LIS
Vendor Interface Document

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Change History

Revision	Date	Pages	Reason
(A)	10/99	All	New manual release
(B)	3/00	All	New fields added to EpiCenter interface to support Phoenix ID/AST instrument data. Added Isolate results reporting for EpiCenter. Added additional results for tests. And changed Patient and Specimen user defined fields 4 & 5 to free text fields.
(C)	3/01	All	Added BD Phoenix 100 section. Updated list of antibiotic and organism codes. EpiCenter uploads chartable rules and special messages. EpiCenter allows blanking of a field. EpiCenter adds fields for excluding isolates from statistics and test complete DT.
(D)	5/01	2, 17, 18, 22, 28, 61-63, 65	Updated orders record to incorporate critical panel specification. Updated result record to include resistance markers 4 – 10. Changed 'resistance mechanism' to 'resistance marker' throughout. Changed "BACTEC9000" to "BT9000" in instrument type result field. Fix Phoenix resistance marker result upload example.
(E)	10/01	All	Formatting changes
(F)	3/02	All	Various updates throughout the document to cleanup references/definitions and lists of information.
(G)	12/03	All	Updates for EpiCenter Version 4 Features
(H)	12/03	18,31,63,65-76	Updates for Phoenix Version 4
(I)	-	-	Skipped
(J)	4/14/04	All	Phoenix Version 4.01Z and EpiCenter 4.10A updates, BD ProbeTec ET and Viper SP updates for new configuration options, status, and assay type list.
(K)	03/14/05	All	Various updates throughout the document to cleanup examples.

Table of Contents

1. Purpose

This document is intended to provide the information necessary for an LIS to exchange medical data with Becton Dickinson instruments. This document was written to include the specifications for the BD data management system as well as all future BD instruments. Any differences between instrument and data management communication are outlined in this documents appendix.

2. Scope

This document details the interface between a Laboratory Information System and Becton Dickinson instruments and the Becton Dickinson data management system. The interface uses the ASTM E_1381 protocol at the physical layer and the ASTM E_1394 protocol at the logical layer.

3. Definitions

LIS – Laboratory Information System; Computer system present in most microbiology labs responsible for collecting patient and test data.

ASTM – American Society for Testing and Materials; Committee responsible for publishing specification on communication between lab instruments and lab computer systems.

ASTM E_1381 – Protocol published by ASTM describing low-level data exchange across a serial port.

ASTM E_1394 – Protocol published by ASTM describing the logical level formatting of patient and test data.

EpiCenter – Data Management System produced by Becton Dickinson that collects microbiology test results.

LIS Interface Library – Common module responsible for implementing communication protocols. This module is used by both the BD instruments and the EpiCenter for LIS communication.

Date/Time – All times will be represented in local time unless otherwise specified.

4. Overview

Becton Dickinson (BD) has released several instruments that perform automated microbiology testing. BD has also released a data management workstation that communicates with these instruments and collects test results. It is BD's intention to communicate these results up to the LIS, if one is present in the microbiology lab. The protocols and specifications for exchanging data between BD instruments and an LIS are described in this and subsequent sections.

It is Becton Dickinson's expectation that an LIS vendor will implement the specifications in this document in their entirety. The proper functioning of the EpiCenter and BD instruments is dependent on the proper exchange of information with an LIS. An agreement to support LIS communication with BD instruments should be considered an agreement to implement all aspects of this specification.

4.1. Physical Cable Interface

The BD instruments and data management system communicate to the LIS using an RS232 serial port interface. The serial port interface used by the instruments uses only 3 signals in the interface cable, Transmit Data (Pin 2), Receive Data (Pin 3), and Signal Ground (Pin 5). Becton Dickinson does not believe that the inclusion of additional signals will cause any problems for the interface, however Becton Dickinson has not tested this case.

4.2. Communication Protocols

The American Society for Testing and Materials (ASTM) has published standards for how information should be exchanged between a clinical instrument and lab computer system. BD has implemented communication software to adhere to these specifications. In system configurations that include the BD data management system, the EpiCenter plays the role of the instrument.

The ASTM committee has produced standards describing both the logical level formatting and the physical exchange of data across a serial port. The logical level formatting describes how to place individual pieces of medical information into a record string, and how to combine record strings into a properly formatted message string. The physical level protocol describes how logical level message strings can be partitioned and passed across an RS232 line to an LIS.

ASTM E_1394 is the publication that outlines the logical formatting of medical information. This is the logical protocol BD uses to read/write data exchanged with the LIS. The ASTM E_1394 publication should be referred to for implementation details. A later section in this document discusses any deviations from that specification.

ASTM E_1381 is the publication that outlines the physical communication of medical information. This is the physical protocol BD uses to read/write data exchanged with the LIS. A later section in this document discusses any deviations from that specification.

4.3. System Configurations

The BD data management system is designed to communicate with several different types of BD instruments. The system configuration of these instruments is outlined in figure 1. New generation BD instruments have a TCP/IP network capability and use a local network to communicate to the EpiCenter. These results are then passed up to an LIS via the protocols described in this document.

Since the EpiCenter collects results from several different types of BD instruments, it passes several types of test results up to the LIS. This document specifies several different types of result records (per ASTM E_1394) for handling all of the various types of result data.

BD also has implemented LIS interface software in each of its new generation instruments. This allows the instruments to pass results directly up to the LIS, when an EpiCenter is not present in the lab. This configuration is illustrated in figure 2. Each of the instruments sends up the results that they acquire. The types of result messages that they produce (per ASTM E_1394) are expected to be the same as those for the EpiCenter.

Any specifications that relate only to a BD instrument are included in an appendix to this document.

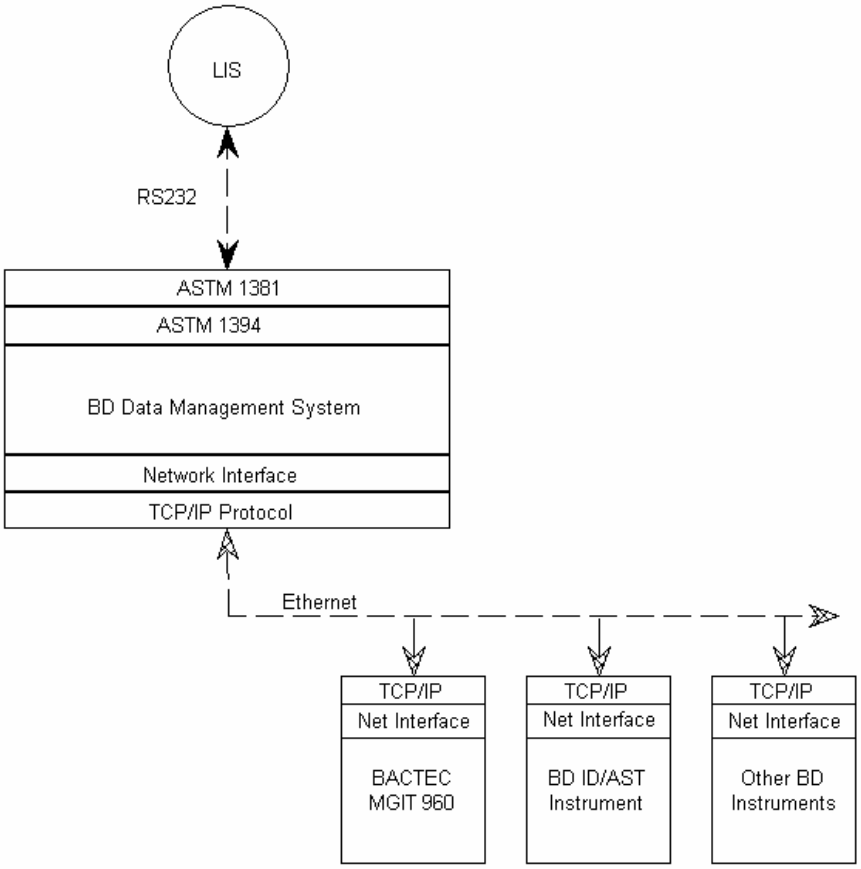

Figure #1

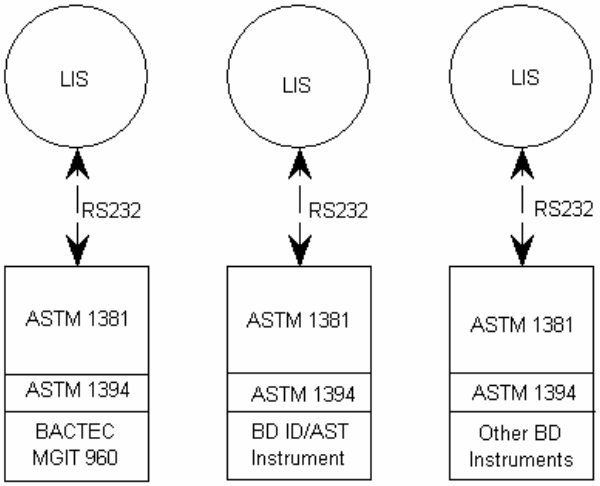

Figure #2

4.4. EpiCenter- LIS Communication

The EpiCenter is designed to handle results from several different types of microbiology tests. BD instruments produce a varied set of results including growth and detection, ID, and AST results. In addition, manual off-line tests are often required to supplement the instrumented results. The EpiCenter is designed to manage these off-line test results as well as instrumented results.

The EpiCenter expects to upload test results, both instrumented and manual, to the LIS. The EpiCenter also expects to receive downloaded patient demographics and supplemental test information from the LIS. The test information that is exchanged with an LIS is configurable by the user, as is described in a later section of this document.

The EpiCenter is designed to use coded values for communicating data with an LIS. Most fields in the BD database are associated with an "LIS Code" that is configurable at the EpiCenter. This is a 20 character string that contains an LIS defined value that uniquely identifies that item. "LIS Codes" are used to represent patient demographic fields, tests, and test results in LIS communications. Later sections of this document outline the fields represented by LIS codes and how they are mapped in an LIS communication.

The most efficient way to implement this interface would be an exchange of configuration information between BD and the LIS vendor. The LIS vendor can provide BD with the LIS Codes necessary to translate message data. The list of tests and results currently defined in the EpiCenter database is included in Appendix B of this document. The EpiCenter can also import coded list information (Body site, Hospital Service, Ordering Physician, etc) The EpiCenter can accept this information as a text based comma separated value file or other similar format.

However, most BD instruments are not able to change their LIS codes for LIS vendor convenience. Instead they pass hard coded literal strings for test id's, test status values, etc. The literal values passed by the instruments are restricted to fields related to that instrument. These literal strings used by the instruments are outlined in later sections of this document.

5. Workflow

The EpiCenter has a more sophisticated workflow with regard to an LIS than any instrument. Therefore this section concentrates more heavily on EpiCenter workflow. Details about BD instrument workflow are provided in an appendix in this document.

5.1. Uploaded Test Results

Each test in the EpiCenter database, both manual and instrumented, has a set of results defined for that test. Each test result has a configurable field determining if that status is reportable to the LIS. This field can be set to one of three values, always report to LIS, never report to LIS and report only when finalized. When a test result is changed to a new value, the EpiCenter checks this field to determine if the result should be uploaded to the LIS. A status configured to be "Auto Upload only when finalized" is only uploaded when the user has finalized the test. By using the "Auto Upload to LIS" field, the user can tailor the LIS interface to upload only the tests and results the LIS has defined. This configuration option also allows the EpiCenter to mimic any LIS workflow defined by a particular instrument.

Test results can be forced over these upload restrictions by first enabling the LIS Forced Upload feature of the BD EpiCenter. Then initiating a manual upload of the test results via the EpiCenter user interface, or querying for the associated specimen or test will

result in the test results being uploaded to the LIS despite the upload restrictions. The EpiCenter can be configured to enable or disable unsolicited uploads from the EpiCenter. If unsolicited uploads are enabled, then when a test is assigned an uploadable status, an upload message is generated to the LIS. If the unsolicited upload option is disabled, then test status changes do not generate upload messages. Instead, the LIS has to query the EpiCenter for test information, and only those tests with an uploadable status are included in the response message. If LIS Forced Uploads is enabled at the EpiCenter, all test results matching the query will be uploaded regardless of whether their status is uploadable.

5.2. Uploaded Isolate Results

In an attempt to characterize an organism, a lab may run more than one ID/AST test on a particular isolate. Multiple ID/AST tests may produce conflicting results for either an organism id or antibiotic susceptibility. The EpiCenter identifies when two or more tests produce conflicting results and alerts the user that they must select the appropriate results for that isolate. Once the conflict has been resolved, the EpiCenter saves the ID and AST results for that isolate separate from the test results. On the EpiCenter, these are called Isolate Level Results.

Figure 3 depicts the basic record structures within the EpiCenter.

