locked memory blocks, and interpret this into information of locked data elements.	N/A	N/A	N/A	YES Note ⁶	YES Note ⁶
System features that support editing shall provide a mechanism for identifying which memory blocks have been changed by the editing operation.	N/A	N/A	N/A	YES	YES
System features that modify existing data elements on a tag shall perform that modification, taking into account that the new data might require more or less encoding space and encode to the rules of ISO/IEC 15962 and ISO 28560-2.	N/A	N/A	N/A	YES	YES
System features that support editing shall selectively lock any modified or appended data element, as defined by the user, ensuring that the locking process results in a compliant encoding.	N/A	N/A	N/A	YES Note ⁷	YES Note ⁷
System features that support editing shall automatically update the OID index within the encoding capacity of the prevailing OID index and its encoded position in memory. That is, the rule for the sequence of the OID index is paramount and, therefore, the OID index should not be nullified and appended if it needs to grow larger than the space currently available to it. One approach to avoid this problem is to always encode the OID index to be large enough to accommodate the library's potential list of data elements or the current complete list of data elements	N/A	N/A	N/A	YES	YES
Provide or report relevant messages where the intended modified or appended data will not fit in the specified memory size.	N/A	N/A	N/A	YES	YES
Append data to a tag such that a potential data overflow issue is resolved without permitting the partial programming of any data element on the tag	N/A	N/A	N/A	YES	YES
Optionally, provide or record messages for any input errors.	N/A	N/A	N/A	YES	YES

⁶ With device-integrated version this is done automatically. In the software-only products information of locked blocks needs to be acquired independently and entered into the editing software.

⁷ The Data Editor tool controls all the formatting independently of the device-integrated version being supported, but the device-integrated version supports physical locking on the RFID tag