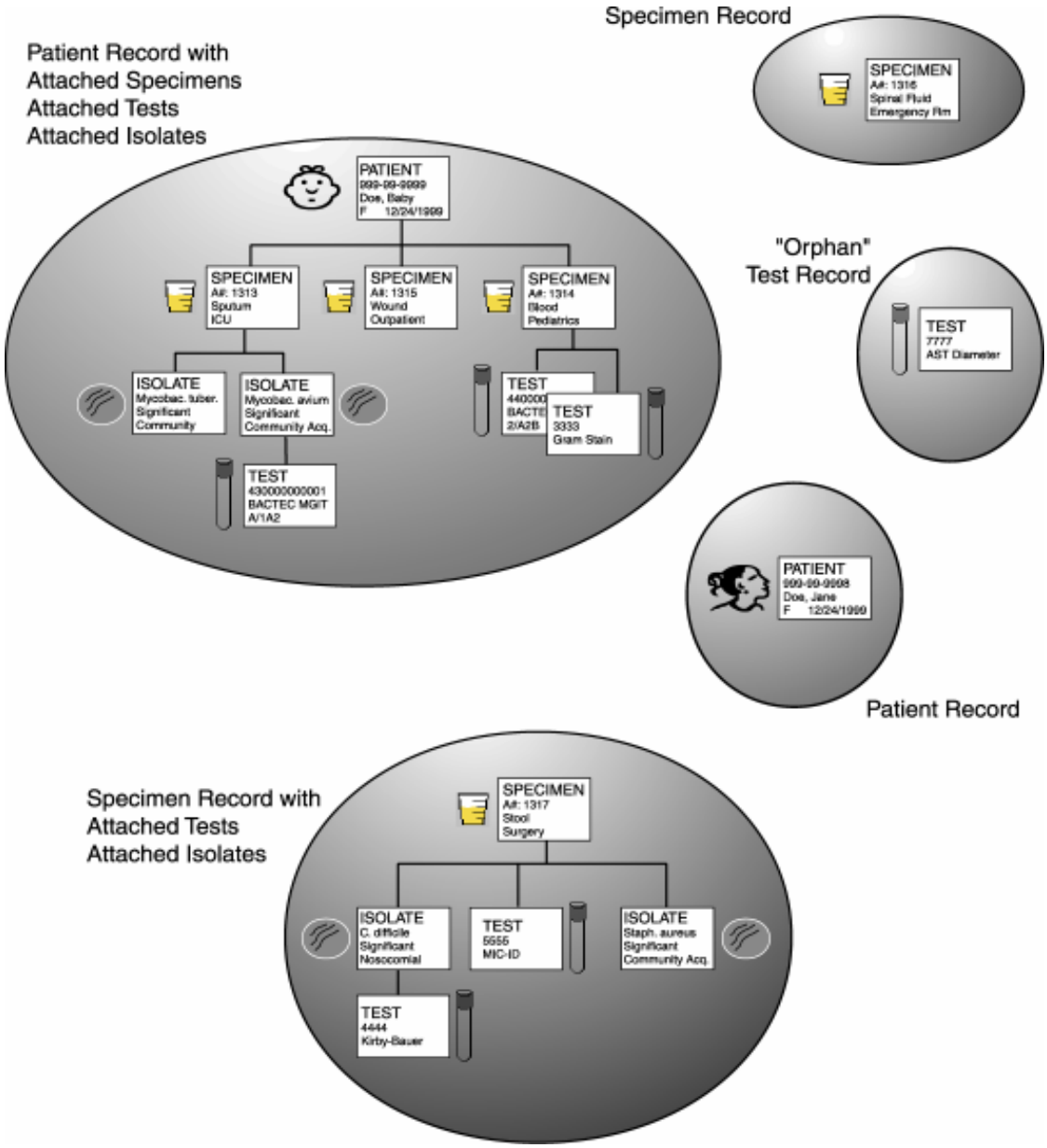

Figure 3

The relationships and hierarchy of the finalization scheme in the EpiCenter is depicted in Figure 4.

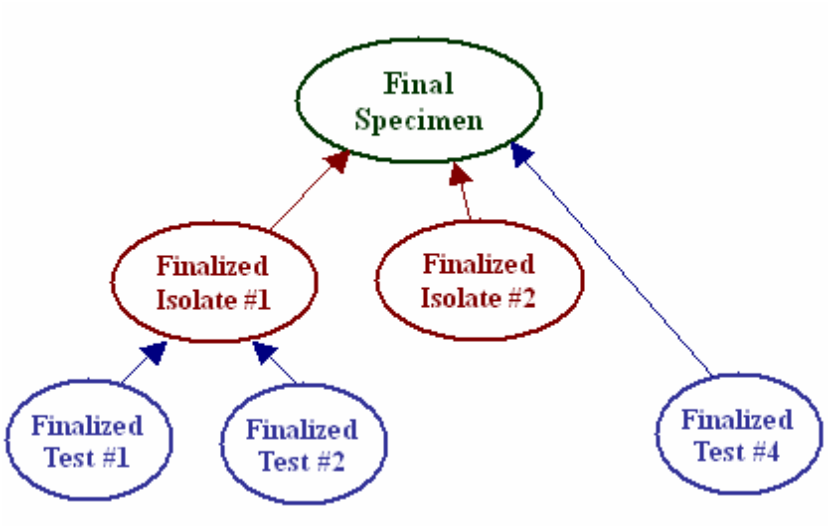

Figure 4

The EpiCenter also includes an expert system, which evaluates ID/AST results. The input to the expert system is the results from any ID/AST test. The output of the expert system may be a different isolate AST result. Any expert system changes to AST results are maintained as a separate field, but are included as part of the isolate results. So isolate results provide both the test result and the expert system result, as described in a later section.

Isolate results may be a compilation of several ID/AST results. They are also free of any conflicts. Expert system evaluations are also available with isolate level results. For these reasons, some LIS sites may find isolate level results more valuable than test level results. The EpiCenter therefore provides a mechanism for uploading isolate level results, test level results, or both.

The configuration section of the EpiCenter allows the user to set an LIS Auto Uploadable field for isolates. This field can be set to Always "Auto Upload" to LIS, "Never Auto Upload" to LIS, "Auto Upload When Specimen Finalized" or "Auto Upload When Isolate Finalized". This works in a similar way as test status results do for tests. When the isolate Auto Upload field is set to "Auto Upload When Specimen Finalized", isolate level results are only uploaded once the specimen has been finalized by the user. When the isolate Auto Upload field is set to "Auto Upload When Isolate Finalized", isolate level results are only uploaded once the isolate has been finalized by the user.

Isolate results can be forced over these upload restrictions by first enabling the LIS Forced Upload feature of the BD EpiCenter. Then initiating a manual upload of isolate results via the EpiCenter user interface, or querying for the associated specimen will result in the isolate results being uploaded to the LIS despite the upload restrictions

Isolate results are differentiated from test results as follows:

- The Test Id in Order field (O, 5, 1, 4) is set to "ISOLATE_RESULTS" instead of a real test id.

- The first result record of an isolate result is always an ID record regardless of test types.
- Unlike test uploads whch have a fixed number of results, the number of results included in an isolate can flucutuate until the isolate is finalized.
- Isolate level AST result records will contain Interpreted (R, 4, 1, 4), Expert (R, 4, 1, 5) and Final (R, 4, 1, 3) AST susceptibility values whereas test level results only contain Interpreted (R, 4, 1, 4) AST susceptibility values.
- Isolate level AST result records will contain the AST test source in field (R, 4, 1, 6).

It is possible to dictate the upload order of individual antimicrobial isolate results from the BD EpiCenter through the use of Antimicrobial Ordering feature.

5.3. Unsolicited Downloads

The EpiCenter accepts unsolicited download data from the LIS containing patient demographics and supplemental test information. The fields that the EpiCenter are interested in receiving are outlined in section 8 (Message Content) of this document.

Supplemental tests and results are expected to be transmitted in the same logical placement as tests and results that are uploaded. The time/date fields for test results are used to identify LIS test results more recent than EpiCenter test results. Also a test/consumable sequence number field can be used as an identifier for a test. This allows the LIS or EpiCenter to distinguish between two tests of the same type ordered against a specimen.

An LIS Test Order can also be accepted via unsolicited download without a test/consumable sequence number. In this way the LIS can order tests on specific specimens and isolates without having to format a valid BD instrumented sequence number. These orders will be automatically associated with matching tests in the EpiCenter database as they are detected. These orders can also be manually associated with orphan tests by the EpiCenter user.

The EpiCenter does not accept edits from the LIS to key fields used to identify patients and specimen. A patient ID is the key field identifying a patient. An accession number is the key field identifying a specimen. If either of these fields is received in a download message to the EpiCenter, and these values are not matched in the EpiCenter database, they are considered new entries. Re-association of a test to a new specimen, or re-association of a specimen to a new patient, must be done at the EpiCenter.

For test order and result information, the EpiCenter evaluates the time stamps associated with that data to determine which results are more current. If the LIS information is more current, than it is used to override the EpiCenter information.

For all other data downloaded from the LIS, which does not include a time stamp, the LIS data is considered correct and overrides any EpiCenter data.

Isolate level results are not accepted in a download from the LIS.

5.4. File Import

The EpiCenter has the ability to import LIS files containing downloaded information. The user can access a screen in the EpiCenter to manually select files to import. Import files must be text files that follow the ASTM 1394 protocol, which describes the serial line interface. The import file text is sent through the same message parser that regular serial communications go through, processing the same fields that are configured for the serial interface.

Currently the EpiCenter does not export any upload information to a file.

5.5. Queries

The EpiCenter is able to generate request messages (or queries) to the LIS for information. When the EpiCenter sees a new accession number, either from user entry or an instrument, the EpiCenter uploads a request message. EpiCenter request messages, (as outlined in section 8 - Message Content), are sent for only a single specimen at a time. Requests for information from the EpiCenter should be interpreted as requests for both patient demographics and supplemental test information for that specimen.

The EpiCenter can be configured to enable or disable queries sent to the LIS. If EpiCenter queries are enabled then the EpiCenter generates request messages to the LIS for information. If LIS queries are disabled, then no request messages are upload to the LIS.

The EpiCenter is also able to respond to a request generated by the LIS. The ASTM E_1394 specification describes several qualifying fields that can be included in the request for a particular set of results. The qualifying fields that the EpiCenter can process are a subset of those and are outlined in section 8 (Message Content) of this document.

The fields that are included in an uploaded response message are the same fields that are included in an n unsolicited upload message.

The EpiCenter only requests information from the LIS one specimen at a time. The EpiCenter does not use many of the qualifying fields provided for in the ASTM specifications. An example of a request from the EpiCenter is provided in section 8.2.6, outlining request record fields.

5.6. Error Reporting

The LIS interface implemented by Becton Dickinson adheres to all of the error detection and recovery outlined in the physical level protocol. The ASTM E_1381 protocol defines the use of check sums, time outs, etc., for the proper exchange of information. The rules described in that specification should be used to indicate whether or not data was properly sent between the LIS and the BD instruments. In the EpiCenter, any errors detected at the physical protocol level are also reported to the user and recorded in an error log.

Information transfers can also contain logical level formatting problems, or errors in message content. These logical errors may be determined after the physical receipt of the message has been acknowledged. The ASTM protocols do not describe a mechanism for reporting logical level errors. Instead any logical level errors are reported to the user by the EpiCenter. The Epicenter has an error log that contains any problems that occurred during the processing of an LIS download. It is the user's responsibility to recognize and resolve logical level problems.

6. Protocol Specifications

Most of the specifications needed for implementing the communication protocols are contained in the published documents referred to Overview Section of this document. The following sections contain any clarifications or deviations to those specifications.

6.1. Physical Protocols

The BD LIS interface implements the ASTM E_1381 physical level protocol as outlined in the published specification except for the deviations described below.

6.1.1. Memory limitations

The ASTM E_1381 protocol does not place a limit on the total size of the message that can be received by the instrument. Since the EpiCenter is software resident on a standard PC, it does not have any significant restrictions on download message sizes. The EpiCenter expects to be able to handle any reasonably sized messages downloaded from the LIS. Should any download message exceed the maximum capacity of the EpiCenter, the message is rejected during transmission and an error notification is displayed to the user.

6.1.2. Unpacked Frames

Becton Dickinson interprets the ASTM E_1381 specification to imply that an intermediate frame of a message should be packed to be 240 characters in length. The only frame that should be less than 240 bytes in size is the last frame of a message.

However BD has had feedback from several LIS vendors who interpreted the ASTM E_1381 specification differently. These vendors have requested that the BD LIS interface be able to send and receive frames that contain only a single logical record. (i.e. Header, Patient, Order, Result and Terminator records all are sent in separate frames). This implies that most frames are less than 240 bytes in length. However it is still possible that a single logical record could be longer than the 240 bytes limit for a frame. In this case a single logical record is sent in several consecutive intermediate frames. All but the last frame are packed to 240 bytes and the last frame containing that logical record is less than 240 bytes.

The BD LIS interface is configurable to send either packed frames or unpacked frames, which contain a single record per frame. (The BD simulator described in a later section also has this configurable option).

6.1.3. BDMODEM

The BD LIS Interface can be configured to use the BDMODEM physical layer protocol. This customized protocol is been implemented by BD instrumemtation already out in the field. In order to maintain backwards compatibilty, the data management system supports this protocol. However, this protocol is not intended to be used for any new LIS connections. BD strongly suggests implementing the industry standard ASTM 1381 protocol for all new LIS connections. A full description of the BDMODEM protocol is provided in other BD documentation. If needed, please contact Becton Dickinson for more information.

6.2. Logical Protocols

The BD LIS interface implements the ASTM E_1394 logical level protocol as outlined in the published specification except for the deviations described below.

6.2.1. Unprocessed Records

The ASTM E_1394 logical level specification describes the use of Scientific and Manufacturer records. The BD LIS interface accepts these records in a download message, however it does not evaluate the content of these record types. These records are extracted from any messages downloaded from the LIS. Messages generated by a BD LIS interface do not contain any of these records.

6.2.2. Download Only Fields

The ASTM E_1394 specification describes several fields that are divided into components, such as patient address field and patient name. For example, the address field is defined to have the street address, city, state, country, and zip code all separated by component delimiters. However these fields are saved as a single string in the EpiCenter database. The BD LIS interface reads those individual components from a download message and concatenate them for storage.

The BD LIS interface does parse these fields into their components for upload messages. If a concatenated field is selected for upload, the entire string is placed in the fist component of the field. For example, a Patient's address, including city, state and zip code, are all included in the string in the Street Address field of the Patient record. Currently the only two fields that are handled this way are Patient Name and Patient Address.

6.2.3. Communication Errors

The ASTM E_1394 protocol defines a hierarchical relationship to logical records. This protocol states that if a complete message is not successfully transmitted, then only the logical records that complete the hierarchical relationship must be resent. For example, if a message containing several patient records is not received by the instrument properly, then only the logical records from the latest Patient record on must be resent in a new message.

However the ASTM E_1381 protocol, in section 6.5.2.3, states that if a message is not received properly, the complete message is resent. The BD LIS interface follows the specification as outlined in the ASTM E_1381 physical level protocol. If a message is not transmitted successfully the BD LIS interface expects the whole message to be resent.

6.2.4. LIS Codes

The EpiCenter uses "LIS Codes" to represent many fields in an LIS communication. "LIS Codes" are values defined by the LIS that uniquely identify a field. BD uses these codes for any information that can be configured by the user. These fields include many patient demographic fields, such as Hospital Service. "LIS Codes" are also used as test ID values, and as test status values, as described in the overview section.

"LIS Codes" are used for field values instead of full names, as described in the ASTM E_1394 specification. If an LIS does not have abbreviated codes for these fields, then the "LIS Codes" can be configured to be the same as the field name text. A complete list of fields associated with an LIS code can be found in section 8 (Message Content) of this document.

Again, instruments generally do not communicate using LIS Codes. They send pre-defined literal strings in their ASTM messages. The strings used by the instruments when reporting their results are outlined in the instrument specific Appendices of this document.

LIS codes are NOT case sensitive.

6.2.5. Blanking fields

As per the ASTM 1394 specification, the EpiCenter will accept the "" string as an indication that the value of a field should be blanked. Key fields, like Patient Id and Accession Number do not support this feature. When any coded list field in the EpiCenter, for example Hospital Service, gets blanked by the LIS, its value will change to the default value of "Unspecifed".

The EpiCenter can exchange fields with an LIS that include a list of possible values, for example Resistance Markers. When the EpiCenter receives data in a download it will replace its entire list with the list provided in the download. And in order to blank out all entries of that list, the "" string should be placed in the first field designated for that data.

7. Configurable Options

There are several aspects of the BD LIS interface that are configurable by the user. This allows the BD instruments to tailor their connection to the local LIS. The configurable parts of the BD LIS interface are described below.

In some cases, configuration options are specific to the EpiCenter. An appendix at the end of this document lists configuration options specific to each instrument.

7.1. Port parameters

The BD LIS interface is based on serial port communication. The parameters for initializing the serial port are configurable by the user to allow for proper communication. The configurable parameters include the following fields.

Comm Port Number – acceptable values range from 1 to 4.

Baud Rate – acceptable values include 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, and 115200.

Data Bits – acceptable values range from 5 to 8.

Stop Bits – acceptable values include 1 and 2.

Parity – acceptable values include ODD, EVEN, and NONE.

7.2. Auto-Populating Lists

The EpiCenter has a configurable option to allow new entries detected in a downloaded message to be automatically added to the BD database. If an unrecognized "LIS Code" is found in a download field, a new entry is made to the database containing that translation code. A notification is then presented to the user suggesting that they complete the proper name, and other fields, for that list entry. This is designed to provide a mechanism for initializing the EpiCenter database with all of the relevant values needed for proper LIS communication.

Antibiotics and organisms are considered coded list fields by the EpiCenter and have an LIS translation code associated with them. For antibiotics and organisms the LIS codes are defaulted to Becton Dickinson defined abbreviations. The user has the ability to modify these codes if they do not agree with codes used by the LIS, however the Organism and Antimicrobial coded lists do not support the auto-populate feature. A listing of antibiotics and corresponding BD abbreviations can be found in Appendix C. A listing of organisms and corresponding BD abbreviations can be found in Appendix D.

7.3. Logical Protocol Parameters

The ASTM E_1394 protocol specifies four types of characters to be used to delimit fields in a record, (field, repeat, component and escape delimiters). The user is able to configure which characters are used as delimiter characters. These characters are defaulted to the ones used in the ASTM E_1394 publication, '|', '\', '^', and '&' respectively.

The user is able to configure whether packed or unpacked frames are uploaded to the LIS. Unpacked frames contain a single logical record per frame.

At the EpiCenter, the user is able to configure whether or not a logical record is terminated by a CR character only, or both a CR – LF character sequence.

7.4. ASTM Field Mapping

There are a number of fields contained in the EpiCenter database that need to be exchanged with the LIS. BD has made an effort to properly map these fields, per the ASTM E_1394 specification, to a field position in an appropriate record. However, some LIS vendors may interpret the meaning of these ASTM fields differently. The BD LIS interface allows the user to update the location of any field. This should allow the user to compensate for any inconsistencies between BD and LIS interfaces.

The user is able to identify each field in the BD database as an upload or download field. Fields enabled for upload messages are included in result messages passed up to the LIS. Fields enabled for download messages are parsed from any download messages from the LIS. This allows the BD LIS interface to be tailored to the specific needs of the LIS environment.

Several fields appear to be mapped into multiple locations, including test/consumable sequence number and Organism Code. These fields are mapped into the Order record because they may be needed to define a specific ordered test. These fields are also mapped into the Result record because they may be considered a result of an ID test. These fields are looked for and extracted from either location.

7.5. User Defined Fields

The EpiCenter contains 5 patient and 5 specimen fields that can be defined by the user. The EpiCenter makes no assumptions about what type of information is maintained in these fields. The user is able to use these fields to contain any data that the EpiCenter did account for with its other fields.

Three patient fields and three specimen fields are managed as coded list fields. These are fields whose value is one from a pre-configured list. For example the Specimen Type field can be set to a value from a determined list. The user is able to configure the entries listed in each field and define a label for that field.

Two more patient and 2 more specimen fields are free text fields that need not come from a pre-defined list of values. For example, these fields could be used for data such as a patient's Social Security Number. The user can also define a label for these fields.

Since the EpiCenter has no knowledge of the type of information being maintained in these fields, it cannot assign a meaningful default mapping in an ASTM record. These fields are mapped by default to an unused ASTM location. They are also disabled by default for both upload and download messages. The user can populate these fields and re-map them to an ASTM location agreed upon with the local LIS.

8. Message Content

The following sections describe which fields are exchanged with each instrument and the EpiCenter.

8.1. Field List

This section lists all of the fields by name that BD instruments can exchange with the LIS. The following tables have a column for the EpiCenter fields as well as several BD instruments. The EpiCenter column indicates the fields the data management system intends to exchange. The MGIT column indicates the fields the BACTEC MGIT 960 instrument intends to exchange. The Phoenix column indicates the fields that BD's Phoenix 100 instrument intends to exchange. And the Probe column indicates the fields the BD ProbeTec ET instrument intends to exchange.

Each field is displayed with its default mapping in the ASTM E_1394 records. This position consists of a record type (Patient, Order, Result, Query, or Comment), a field delimiter counter, repeat delimiter counter, and component delimiter counter. The fields are grouped according to the ASTM E_1394 record type they are mapped to.

The field list also indicates if that field is defaulted as an upload (U) or download (D) field, or both (U/D). A blank column indicates that the field is not to be exchanged with an LIS. Fields not configured to be exchanged with the LIS are ignored in a download message.

The first two fields of every record include the Record Type indicator and a record index value. These fields are considered part of every record but are not listed in these tables. The following section describes these fields in more detail, including the expected values for each field.

Result records have data fields with multiple definitions, such as Result Data 1, Result Data 2, etc. The data contained in these fields depends on the type of results being reported. ID tests may have organism data in those fields, while AST tests have antibiotic data in those fields. The following sections describe in more detail what data can be expected in a result record.

Header Record Field Name	ASTM Pos.	Direction
Sender Name	H, 5, 1, 1	U
Version Number	H, 13, 1, 1	U
Message Date/Time	H 14, 1, 1	U

Patient Record Field Name	ASTM Pos.	Direction
Patient ID	P, 4, 1, 1	U/D
Patient Name (Last)	P, 6, 1, 1	U/D
Patient Name (First)	P, 6, 1, 2	D
Patient Name (Middle)	P, 6, 1, 3	D
Patient Name (Suffix)	P, 6, 1, 4	D
Patient Name (Title)	P, 6, 1, 5	D

Patient Record Field Name	ASTM Pos.	Direction
Date of Birth	P, 8, 1, 1	U/D
Patient Sex	P, 9, 1, 1	U/D
Address (Street)	P, 11, 1, 1	U/D
Address (City)	P, 11, 1, 2	D
Address (State)	P, 11, 1, 3	D
Address (Zip Code)	P, 11, 1, 4	D
Address (Country)	P, 11, 1, 5	D
Patient Phone Number	P, 13, 1, 1	U/D
Admitting Physician	P, 14, 1, 1	U/D
Patient User Field 1	P, 15, 1, 1	
Patient User Field 2	P, 15, 2, 1	
Patient User Field 3	P, 15, 3, 1	
Patient User Field 4	P, 15, 4, 1	
Patient User Field 5	P, 15, 5, 1	
Patient Diagnosis	P, 19, 1, 1	U/D
Patient Therapy (1-5)	P, 20, 1-5,1	U/D
Admit Date/Time	P, 24, 1, 1	U/D
Room Number	P, 26, 1, 1	U/D
Hospital Service	P, 33, 1, 1	U/D
Hospital Client	P, 34, 1, 1	U/D

Order Record Field Name	ASTM Pos.	Direction
Accession Number	O, 3, 1, 1	U/D
Isolate Number	O, 3, 1, 2	U/D
Organism	O, 3, 1, 3	U/D
Exclude Isolate from Statistics	O, 3, 1, 4	U/D
Test ID	O, 5, 1, 4	U/D
Test/Consumable Sequence Number	O, 5, 1, 5	U/D
Priority	O, 6, 1, 1	U/D
Collection Date/Time	O, 8, 1, 1	U/D
Collected By	O, 11, 1, 1	U/D
Received By	O, 11, 1, 2	U/D
Specimen Action Code	O, 12, 1, 1	U
Isolate Source Test (1-3)	O, 14,1-3,1	U/D
Isolate Source Test Start Time (1-3)	O, 14,1-3,2	U/D
Receipt Date/Time	O, 15, 1, 1	U/D
Specimen Type	O, 16, 1, 1	U/D
Body Site	O, 16, 1, 2	U/D
Ordering Physician	O, 17, 1, 1	U/D
Ordering Physician Phone	O, 18, 1, 1	U
Ordering Physician Fax	O, 18, 1, 2	U
Ordering Physician Pager	O, 18, 1, 3	U
Specimen User Field 1	O, 19, 1, 1	
Specimen User Field 2	O, 19, 2, 1	
Specimen User Field 3	O, 19, 3, 1	
Specimen User Field 4	O, 19, 4, 1	
Specimen User Field 5	O, 19, 5, 1	
Finalized Date/Time*	O, 23, 1, 1	U/D
Specimen Reimbursement Value	O, 24, 1, 1	U
Test Reimbursement Value	O, 24, 2, 1	U
Isolate Classification/Nosocomial	O, 29, 1, 1	U/D

Result Record Field Name	ASTM Pos.	Direction
Result Type Code	R, 3, 1, 4	U/D
Test/Consumable Sequence Number	R, 3, 1, 5	U/D
Antibiotic	R, 3, 1, 6	U/D
Antibiotic Concentration	R, 3, 1, 7	U/D
Antibiotic Concentration Units	R, 3, 1, 8	U/D
Test Status	R, 4, 1, 1	U/D
Result Data 1		
BACTEC MGIT 960 Growth Units	R, 4, 1, 2	U
ProbeTecET/Viper SP Alg.Results	R, 4, 1, 2	
AST MIC for AST MIC test	R, 4, 1, 2	U/D
AST Diameter for AST Dia. test	R, 4, 1, 2	U/D
Organism ID for ID test	R, 4, 1, 2	U/D
Result Data 2		
AST susceptibility (Final)	R, 4, 1, 3	U/D
Profile Number for ID Test	R, 4, 1, 3	U/D
Profile Number for Isolate ID	R, 4, 1, 3	U/D
Result Data 3		
AST susceptibility (Interpreted)	R, 4, 1, 4	U
Resistance Marker 1	R, 4, 1, 4	U
Result Data 4		
AST susceptibility (Expert)	R, 4, 1, 5	U
Resistance Marker 2	R, 4, 1, 5	U
Result Data 5		
AST Source test	R, 4, 1, 6	U
Resistance Marker 3	R, 4, 1, 6	U
Result Data 6		
Resistance Marker 4	R, 4, 1, 7	U
Result Data 7		
Resistance Marker 5	R, 4, 1, 8	U
Preliminary/Final Status	R, 9, 1, 1	U/D
Test Start Date/Time	R, 12, 1, 1	U/D
Result/Status Date/Time	R, 13, 1, 1	U/D
Test Complete Date/Time	R, 13, 2, 1	U
Instrument Type	R, 14, 1, 1	U
Media/Assay Type	R, 14, 1, 2	U
Protocol Length	R, 14, 1, 3	U
Instrument Number	R, 14, 1, 4	U
Instrument Location	R, 14, 1, 5	U
Additional Result Quantity (1-5)	R, 15, 1-5,1	U/D
Additional Result (1-5)	R, 15,1-5,2	U/D

Comment Record Field Name	ASTM Pos.	Direction
Comment Text	C, 4, 1, 1	U/D
Comment Type	C, 5, 1, 1	U/D

Request Record Field Name	ASTM Pos.	Direction
Request Starting Patient Id	Q, 3, 1, 1	D
Request Starting Accession Number	Q, 3, 1, 2	U/D
Request Starting Sequence Number	Q, 3, 1, 3	D
Request Ending Patient Id	Q, 4, 1, 1	D
Request Ending Accession Number	Q, 4, 1, 2	D
Request Ending Sequence Number	Q, 4, 1, 3	D
Request Test Id	Q, 5, 1, 1	D
Request Test Status	Q, 5, 1, 2	D
Request Instrument Type	Q, 5, 1, 3	D
Request Instrument Number	Q, 5, 1, 4	D
Request Result Qualifier	Q, 5, 1, 5	D
Request Time Qualifier	Q, 6, 1, 1	D
Starting Date/Time	Q, 7, 1, 1	D
Ending Date/Time	Q, 8, 1, 1	D
Request Information Status Code	Q, 13, 1, 1	U/D

Terminator Record Field Name	ASTM Pos.	Direction
Termination Code	L, 3, 1, 1	U/D

8.2. Field Descriptions

This section provides detailed information for each field listed in the previous section.

8.2.1. Header Fields

The header records that start each logical message are the same from all BD instruments. An example record is provided below. For examples of Header records used in the context of a message, please refer to Appendix A of this document.

H|\^&| | |Becton Dickinson| | | | | | |V1.00|19981019184200

Delimiter Fields (H, 2, 1, 1) – These single characters can be used to process the remainder of the message. These characters denote the field, repeat, component and escape delimiters as described in the ASTM E_1394 specification. These fields are defaulted to "|", "\", "^", and "&" respectively, as shown above.

Sender Name (H, 5, 1, 1) – Messages coming from a Becton Dickinson instrument have the BD identifier in this field as shown above.

Version Number (H, 13, 1, 1) – This version number represents the version of the BD LIS interface used for communications.

Message Date/Time (H, 14, 1, 1) – BD includes the current time and date when constructing his message, formatted as described in the ASTM E_1394 specification in section 6.6.2.

8.2.2. Patient Fields

A full patient record is shown below. The fields used in this example are referred to in the field explanations. For examples of Patient records used in the context of a message, please refer to Appendix A of this document.

P|1| |PatId123| |Doe^John^R^Jr.^Dr.| |19651029|M| |2 Main St.^Baltimore^ MD^21211^USA| |(410) 316 - 4000|JSMITH| | | | |PNEU|P\AM\AMX| | | |19981015120000| |324| | | | | |ER|St. Josephs Hospital

Patient ID (P, 4, 1, 1) - Identifier that uniquely identifies a patient**. This is a required field for patient demographic downloads**. This field can be up to 16 characters long. (e.g. PatId123)

Patient Name (P, 6, 1, 1-5) – Patient name is divided into 5 components in the ASTM E_1394 specification. The BD EpiCenter stores these fields as a single string in its database. Therefore the BD LIS Interface concatenates these fields from a download message. The patient name can be up to 40 characters long. If these fields are selected for upload on the EpiCenter the whole name is placed in the first component of this field (P, 6, 1, 1). Patient name shown in the sample record is Dr. John R Doe Jr.

Date of Birth (P, 8, 1, 1) – Patient date of birth formatted as described in ASTM E_1394 section 6.6.2. The date shown in the sample record is Oct. 29, 1965.

Patient Sex (P, 9, 1, 1) – There are 3 predefined values accepted for this field in the BD EpiCenter database, Male, Female, and Unspecified. If the value does not match the code for either Male or Female then the sex is set to Unspecified. (This is an LIS coded field for the EpiCenter).

Patient Address (P, 11, 1, 1-5) – The ASTM E_1394 specification suggests that the address field be divided into 5 separate components. The EpiCenter concatenates all 5 address fields into one before saving it in the database. The patient address can be up to 255 characters long. If this field is selected for upload on the EpiCenter, the whole address is placed in the first component of this field (P, 11, 1, 1).

Patient Phone Number (P, 13, 1, 1) – This field is defined as a free text field that can be up to 25 characters long.

Admitting Physician (P, 14, 1, 1) – The physician admitting the patient into the hospital. In the example above "JSMITH" could be used as an LIS defined abbreviation for Dr. Jane T. Smith, who may work in the hospital. (This is an LIS coded field for the EpiCenter).

Patient Diagnosis (P, 19, 1, 1) – The diagnosis assigned to the patient for the current visit. In the example above "PNEU" could be used as an LIS defined abbreviation for Pneumonia. (This is an LIS coded field for the EpiCenter).

Patient Therapy (P, 20, 1-5, 1) – This field contains up to 5 antibiotics that the patient may be receiving at the time the specimen is being processed. A repeat delimiter as per ASTM E_1394 specifications separates each antibiotic. The above example indicates that the patient is currently receiving Penicillin (P), Ampicillin (AM), and Amoxicillin (AMX). (This is an LIS coded field for the EpiCenter).

Admission Date/Time (P, 24, 1, 1) – This is the time and date that the patient was admitted to the hospital. This field is formatted as specified in the ASTM E_1394

specification, in section 6.6.2. The time portion of this field is assumed to be local time. The optional time zone is deemed unnecessary and is not evaluated.

Room Number (P, 26, 1, 1) – This is a text field containing the patient's room number and can be up to 10 characters long.

Hospital Service (P, 33, 1, 1) – The ward or hospital service involved in caring for this patient. (This is an LIS coded field for the EpiCenter). (e.g. ER may represent the Emergency Room).

Hospital Client (P, 34, 1, 1) – This field is used by reference laboratories that accept specimens from client hospitals. (This is an LIS coded field for the EpiCenter).

User Defined Patient Fields 1-3 (P, 15, 1-3, 1) – In the EpiCenter, the user has the ability to configure the values for 3 coded lists related to patient fields. These fields are mapped to unused fields in the patient record by default. The user may fill these fields and remap them to a field agreed upon by the local LIS. (These are LIS coded fields for the EpiCenter).

User Defined Patient Fields 4-5 (P, 15, 4-5, 1) – In the EpiCenter, the user has 2 free text fields that can hold any alpha-numeric information. These fields are mapped to unused fields in the patient record by default. The user may fill these fields and remap them to a field agreed upon by the local LIS.

8.2.3. Order Fields

A full order record is shown below to provide examples for the content of each field. For examples of Order records used in the context of a message, please refer to Appendix A of this document.

O|1|Acc123^1^MYCBTUB | | ^ ^ ^ MGIT_960_GND ^Seq123| | |19981019023300| | |SJB^MMF|A| | |19981019045200 |Blood^Arm|MJones|(410) 555 – 1234^(410) 555 – 9876^(410) 555 – 7777| | | | |19981020053400|62| |O| | |Nos

Accession Number (O, 3, 1, 1) – The unique alphanumeric string that identifies a specimen. This field can be up to 20 characters long. (e.g. Acc123) This is a required field for processing specimen and test information.

Isolate Number (O, 3, 1, 2) – The number associated with an isolate that the test should be performed on.. This field should only be used when ordering isolate based tests, otherwise this field should be left blank. Isolate numbers can range from 1 to 20.

Organism (O, 3, 1, 3) – The organism assigned to a particular isolate. The organism code shown in the example above, MYCBTUB, is the code for Mycobacterium tuberculosis. (This is an LIS coded field for the EpiCenter).

> If an organism is indicated when ordering a BD Phoenix 100 ID/AST combo panel, then the ID portion of the panel will automatically be disabled. As a result, only the AST portion of the panel will report results.

Exclude Isolate from Statistics (O, 3, 1, 4) – This field will explicitly indicate if this isolate should be included or excluded from statistic reporting. If this field contains an "I", then the isolate will be included in statistical reporting. If this field contains an "E",

then the isolate will be excluded from statistical reporting. If this field is left empty, then the EpiCenter will use its internal logic to make this decision.

Test Id (O, 5, 1, 4) – The unique code used to represent a particular test. This is an LIS coded field for the EpiCenter. For BD instrumented tests, the test ID is the pre-defined test name provided in appendix B. (e.g. MGIT_960_GND)

> **For isolate level results coming from the EpiCenter, this field will contain the string "ISOLATE_RESULTS".**

Test/Consumable Sequence Number (O, 5, 1, 5) – The value that identifies a test ordered. For tests originating from an instrument, this field is set with the consumable id value. For manual tests ordered at the EpiCenter, this field contains any test id entered by the user at test order time. In downloads from the LIS, this field is used to distinguish between multiple tests (of the same type) ordered against a specimen. If this field is blank, the EpiCenter assumes that this is an LIS Test Order and creates a blank test in the EpiCenter database. These orders will be automatically associated with matching tests in the EpiCenter database as they are detected. These orders can also be manually associated with orphan tests by the EpiCenter user**.**

This value can be up to 17 characters long.

Priority (O, 6, 1, 1) – This field is defined in the ASTM E_1394 specification. Currently only the values 'A' for Critical, 'R' for Normal and blank for default normal or no change are supported.

Collection Date/Time (O, 8, 1, 1) – Date and time that the specimen was collected from the patient, formatted as described in ASTM E_1394 section 6.6.2. The date/time shown in the sample record is 2:33 am on Oct. 19, 1998.

Collected By (O, 11, 1, 1) – The hospital personnel that collected the specimen from the patient. The example above shows that the specimen was collected by SJB which could be the initials for Sarah J Baker. (This is an LIS coded field for the EpiCenter).

Received By (O, 11, 1, 2) – The lab technician that received the specimen. The example above shows that the specimen was received by MMF, which could be the initials for Mike M Ferris. (This is an LIS coded field for the EpiCenter).

Specimen Action Code (O, 12, 1, 1) – This field is defined in the ASTM E_1394 specification. Currently only the value Q is supported, for QC tests. Normal tests leave this field blank.

Isolate Source Test (1-3) (O, 14, 1-3, 1) – The isolate source test is the specimen level test that produced the isolate. Often growth and detection tests are sub-cultured to produce several isolates. This field will contain test ids for up to 3 tests that yielded an isolate. This field only applies to Order records containing isolate information.

Isolate Source Test Start Time (1-3) (O, 14, 1-3, 2) – This is the start date and time of the isolate source test described above. It is possible that two of the same test type will be run on a specimen. This field is used to uniquely identify the isolate source test. This field only applies to Order records containing isolate information. This field is formatted as described in ASTM E_1394 section 6.6.2.

Receipt Date/Time (O, 15, 1, 1) – Date and time that the specimen was received into the lab, formatted as described in ASTM E_1394 section 6.6.2. The date/time shown in the sample record is 2:33 am on Oct. 19, 1998.

Specimen Type (O, 16, 1, 1) – The type of specimen collected from the patient. (This is an LIS coded field for the EpiCenter). (e.g. Blood)

Body Site (O, 16, 1, 2) – The body area that the specimen was taken from. (This is an LIS coded field for the EpiCenter). (e.g. Arm)

Ordering Physician (O, 17, 1, 1) – The physician that ordered this test. (This is an LIS coded field for the EpiCenter). (e.g. MJones could represent Mark Jones).

Ordering Physician Phone Numbers (O, 18, 1, 1-3) – The phone numbers that can be used to reach the ordering physician. Three numbers are accepted in this field, phone number, fax number and pager number. A component delimiter separates each phone number. These fields are free text fields that can be up to 25 characters in length.

User Defined Specimen Fields 1-3 (O, 19, 1-3, 1) – In the EpiCenter, the user has the ability to configure the values for 3 coded lists related to specimen fields. These fields are mapped to unused fields in the patient record by default. The user may fill these fields and remap them to a field agreed upon by the local LIS. (This is an LIS coded field for the EpiCenter).

User Defined Specimen Fields 4-5 (O, 19, 4-5, 1) – In the EpiCenter, the user has 2 free text fields that can hold any alphanumeric information. These fields are mapped to unused fields in the order record by default. The user may fill these fields and remap them to a field agreed upon by the local LIS.

Finalized Date/Time (O, 23, 1, 1) – The ASTM specification describes this field as containing the time the results were last modified. The EpiCenter places this information in the result record to be evaluated for each result. This field contains the date/time, formatted as described in ASTM E_1394 section 6.6.2, that the results for this test were finalized.. This field is blank if the test results are not yet finalized. The time shown in the example record is 5:34 am on Oct 20, 1998.

For isolate level results, this field contains the date/time the specimen was finalized.

Specimen Reimbursement Value (O, 24, 1, 1) – The value used for insurance reimbursement based on the specimen type. This number can be between 0 and 10,000. The value of 62 is used in the example record above.

Test Reimbursement Value (O, 24, 2, 1) – The value used for insurance reimbursement based on this test type. This number can be between 0 and 10,000. The example record above does not have a test reimbursement value.

Report Type (O, 26, 1, 1) – This field is defined in the ASTM E_1394 specification. When a cancelled order is sent back to the LIS the report type is 'X'.

Isolate Classification/Nosocomial (O, 29, 1, 1) – This field contains the EpiCenter LIS code for the isolate classification. The EpiCenter has a pre-defined list of classifications for an isolate. The complete list is as follows (Significant/Nosocomial, Significant/Community Acquired, Significant/Unknown, Contaminate, Not Determined). If a downloaded code is not recognized, then the Isolate Classification is set as Significant/Unknown.

8.2.4. Result Fields

The EpiCenter uploads results from several different types of tests. This causes several different types of result records to be passed to the LIS. The information contained in the generic "Data Fields" depends on the type of result being reported. AST Result records contain antibiotic and susceptibility information. ID Result records contain organism and Resistance Marker information. Growth and Detection result records contain a Positive or Negative status. Below are several different examples of result records, each one passing up a different type of result.

For AST sets, several result records may be sent to the LIS in a single message. Each result record would report the results for a single drug in the AST set. For ID/AST combo tests, an ID result record is sent as the first result record, and the AST result records follow. An example AST set result message is shown in the Appendix A of this document.

Isolate results are also exchanged using these records. Isolate results are exchanged using the same format as an ID/AST combo tests with an ID record first, then followed by several AST result records. **Since isolate results are not associated with a particular test, the test code field in the Order record is replaced with the literal string "ISOLATE_RESULT".**

For examples of Results records used in the context of a message, please refer to Appendix A of this document.

BACTEC MGIT 960 growth and detection test level result example

R|1| ^ ^ ^GND_MGIT^430100001234|INST_POSITIVE ^87| | | |P| | |19981019153400|19981020145000| MGIT960^^42^3^B/A12

BACTEC MGIT 960 AST test level result example:R|1| ^ ^ ^AST_MGIT^439400005678^P^0.5^ug/ml| INST_COMPLETE^105^^S| | | |P| | |19981019153400| 19981020145000|MGIT960^^42^3^ B/A12

Phoenix AST MIC test level result example:

R|1| ^ ^ ^AST_MIC^429530000002^P| INST_COMPLETE^0.5^^S| | | | F| | |19981019153400| 19981020145000

Diameter based AST test level result example:R|1|^^^AST_DIA^Seq123^P^0.5|COMPLETE^15 ^^S| | | |F| | |19981019153400| 19981020145000

Identification test level result example:

R|1| ^ ^ ^ID^Seq123|Complete^MYCBTUB^45678^RM_VRE| | | | |F| | |19981019153400|19981020145000

For all other tests:

R|1| ^ ^ ^OTHER^Seq123|Complete| | | |F| | |19981019153400|19981020145000| |Many^GPOS_Bac\Few^GNEG_Rods

Isolate level result example:

R|1| ^^^AST^^P^100.0^ug/mL| ^^R^R^^MGIT_960_AST92| | | |F

"Universal Test ID" ASTM E_1394 Result field 3

Result ID Code (R, 3, 1, 4) – This is a BD defined code that indicates the type of information being exchanged in the result record. The interpretation of several fields may vary depending on which type of result is being passed. The possible values for this field include the following.

GND – indicates results for a generic growth and detection test.

GND_MGIT – indicates results for a BACTEC MGIT 960growth and detection test.

GND_PROBETEC – indicates results for a BDProbeTec ET test.

AST – indicates results for a generic AST test not included in the other AST categories.

AST_MGIT – indicates results for a BACTEC MGIT 960 Antibiotic Susceptibility Test.

AST_MIC – indicatesresults for an MIC based Antibiotic Susceptibility Test.

AST_DIA – indicates results for a diameter based Antibiotic Susceptibility Test. (e.g. Kirby Bauer tests).

ID – indicates identification results.

OTHER – indicates test results not included in the above categories.

Test/Consumable Sequence Number (R, 3, 1, 5) – The value that identifies the media/consumable used for generating these results. This field may be blank for manual test results where a sequence number is not known. This value can be up to 17 characters long. The example records above show the results being reported for sequence number "Seq123".

A test/consumable sequence number is required for all instrumented test results downloaded to the EpiCenter. For manual or supplemental test results downloaded to the EpiCenter this field is optional. If no sequence number is included with the results the EpiCenter searches on the current access number for any test matching the test code provided in the order record. If a match is found, the EpiCenter updates the results for that test. If no test match is found, then the EpiCenter orders a new test. **Be aware that unwanted consequences could occur if more than one of a particular test type are ordered for an access number and test sequence numbers are not used.**

Antibiotic (R, 3, 1, 6) (*AST Results*) – The antibiotic tested in this AST test. The antibiotic code shown in the above AST examples is "P" for Penicillin. (This is an LIS coded field for the EpiCenter).

Concentration (R, 3, 1, 7) (*AST Results*) – Several AST tests, such as Kirby Bauer tests, are done with antibiotics at a specific concentration. For these tests the antibiotic concentration is needed to define the test that results are being provided for. When no concentration units are provided it is assumed to be in ug/ml. This field can be up to 15 characters long. The antibiotic concentration shown in the AST (MGIT960) example above is "0.5".

Concentration Units (R, 3, 1, 8) (*AST Results*) – The BACTEC MGIT 960 results include the concentration units of the concentration provided in the previous field. This field can be up 15 characters long. The concentration units shown in the AST example above is "ug/ml" for micrograms per milliliter. This is also assumed to be the default if no other value is provided.

"Data or Measurement Values" ASTM E_1394 Result field 4

The contents of the Result Data fields vary depending on the type of test result being reported, as described below.

Test Status (R, 4, 1, 1) – The status value for a particular test. This field is filled for all test results. This is an LIS coded field for the EpiCenter. For BD instrumented tests, the status code is one of the pre-defined values listed in Appendix B of this document. The GND example record shown above has a test status value of INST_POSITIVE.

Result Data Field 1

Growth Units (R, 4, 1, 2) (*BACTEC MGIT 960 Results Only*) – See Appendix E for instrument specific information. The Positive GND tube listed above indicates 87 growth units. The AST example record shows a growth value of 105. This field is never more than 5 characters long.

ProbeTecET Algorithmic Result (R, 4, 1, 2) (*BDProbeTec ET/Viper SP Result Only*) – See Appendix E for instrument specific information. (future)

Minimum Inhibitory Concentration (R, 4, 1, 2) (*MIC based AST Result*) – For AST tests that produce MIC values, this field contains the minimum antibiotic concentration that inhibits growth of the tested organism. The example above for an MIC based AST test contains an MIC value of "0.5". This field can be up to 20 characters long and is assumed to contain a number in ug/ml.

This field may contain signed MIC values such as "<=4" or ">8", MIC values for compound antimicrobials such as "0.5/4"or "<=0.5/16" as well as the following:

"?" - Ongoing

"C" - Antimicrobial is Rapid Completed ***(For nonQC tests in EpiCenter V4 and later)***

"X" - Error

Diameter (R, 4, 1, 2) (*Diameter based AST Results*) – For Kirby Bauer type tests, this field contains the diameter of the inhibited growth region caused by the antibiotic. The diameter based AST example above shows a diameter value of 15. This number is assumed to be in millimeters.

Organism (R, 4, 1, 2) (*ID Results Only*) – The organism assigned to a particular isolate. The organism code shown in the example above, MYCBTUB, is the code for Mycobacterium tuberculosis. (This is an LIS coded field for the EpiCenter).

Result Data Field 2

AST Susceptibility, Final (R, 4, 1, 3) (*Isolate AST results only*) – This is a code that indicates is the organism is susceptible to the antibiotic specified in this record. The acceptable values for this field are **S**, **I**, **R, N**, and **X**, representing susceptible, intermediate, resistant, not-susceptible and error respectively. This field is only uploaded by the EpiCenter as part of an isolate level result (see earlier section). The isolate AST example record shows that the user decided to override the expert system results and say that the organism was susceptible to the antibiotic, indicated by "S" in the Final field.

Profile Number (R, 4, 1, 3) (*ID results and Isolate ID results*) – This is a text field that holds the profile number associated with an ID test. This value can be up to 16 characters long. The ID result record example above indicates a profile number of 45678.

Result Data Field 3

AST Susceptibility, Interpreted (R, 4, 1, 4) (*All AST results*) – This is a code that indicates is the organism is susceptible to the antibiotic specified in this record. The acceptable values for this field are **S**, **I**, **R, N**, and **X**, representing susceptible, intermediate, resistant, not-susceptible and error respectively. This field contains the AST interpretation from the instrument or user before being processed by the Expert System. The isolate AST example record shows that the organism has intermediate susceptibility to the specified antibiotic, indicated by "I".

Resistance Marker 1 (R, 4, 1, 4) (*Isolate ID results*) – This represents a Resistance Marker associated with the organism identified in the ID result record. The EpiCenter generates this data as part of the expert system and are only included for Isolate uploads. The first Resistance Marker in the ID example above is RM_VRE, which may be an LIS code used for Vancomycin resistant Enterococci. (This is an LIS coded field for the EpiCenter).

Result Data Field 4

AST Susceptibility, Expert (R, 4, 1, 5) (*Isolate AST results only*) – This is a code that indicates if the organism is susceptible to the antibiotic specified in this record. The acceptable values for this field are **S**, **I**, **R, N**, and **X**, representing susceptible, intermediate, resistant, not-susceptible and error respectively. This field is only uploaded by the EpiCenter as part of an isolate level result (see earlier section). The BD Phoenix instrument and the EpiCenter have an expert system that can produce a secondary evaluation of susceptibility. The isolate AST example record shows that the expert system decided that the organism is resistant to the specified antibiotic, indicated by "R".

Resistance Marker 2 (R, 4, 1, 5) (*Isolate ID results*) – This represents a Resistance Marker associated with the organism identified in the ID result record. The EpiCenter generates this data as part of the expert system and are only included for Isolate uploads. The example record above contains only one Resistance Marker. (This is an LIS coded field for the EpiCenter).

Result Data Field 5

AST Source Test (R, 4, 1, 6) (*Isolate AST results*) – This represents the Test Id for the source test that included this AST result. This is included because Isolate results may be compiled from several different AST tests. The example Isolate upload record above contains the Test Id of MGIT_960_AST. (This is an LIS coded field for the EpiCenter).

It is possible that there can be results on the isolate upload that have been inferred by the EpiCenter BDXpert system and are not associated with a test. When this condition occurs, EpiCenter uploads a "blank", or an empty field in the AST Source Test field(R, 4, 1, 6) as well as the MIC field(R, 4, 1, 2).

Results example with AST Source Test:

R|2|^^^AST^^CTX|^<=1^S^S^^**NMICID4** | | | | |F

Inferred results example without AST Source Test:

R|3|^^^AST^^CZ|^^R^^R| | | | |F

Resistance Marker 3 (R, 4, 1, 6) (*Isolate ID results*) – This represents a Resistance Marker associated with the organism identified in the ID result record. The EpiCenter generates this data as part of the expert system and are only included for Isolate uploads.

The example record above contains only one Resistance Marker. (This is an LIS coded field for the EpiCenter).

Result Data Field 6

Resistance Marker 4 (R, 4, 1, 7) (*Isolate ID results*) – This represents a Resistance Marker associated with the organism identified in the ID result record. The EpiCenter generates this data as part of the expert system and are only included for Isolate uploads. The example record above contains only one Resistance Marker. (This is an LIS coded field for the EpiCenter).

Result Data Field 7

Resistance Marker 5 (R, 4, 1, 8) (*Isolate ID results*) – This represents a Resistance Marker associated with the organism identified in the ID result record. The EpiCenter generates this data as part of the expert system and are only included for Isolate uploads. The example record above contains only one Resistance Marker. (This is an LIS coded field for the EpiCenter).

Preliminary/Final Status (R, 9, 1, 1) – This field contains either a "P" or an "F" as defined in the ASTM E_1394 specification. The result status shown in the examples above are final. ***For isolate level results, this indicates the status of the isolate.***

Start Date/Time (R, 12, 1, 1) – This is the date and time that the test was first started or entered into an instrument. This field is formatted as described in the ASTM E_1394 specification in section 6.6.2. The test start time shown above is 3:34 pm on Oct 19, 1998. **This field has special significance for BACTEC MGIT 960 AST tests. Please read the instrument specific section for more details.**

Result/Status Date/Time (R, 13, 1, 1) – This is the date and time that the test received the status being reported in this record. This is a required field and is used to identify when results downloaded from the LIS are more recent than those contained in the EpiCenter. This field is formatted as described in the ASTM E_1394 specification in section 6.6.2. The test status time shown above is 2:50 p.m. on Oct 20, 1998.

Test Complete Date/Time (R, 13, 2, 1) – This is the date and time that an instrumented test finished its results. This is different than the Result Date/Time in that this time will not change if the user assigns a new status to a test. For a growth and detection result record, this field will hold the Positivity Date/Time. For an ID result record, this field will hold the time that the Id portion of a BD Phoenix 100 panel completed. For an AST result from a BD Phoenix 100 panel, this field will hold the time that a valid MIC was produced. This field is formatted as described in the ASTM E_1394 specification in section 6.6.2.

Instrument Type (R, 14, 1, 1) *(Instrumented Results Only)* – This field indicates which BD instrument produced the result. This field is filled with one of several BD defined values listed below. The examples above indicate that it came from a BACTEC MGIT 960 instrument.

"BT9000" – BACTEC 9000 series instrument

"MGIT960" – BACTEC MGIT 960 instrument

"PHOENIX" – BD ID/AST instrument

"PROBETEC" – BDProbeTec ET instrument

Media Type (R, 14, 1, 2) ***(Instrumented Results Only)*** – This field indicates the type of media or consumable used to perform this test. See Appendix E for instrument specific information.

Protocol Length (R, 14, 1, 3) ***(Instrumented Results Only)*** – this field indicates the length of time (in hours or days) required to complete the test. For growth and detection tests, this number represents the number of days before a tube can be considered negative. In the example above, the standard protocol for BACTEC MGIT 960 GND tests is 42 days.

Instrument Number (R, 14, 1, 4) ***(Instrumented Results Only)*** – This is the user number assigned to the instrument that ran the test. This value can be between 1 and 99.

Instrument Location (R, 14, 1, 5) ***(Instrumented Results Only)*** – This value indicates the position inside of the instrument where the test was performed. For BACTEC MGIT 960 tests this value indicates a drawer number, row number and well number. In the GND example above, the location B/A12 indicates that the test was performed in drawer B, row A well number 12.

BDProbeTec ET QC Type (R, 14, 1, 6) ***(BDProbeTec ET Result Only)*** – See Appendix E for instrument specific information.

BDProbeTec ET QC Kit Lot Number (R, 14, 1, 7) ***(BDProbeTec ET Result Only)*** – See Appendix E for instrument specific information.

Additional Results Quantity 1-5 (R, 15, 1-5, 1) ***(EpiCenter Additional Results Only)*** – This field contains a text value that associates a quantity to the additional result reported in the next ASTM component field. The quantities Many and Few are used in the example record for other tests. See the Additional Results field description for more detail. (This is an LIS coded field for the EpiCenter).

Additional Results (R, 15, 1-5, 2) ***(EpiCenter Additional Results Only)*** – There are several tests that can be assigned multiple results at one time. An example of such a test is a Gram Stain test, which can be assigned results such as “Gram Negative Rod Seen” AND “Gram Positive Bacillus Seen”. These results differ from GnD test results of simply Positive or Negative. The EpiCenter maintains a user configurable list of additional test results that can apply to a test. Each additional result can also be associated with a quantity value, which precedes the additional result in the record. In the example above for Other tests, the additional results and quantities reported are Many GP_BAC and Few GN_RODS. (These are LIS coded fields for the EpiCenter).

8.2.5. Comment Fields

The EpiCenter accepts and sends comment strings for patients, specimen, and isolates. Patient comments are exchanged in a comment record following a patient record, and include the patient type identifier. Specimen and isolate comments are exchanged in a comment record following the order record, and include either the specimen or isolate type identifier. An order record with both a specimen and isolate comment is shown below.

If multiple comment records are received for a patient, specimen, or isolate, then all comments of the same type are appended together and saved in the EpiCenter.

The EpiCenter can upload the description for chartable rules. This is the descriptive text for expert system rules that have been run against an isolate. The user has the ability to configure individual rules as reportable on a patient’s chart report. If a rule is configured to be chartable, the rule description will be included in an upload Comment record. These comment records will follow after an Order record. Since the EpiCenter expert

system rules only apply to isolates, these types of comments will only be part of Isolate Uploads as described in section 5.2.

The following is an example of a comment record containing a rule where <310> is the rule number and (AMX, ATM, CAZ) is a list of the affected antimicrobials.

C|1| |<310> BDXpert Rule 310 text.(AMX, ATM, CAZ)|E

Special Messages are messages that indicate a special condition for a BD Phoenix 100 panel. These will be uploaded in a Comment record as part of the test results for the panel. The following is an example of a comment record containing a special message with a list of the affected antimicrobials.

C|1| | Special message text.(AM, CAZ)|T

Comment records not appearing after the Patient or Order records are ignored. Comments not containing the appropriate type indicator are ignored.

O|1|Acc123^1^MYCBTUB|

C|1| |This is a specimen comment |S

C|2| |This is an isolate comment |I

Comment Text (C, 4, 1, 1) – The text to be used for the patient, specimen or isolate comment. This field can be up to 1600 characters long.

Comment Type (C, 5, 1, 1) – The type of comment record. This field should be a **P, S, I, E, or T** for patient, specimen, isolate, chartables rule, or special message comments respectively.

8.2.6. Request Fields

The ASTM E_1394 defines a Request record with several fields for qualifying the requested data. Data requests can be made by specifying ranges of patient IDs, accession numbers, or sequence numbers. Data requests can also be qualified by date/time ranges.

All of these fields are supported by the BD EpiCenter interface for requests originating FROM the LIS.The field mapping table on the previous pages correctly indicates the support query fields. Examples can also be found in the Sample Messages section of this document.

Q|1|^Acc123||MGIT_960_GND^INST_POSITIVE^MGIT_960^2|R|19981019120000|19981020120000

The sample record shown above is evaluated to request the result information for positive MGIT_960_GND tests, on instrument 2, for the specimen with an accession number of Acc123 between the dates specified. Note that all query criteria are ANDed together, so that only records that meet ALL criteria will be uploaded in response to a query from the LIS.

The EpiCenter only requests information from the LIS on a per specimen basis. The request records generated by the EpiCenter contains only the accession number as a qualifying field as shown below. The EpiCenter request should be interpreted as requesting both patient demographics and all ordered tests for that specimen.

Q|1|^Acc123| | |R

Starting Patient ID (Q, 3, 1, 1) – A patient ID value. This field should be filled if the data request is for either a single patient or for a range of patients. If patient ID is not to be used as a search criteria for requested data, then this field can be left blank. This field can be up to 16 characters long. In the example above, a range of patients is specified, beginning with patient ID "Pat123".

Starting Access Number (Q, 3, 1, 2) – A specimen ID value. This field should be filled if the data request is for either a single specimen or for a range of specimen. If accession number is not to be used as a search criterion for requested data, then this field can be left blank. This field can be up to 20 characters long. In the example above, a range of specimen is specified, beginning with Accession number "Acc123".

Starting Sequence Number (Q, 3, 1, 3) – A consumable ID value. This field should be filled if the data request is for either a single test or for a range of tests. If sequence number is not to be used as a search criterion for requested data, then this field can be left blank. This field can be up to 17 characters long. In the example above, no specific sequence numbers are requested.

Ending Patient ID (Q, 4, 1, 1) – The patient ID that ends the alphanumeric range of ID values requested. If only data for a single patient ID is requested, then this field can be left blank. This field can be up to 16 characters long. This field contains "Pat456" in the example shown above.

Ending Accession Number (Q, 4, 1, 2) – The specimen ID that ends the alphanumeric range of ID values requested. If only data for a single accession number is requested, then this field can be left blank. This field can be up to 20 characters long. This field contains "Acc456" in the example shown above.

Ending Sequence Number (Q, 4, 1, 3) – The consumable ID that ends the alphanumeric range of ID values requested. If only data for a single test is requested, then this field can be left blank. This field can be up to 17 characters long. In the example above, no specific sequence numbers are requested.

Test ID (Q, 5, 1, 1) – This is the code used to represent a particular test, and is used to request the results for this test type. This is an LIS coded field for the EpiCenter. For BD instrumented tests, the test id is the pre-defined test name listed in appendix B.

Test Status (Q, 5, 1, 2) – The status for a particular test. This field is only evaluated if the Test ID field contains valid data. This is an LIS coded field for the EpiCenter. For BD instrumented tests the status value is one of the pre-defined values listed in Appendix B. The example record requests result information for XXX tests with a status of INST_POSITIVE.

Instrument Type (Q, 5, 1, 3) – This field indicates the type of instrumented test requested by the LIS. The EpiCenter may be connected to several instruments of different types. This field allows the LIS to request all tests run in a particular instrument type. The appropriate values for this field are listed for the Instrument Type in the result record (R, 14, 1, 1). If the value MGIT960 is used in this field, all MGIT_960_GND and all MGIT_960_AST tests are returned.

Instrument Number (Q, 5, 1, 4) – This field allows the LIS to request results for a particular instrument number. This field is only evaluated if the instrument type field is also set.

Result Qualifier (Q, 5, 1, 5) – This field allows the LIS to request results that have been modified since the last request. The only acceptable value for this field is MOD, to indicate modified results. If this field is left blank, all results that meet the remaining criteria are included. The BD EpiCenter will not accept other criteria in a query containing the MOD result qualifier.

Time Qualifier (Q, 6, 1, 1) – The use of this field is described in the ASTM E_1394 specification. The following date time fields can refer to test order times (**S**) or result times (**R**). In the example record times refer to result dates.

> **EpiCenter NOTE**: If no Time Qualifier is specified, the Starting and Ending Times will, by default, refer to Result times.

Starting Date/Time (Q, 7, 1, 1) – The starting date/time (inclusive) of the data requested. This field is formatted as specified in ASTM E_1394 specifications section 6.6.2. The date/time requested in example above is 12 pm on Oct 19, 1998.

> **EpiCenter NOTE**: If a Starting Date/Time is specified and no Ending Date/Time is specified, data will be delivered whose Collection or Result Time is **since** the specified Starting Date/Time.
>
> **EpiCenter NOTE**: If a Starting Date/Time specifies only the Date portion, the time will default to midnight 00:00:00.

Ending Date/Time (Q, 8, 1, 1) – The ending date/time (inclusive) of the data requested. This field is formatted as specified in ASTM E_1394 specifications section 6.6.2. The date/time requested in example above is 12 pm on Oct 20, 1998.

> **EpiCenter NOTE**: If an Ending Date/Time specifies only the Date portion, the time will default to 23:59:59.

Request Information Status Code (Q, 13, 1, 1) – This field cancels an outstanding query. The only acceptable value for this field is 'A'. The EpiCenter will ignore any other Request criteria fields when they appear in the same query record as a Query Cancel command.

If the string 'ALL" appears in any Request Field, and no other Criteria are present, the EpiCenter will attempt to upload all test data in its database to the LIS.

If the string 'ALL" appears in any Request Field, and any other Criteria are present, the EpiCenter will ignore it because an empty criteria field is an implied 'ALL'.

8.2.7. Terminator Fields

Below is an example terminator record.

L|1|N

Termination Code (L, 3, 1, 1) – The termination code provides an explanation of the end of session as described in the ASTM E_1394 specification. The EpiCenter supporta codes of N, Q, F and I in request responses downloaded from the LIS, as described in the ASTM specifications. However the EpiCenter and all of the BD instruments upload either N, Q or F. All other codes are ignored and treated as a normal message. Normal result uploads are indicated with N and request response uploads are indicated by F. Requests that contain an error are replied to with an empty message containing the code 'Q' in the terminator record. Requests that have no data satisfying the request, are responded to with a message containing only a Header and Terminator record.

The BD interface sends the results for a single test in a message. However there may be several tests that satisfy a data request downloaded by the LIS. In this instance, the BD interface uploads all tests but the last as single tests in separate messages marked as normal uploads (N). Only the last test that satisfies the request is marked as query response (F). Once the LIS receives the query response indicator (F), it has received all of the data it requested.

9. Simulator

Becton Dickinson has developed a simulator for testing the physical level LIS interface. This simulator can be configured to emulate either the LIS or instrument in the ASTM E_1381 protocol.

The simulator accepts ASTM E_1394 message strings from a file and transmit them across the serial port interface. The simulator also receives messages across the serial port interface and save the message text into a file. A full description of the simulators specifications can be found in a separate document. Becton Dickinson intends to make the simulator and supporting document available to LIS vendors to help facilitate interface development.

10. Appendix A - Sample EpiCenter Messages

1) BACTEC MGIT 960 GND tube ordered at the LIS for a new patient. Patient and test informartion is downloaded to the EpiCenter.

H|\^&| | | | | | | | | | |19981019184200
P|1| |PatId123| |Doe^John^R^Jr.^Dr.| |19651029|M| |2 Main St.^Baltimore^ MD^21211^USA|
|(410) 316 - 4000|JSMITH| | | | |P\AM\AMX| | | |19981015120000| |324| | | | | |ER|St. Josephs Hospital
O|1|Acc123^ ^ ^Seq123| | ^ ^ ^MGIT_960_GND| | |19981019023300| | |SJB^MMF|A| |
|19981019045200 |Blood^Arm|MJones|(410)555–1234^(410)555–9876^(410)555–7777| | | |19981020053400|62| |O| |Nos
L|1|N

2) The EpiCenter can receive a new accession number from a barcode on an instrumented test. The EpiCenter requests information from the LIS about that specimen.

H|\^&| | |Becton Dickinson| | | | | |V1.00|19981019184200
Q|1|^Acc123| | |R
L|1|N

The LIS should respond to this request with patient demographics and ordered test information. Patient Demographics may not be included if they are not yet known. The terminator record should indicate that this is a message in response to a request.

H|\^&| | | | | | | | | | |19981019184200
P|1| |PatId123
O|1|Acc123| | ^ ^ ^AcidFastSmear
R|1| ^ ^ ^GND|NO_AFB| | | | | | | |19981019153400|19981020145000
O|2|Acc123^1^MYCBTUB| | ^ ^ ^KirbyBauer
R|1| ^ ^ ^AST_DIA^^P^0.5^ug/ml|Complete^10^^I| | | | | | |19981019153400| 19981020145000
R|2| ^ ^ ^AST_DIA^^AM^1.5^ug/ml|Complete^5^^R| | | | | | |19981019153400| 19981020145000
R|3| ^ ^ ^AST_DIA^^AMX^2.0^ug/ml|Complete^20^^S| | | | | | |19981019153400|
19981020145000
L|1|F

3) The EpiCenter can also report new instrument status values to the LIS in an unsolicited upload message.

H|\^&| | |Becton Dickinson| | | | | | | V1.00 |19981019184200
P|1| |PatId123
O|1|Acc123| | ^ ^ ^MGIT_960_GND
R|1| ^ ^ ^GND^Seq456|INST_POSITIVE^87| | | | | |
|19981019153400|19981020145000|43^01^42^3^B/A12
O|2|Acc123| | ^ ^ ^MGIT_960_AST
R|1| ^ ^ ^AST_MGIT^439400001234^P^0.5^ug/ml| INST_COMPLETE^105^^S| | | | | | |
|19981019153400| 19981020145000| MGIT960^^42^3^ B/A13
R|2| ^ ^ ^AST_MGIT^439400001234^AMX^0.5^ug/ml| INST_COMPLETE^142^^I| | | | | | |
|19981019153400| 19981020145000| MGIT960^^42^3^ B/A14
R|3| ^ ^ ^AST_MGIT^439400001234^AM^0.5^ug/ml| INST_COMPLETE^130^^R| | | | | | |
|19981019153400| 19981020145000| MGIT960 ^^42^3^ B/A15
L|1|F

4) The LIS can request result information from the EpiCenter.

H|\^&| | | | | | | | | | |19981019184200
Q|1|^Acc123|^Acc125|MGIT_960_GND^INST_POSITIVE^MGIT_960^2|R
L|1|N

This might be a typical response message from the EpiCenter.

H|\^&| | |Becton Dickinson | | | | | | | V1.00|19981019184200
P|1| |PatId123
O|1|Acc123| | ^ ^ ^MGIT_960_GND
R|1| ^ ^ ^GND_MGIT^430100002222|INST_POSITIVE^87| | | | | |
|19981019153400|19981020145000| MGIT960^^42^3^B/A21
P|2| |PatId456
O|1|Acc124| | ^ ^ ^MGIT_960_GND
R|1| ^ ^ ^GND_MGIT^430100003333|INST_POSITIVE^147| | | | | |
|19981019153400|19981020145000| MGIT960^^42^3^B/A22
P|3| |PatId789
O|1|Acc125| | ^ ^ ^MGIT_960_GND
R|1| ^ ^ ^GND_MGIT^430100005678|INST_POSITIVE^72| | | | | |
|19981019153400|19981020145000| MGIT960^^42^3^B/A23
L|1|F

5) The EpiCenter can be configured to upload isolate level results, which may send the following data.

H|\^&| | |Becton Dickinson| | | | | | |V1.00 |19981019184200
P|1| |PatId123
O|1|Acc123^1| | ^ ^ ^ISOLATE_RESULT
R|1|^^^ID^ENTBCLO
R|2| ^ ^ ^AST^^P^0.5|^^S^S^R|
R|3| ^ ^ ^AST^^AMX^0.5|^^I^I^R|
R|4| ^ ^ ^AST^^AM^0.5^|^^R^R^S|
L|1|F

6) An EpiCenter is configured with mixed instruments, Phoenix, BACTEC, and MGIT 960. All test uploads except BACTEC and MGIT 960 GND tests are disabled. Isolate uploads are configured to upload upon isolate finalization.

H|\^&|||Becton Dickinson|||||||V1.0|20050316152604

P|1||PatXYZ||Mr. Fred A. Stare

O|1|Acc456^2^STACOH||^^^ISOLATE RESULT|||20041104082700|||||||
20041104082750||||||||||||UNK

R|1|^^^ID|^STACOH^00001C71C71C71C7|||||F

R|2|^^^AST^^AM|^^X^^X^GPIDAST 954|||||F

R|3|^^^AST^^AMC|^>16/8^X^R^X^GPIDAST 954|||||F

R|4|^^^AST^^CF|^>0.125^X^R^X^GPIDAST 954|||||F

R|5|^^^AST^^CIP|^<=2^S^S^^GPIDAST 954|||||F

R|6|^^^AST^^CRO|^>1^X^X^^GPIDAST 954|||||F

R|7|^^^AST^^FEP|^<=4^X^S^X^GPIDAST 954|||||F

R|8|^^^AST^^GM|^>32^R^R^^GPIDAST 954|||||F

R|9|^^^AST^^INH^0.10 ug/mL|^^R^R^^MGIT_960_AST94|||||F

R|10|^^^AST^^INH^0.40 ug/mL|^^S^S^^MGIT_960_AST94|||||F

R|11|^^^AST^^IPM|^4^X^S^X^GPIDAST 954|||||F

R|12|^^^AST^^LVX|^^S^^S|||||F

R|13|^^^AST^^MEM|^<=1^X^S^X^GPIDAST 954|||||F

R|14|^^^AST^^OFX|^^S^^S|||||F

R|15|^^^AST^^P|^>1^X^X^^GPIDAST 954|||||F

R|16|^^^AST^^RA^1.0 ug/mL|^^I^I^^MGIT_960_AST94|||||F

R|17|^^^AST^^SXT|^^^^^GPIDAST 954|||||F

R|18|^^^AST^^TE|^^^^^GPIDAST 954|||||F

R|19|^^^AST^^TZP^0.5|^^R^R^^ASTDIA1|||||F

L|1|N

The MGIT 960 G&D test level upload.

H|\^&|||Becton Dickinson|||||||V1.0|20050316152953

P|1||PatXYZ||Mr. Fred A. Stare

O|1| Acc456||^^^MGIT_960_GND^430100065177|R||
20041104082700|||||||20041104082750|||||||20050316152949

R|1|^^^GND_MGIT^430100065177|INST_NEGATIVE^0|||||F|||20041029112243|20041103110237|MGIT960^^5^1^B/C17

L|1|N

The BACTEC G&D test level upload.

H|\^&|||Becton Dickinson|||||||V1.0|20050316153240

P|1||PatXYZ||Mr. Fred A. Stare

O|1| Acc456||^^^PLUSANF^449305384011|R||
20041104082700|||||||20041104082750|||||||20050316153238

R|1|^^^GND^449305384011|Manual Positive|||||F|||
20041106090458|20050316140431\20050316140431|BT9000^93^30^C2^C30
L|1|N

11. Appendix B – Tests and Results

The following appendix lists test names and test status values. If the LIS code for a test name or test status is different than the name, it is in parenthesis next to the name. Instrumented tests and their status values appear in **bold**. At the EpiCenter the non-instrumented tests can be reconfigured by the user. *Note: This list is not intended to be an exhaustive list, for example only some of the Test Names are listed for the Phoenix Gram Negative and Gram Positive panel types.*

Test Type	Test Name (LIS Code)	Test Status (LIS Code)
Growth and Detection Tests	30 degree MGIT 960 G&D Tube (30MGT)	False Positive
		Incomplete
		Negative
		Positive
	Acid Fast Smear (AFS)	Incomplete
		Acid Fast Bacilli Seen (AFB Seen)
		No Acid Fast Bacilli Seen (No AFB Seen)
	ProbeTec ET Assay (BD_PROBETEC_GND)	**Positive (INST_POSITIVE)**
		Negative (INST_NEGATIVE)
		Indeterminate (INST_INDETERMINATE)
		Equivocal (INST_EQUIVOCAL)
		QC Pass (INST_QC_PASS)
		QC Fail (INST_QC_FAIL)
	Colistin (COLIS)	Incomplete Negative Positive
	Gram Stain (GRMSTN)	
	Lowenstein-Jensen Medium (LJ)	
	Myco/F Lytic (MYFLTC)	
	MGIT 960 G&D Tube (MGIT_960_GND)	**Pending (Pending)**
		False Positive (False Positive)
		Manual Negative (Manual Negative)
		Manual Positive (Manual Positive)
		Threshold Positive (Threshold Positive)
		Negative (INST_NEGATIVE)
		Ongoing (INST_ONGOING)
		Removed Ongoing (INST_REMOVED)
		Positive (INST_POSITIVE)
		Complete (INST_COMPLETE)
	Middlebrook 7H11 Medium (7H11)	Contaminate
		Incomplete
		Negative
		Positive
ID Tests	Indirect Acid Fast Smear (INDAFS)	Complete Incomplete
	Indirect Gram Stain (INDGRMSTN)	
	ProbeTec ET MAC (ETMAC)	
	ProbeTec ET Mtb (ETMTB)	
AST – Diameter Tests	Ampicillin Disk (AMDISK)	Complete Incomplete
	Cephalothin Disk (CFDISK)	
	Gentamicin Disk (GMDISK)	
	Penicillin Disk (PDISK)	

Test Type	Test Name (LIS Code)	Test Status LIS Code
AST – MGIT 960	**MGIT 960 AST Carrier Set (MGIT_960_AST)**	**Pending (Pending)** **Manual Complete (Manual Complete)** **AST Error (INST_ERROR)** **Complete (INST_COMPLETE)** **Ongoing (INST_ONGOING)**
AST-MIC Tests	460TB AST (460TB) Ethambutol AST Test (ETHM) Isoniazid AST Test (INH) Pyrazinmide AST Test (PZA) Rifampin AST Test (RIF) Streptomycin AST Test (STREPM)	Complete Incomplete
Phoenix Gram Negative	**NID** **NQC01** **NMIC/ID-1** **NMIC/ID-13** **NMIC/ID-14** **NMIC/ID-15**	**Complete (INST_COMPLETE)** **Rapid Complete (INST_RAPID_COMPLETE)** **Ongoing (INST_ONGOING)** **Partially Complete (INST_PARTIAL_COMPLETE)** **In Attention Complete (INST_ATTN_COMPLETE)** **In Attention Ignored (INST_ATTN_IGNORED)** **Pending (INST_PENDING)** **QC Status see section 14.3.3**
Phoenix Gram Positive	**PID** **PQC01** **PMIC/ID-1** **PMIC/ID-17** **PMIC/ID-18** **PMIC/ID-20**	**Complete (INST_COMPLETE)** **Rapid Complete (INST_RAPID_COMPLETE)** **Ongoing (INST_ONGOING)** **Partially Complete (INST_PARTIAL_COMPLETE)** **In Attention Complete (INST_ATTN_COMPLETE)** **In Attention Ignored (INST_ATTN_IGNORED)** **Pending (INST_PENDING)** **QC Status see section 14.3.3**
BD Sceptor Panels		**Complete (COMPLETE)**
Other Tests	Blood Agar Plate (TSA) Blood Agar Plate Anaerobic (BAPANA) CDC Anaerobe 5% Sheep Blood Agar (CDC) CDC Anaerobe Laked Sheep Blood Agar with KV (KV) Cefinase (CEFINASE) Choc Plate (CHOC) Indole (INDOLE) MacConkey II Agar (MAC)	Complete Incomplete

12. Appendix C – Antibiotic Abbreviations

The following is a list of the antibiotics in the BD database, with the associated LIS Code. On the EpiCenter and BD Phoenix 100, these codes are configurable by the user. However on the MGIT and ProbeTec ET instruments these values are not configurable. Therefore a direct instrument interface sends these values as AST results.

1st gen cephalosporin	CEFG1	Framycetin	SO
1st gen cephalosporins	CEF_G1	Furazolidone	FX
1st gen cephalosporins w/ anti-pseudomona	CEF_H1AP	Fusidic Acid	FA
2nd gen cephalosporin; grp 1	GRP1	Gatifloxacin	GAT
2nd gen cephalosporin; grp 2 (cephamycins	GRP2	Gemifloxacin	GEM
2nd gen cephalosporin; grp 3	GRP3	Gentamicin	GM
2nd gen cephalosporins	CEF_G2	Gentamicin-Syn	GMS
3rd gen cephalosporin w/ aerobic GNR acti	CEF_MAP	Glycopeptides	GLYCPEP
3rd gen cephalosporin w/ anti-pseudomonal	CEF_AP	Grepafloxacin	GRX
3rd gen cephalosporins	CEF_G3	High level aminoglycosides	HLAR
4th gen cephalosporin	CEFG4	Hydrolyzable Penicillins	PEN_GRP
4th gen cephalosporins	CEF_G4	Imidazole	IMIDAZ
6' methoxypenicillin	MO_PEN	Imipenem	IPM
Amdinocillin	AMD	Isepamicin	ISP
amdinopenicillins	AMDINO_PEN	Isoniazid	INH
Amikacin	AN	Josamycin	JM
Aminocyclitols	AMNCYC	Kanamycin	K
Aminoglycosides	AMNGLY	Kanamycin Synergy	KS
aminopenicillins	AM_PEN	Levofloxacin	LVX
aminopenicillins w/ Beta-lact. Inhib.	AM_PEN_BLI	Lincomycin	L
Amoxicillin	AMX	Lincosamides	LINCO
Amoxicillin/Clavulanate	AMC	Linezolid	LZD
Amoxicillin/Clavulanate (f)	AXC	Lividomycin	LV
Ampicillin	AM	Lomefloxacin	LOM
Ampicillin/Sulbactam	SAM	Loracarbef	LOR
Ampicillin/Sulbactam (f)	SXA	Lymecycline	LYM
Antimycobacterial drugs	AMYCOB	Macrolides	MACRO
Apalcillin	APL	Macrolides Lincosam. Streptog	MLS
Apramycin	AP	Mecillinam	MEC
Arbekacin	ARB	Meropenem	MEM
Aspoxicillin	APX	Methacycline	MC
Astromycin	AST	Methicillin	DP
Azithromycin	AZM	Metronidazole	MET
Azlocillin	AZ	Mezlocillin	MZ
Aztreonam	ATM	Mezlocillin/Sulbactam	MZS
Bacitracin	B	Micronomycin	MCR
Benzylpenicillin	BZP	Midecamycin	MID
Beta-lactams	BETA_LAC	Minocycline	MI
Biapenem	BPM	Monobactams	MONOBAC
Capreomycin	CAP	Moxalactam	MOX
Carbacephem	CARBACEF	Moxifloxacin	MXF
Carbenicillin	CB	Mupirocin	MUP
Carbepenems	CARBAPEN	Nafcillin	NF
carboxypenicillins	CO_PEN	Nalidixic Acid	NA
carboxypenicillins w/ Beta-lact. Inhib.	CO_PEN_BLI	Neomycin	N
Carumonam	CAR	Netilmicin	NET
Cefaclor	CEC	Nifuroazide	NFX
Cefadroxil	CFR	Nifurzide	NZD
Cefamandole	MA	Nitrofurantoin	FM
Cefatrizine	FAT	Nitroxoline	NIT
Cefazolin	CZ	Non-hydrolyzable Penicillins	PEN_M
Cefbuperazone	CFB	Norfloxacin	NOR
Cefdinir	CDR	Novobiocin	NB
Cefditoren	CDN	Nystatin	NY
Cefditoren pivoxil	CDNp	Ofloxacin	OFX
Cefepime	FEP	Olandeomycin	OL
Cefepime/Sulbactam	SFP	Ornidazole	ORN
Cefetamet-pivoxil	CAT	Others	OTHER
Cefixime	CFM	Oxacillin	OX
Cefmenoxime	CMX	Oxolinic Acid	OA
Cefmetazole	CMZ	Oxytetracycline	T
Cefminox	CNX	p-Aminosalicylic acid	PAS
Cefodizime	CDZ	Panipenem	PAN
Cefonicid	CID	Paromomycin	PAR
Cefoperazone	CFP	Pefloxacin	PEF
Cefoperazone/Sulbactam	SCP	Penamycin	PENAMYCIN
Ceforanide	CND	Penicillin G	P
Cefotaxime	CTX	Penicillin V	PV

Cefotaxime/Clavulanate	CCX	Penicillin w/ Beta-lact. inh	PEN_BLI
Cefotaxime/Sulbactam	SCT	Penicillins	PENS
Cefotetan	CTT	Penicillins w/ Beta-lact. in	PENS_BLI
Cefotiam	CFT	Phenoxymethylpenicillin	PXM
Cefotiam-hexiteil	CFTh	Pipemidic Acid	PI
Cefoxitin	FOX	Piperacillin	PIP
Cefozopran	CFZ	Piperacillin/Sulbactam	SPI
Cefpimazole	CPZ	Piperacillin/Tazobactam	TZP
Cefpiramide	CPM	Pirlimycin	PRL
Cefpirome	CPO	Piromidic Acid	PIR
Cefpirome/Sulbactam	SCO	Pivampicillim	PAM
Cefpodoxime-proxetil	CPD	Pivmecillinam	PMC
Cefpodoxime/Clavulanate	CCP	Polymyxin B	PB
Cefprozil	CPR	Primary aminoglycosides	PRI_AMN
Cefroxadine	CFX	Primary penicillin	PRI_PEN
Cefsulodin	CFS	Primary quinolones	PRI_QUIN
Ceftazadime/Sulbactam	SCZ	Pristinamycin	PR
Ceftazidime	CAZ	Pyrazinamide	PZA
Ceftazidime/Clavulanate	CCZ	Quinolones	QUIN
Cefteram	CEM	Quinupristin/dalfopristin	SYN
Ceftibuten	CTB	Rifabutin	RBN
Ceftiofur	XNL	Rifampin	RA
Ceftizoxime	ZOX	Rifamycin	RF
Ceftriaxone	CRO	Rifamycins	RIFAMYC
Ceftriaxone/Clavulanate	CCR	Rokitamycin	ROK
Cefuroxime sodium	CXM	Rosoxacin	R
Cefuroxime-axetil	CXMa	Roxithromycin	RXT
Cefuzonam	CZN	Sarafloxacin	SRF
Cephalexin	CN	Sisomycin	SIS
Cephaloridine	CD	Sparfloxacin	SPX
Cephalosporins	CEPHEM	Spectinomycin	SPT
Cephalosporins w/ Beta-lactamase inhib.	CEPHEM_BLI	Spiramycin	SP
Cephalosporins w/ Beta-lactamse inhib.	CEF_BLI	Streptogramins	STREPTO
Cephalothin	CF	Streptomycin	S
Cephapirin	CP	Streptomycin-Syn	STS
Cephradine	CH	Sulbenicillin	SBC
Chloramphenicol	C	Sulfadiazine	SD
Chlortetracycline	A	Sulfamethizole	TH
Cinoxacin	CIN	Sulfamethoxazole	SMZ
Ciprofloxacin	CIP	sulfapenicillin	SU_PEN
Clarithromycin	CLR	Sulfathiazole	ST
Clinafloxacin	CLX	Sulfisoxazole	G
Clindamycin	CC	Systemic fluoroquinilones	SYS_FQUIN
Clofazimine	CLO	Teicoplanin	TEC
Cloxacillin	CX	Telithromycin	TEL
Colistin	CL	Temafloxacin	TMA
Cyclic peptides	CYC_PEP	Temocillin	TEM
Cycloserine	CS	Tetracycline	TE
Daptomycin	DAP	Tetracyclines	TET
Dibekacin	DKB	Thiacetazone	TB1
Dicloxacillin	DX	Thiamphenicol	TP
Difloxacin	DFX	Ticarcillin	TIC
Dihydrofolate reductase inhibitor	DHFR_INH	Ticarcillin/Clavulanate	TIM
Dihydrofolate reduct./Dihydropteroate syn	DHFR_DHPS_INH	Tilmicosin	TIL
Dihydropteroate synthetase inhibitor	DHPS_INH	Tobramycin	NN
Dirithromycin	DTM	Tosufloxacin	TFX
Doxycycline	D	Trimeth/Sulfa (DIN)	STG
Enoxacin	ENX	Trimethoprim	TMP
Enrofloxacin	EFX	Trimethoprim/Sulfadiazine	SDT
Epicillin	EP	Trimethoprim/Sulfamethoxazol	SXT
Erythromycin	E	Triple Sulfa	SSS
Ethambutol	EM	Trospectinomycin	TRP
Ethionamide	EA	Trovafloxacin	TVA
Fleroxacin	FLE	Tylosin	TYL
Flomoxef	FLO	Unspecified	UNS
Flucloxacillin	FO	ureidopenicillins	UR_PEN
Flumequine	FLQ	ureidopenicillins w/ B-lact.	UR_PEN_BLI
Fluoroquinilones	FQUIN	Urinary fluoroquinilones	UR_FQUIN
Folate antagonists	FOL_ANT	Vancomycin	VA
Fosfomycin w/G6PD	FF	Virginiamycin	VRG

13. Appendix D – Organism Abbreviations

The following is a list of the organisms in the BD database, with the associated LIS Code. On the EpiCenter and BD Phoenix 100, these codes are configurable by the user. However on the MGIT and ProbeTec ET instruments these values are not configurable. Therefore a direct instrument interface sends these values as AST results.

Abiotrophia	ABI	Lactobacillus catenaformis	LACBCAT
Abiotrophia defectiva	STRDEF	Lactobacillus crispatus	LACBCRI
Acholeplasma	ACHO	Lactobacillus delbrueckii ssp bulgaricus	LACBDELB
Acholeplasma laidlawii	ACHOLAI	Lactobacillus delbrueckii ssp delbrueckii	LACBDELD
Achromobacter	ACHR	Lactobacillus delbrueckii ssp lactis	LACBDELL
Achromobacter piechaudii	ALCPIE	Lactobacillus fermentum	LACBFER
Achromobacter species	ACHRSPE	Lactobacillus gasseri	LACBGAS
Achromobacter xylosoxidans ssp denitrific	ALCDEN	Lactobacillus jensenii	LACBJEN
Achromobacter xylosoxidans ssp xylosoxida	ALCXYL	Lactobacillus johnsonii	LACBJOH
Acid Fast Bacilli	AFB	Lactobacillus kefiri	LACBKEF
Acid Fast Bacilli (Group)	AFBG	Lactobacillus paraplantarum	LACBPAR
Acidaminococcus	ACIA	Lactobacillus plantarum	LACBPLA
Acidaminococcus fermentans	ACIAFER	Lactobacillus reuteri	LACBREU
Acidovorax	ACID	Lactobacillus rhamnosus	LACBRHA
Acidovorax delafieldii	ACIDDEL	Lactobacillus salivarius	LACBSAL
Acidovorax facilis	ACIDFAC	Lactobacillus species	LACBSPE
Acidovorax temperans	ACIDTEM	Lactobacillus uli	LACBULI
Acinetobacter	ACIN	Lactococcus	LACC
Acinetobacter baumannii	ACINBAU	Lactococcus garvieae	LACCGAR
Acinetobacter baumannii/calcoaceticus com	ACINBCX	Lactococcus lactis ssp cremoris	LACCLACC
Acinetobacter baumannii/haemolyticus	ACINBAUHAE	Lactococcus lactis ssp hordniae	LACCLACH
Acinetobacter calcoaceticus	ACINCAL	Lactococcus lactis ssp lactis	LACCLACL
Acinetobacter haemolyticus	ACINHAE	Lactococcus plantarum	LACCPLA
Acinetobacter johnsonii	ACINJOH	Lactococcus raffinolactis	LACCRAF
Acinetobacter junii	ACINJUN	Lactococcus species	LACCSPE
Acinetobacter lwoffii	ACINLWO	Lautropia	LAU
Acinetobacter lwoffii/haemolyticus	ACINLWOHAE	Lautropia mirabilis	LAUMIR
Acinetobacter radioresistens	ACINRAD	Leclercia	LEC
Acinetobacter species	ACINSPE	Leclercia adecarboxylata	LECADE
Actinobacillus	ACTB	Legionella	LEG
Actinobacillus actinomycetemcomitans	ACTBACT	Legionella anisa	LEGANI
Actinobacillus capsulatus	ACTBCAP	Legionella birminghamensis	LEGBIR
Actinobacillus equuli	ACTBEQU	Legionella bozemaniae	LEGBOZ
Actinobacillus hominis	ACTBHOM	Legionella cincinnatiensis	LEGCIN
Actinobacillus lignieresii	ACTBLIG	Legionella dumoffii	LEGDUM
Actinobacillus muris	ACTBMUR	Legionella feeleii	LEGFEE
Actinobacillus pleuropneumoniae	ACTBPLE	Legionella gormanii	LEGGOR
Actinobacillus rossii	ACTBROS	Legionella hackeliae	LEGHAC
Actinobacillus seminis	ACTBSEM	Legionella israelensis	LEGISR
Actinobacillus species	ACTBSPE	Legionella jordanis	LEGJOR
Actinobacillus suis	ACTBSUI	Legionella lansingensis	LEGLAN
Actinobacillus ureae	ACTBURE	Legionella longbeachae	LEGLON
Actinobaculum	ACTC	Legionella maceachernii	LEGMAC
Actinobaculum schaalii	ACTCSCH	Legionella micdadei	LEGMIC
Actinobaculum suis	ACTMSUI	Legionella oakridgensis	LEGOAK
Actinomadura	ACTA	Legionella pneumophila	LEGPNE
Actinomadura madurae	ACTAMAD	Legionella pneumophila ssp fraseri	LEGPNEF
Actinomadura pelletieri	ACTAPEL	Legionella pneumophila ssp pascullei	LEGPNEPA
Actinomyces	ACTM	Legionella pneumophila ssp pneumophila	LEGPNEPN
Actinomyces bovis	ACTMBOV	Legionella sainthelensi	LEGSAI
Actinomyces denticolens	ACTMDEN	Legionella species	LEGSPE
Actinomyces europaeus	ACTMEUR	Legionella tucsonensis	LEGTUC
Actinomyces georgiae	ACTMGEO	Legionella wadsworthii	LEGWAD
Actinomyces gerencseriae	ACTMGER	Leifsonia	LEI
Actinomyces graevenitzii	ACTMGRA	Leifsonia aquatica	CORAQU
Actinomyces hordeovulneris	ACTMHOR	Leminorella	LEM
Actinomyces howelli	ACTMHOW	Leminorella grimontii	LEMGRI
Actinomyces hyovaginalis	ACTMHYO	Leminorella richardii	LEMRIC
Actinomyces israelii	ACTMISR	Leminorella species	LEMSPE
Actinomyces meyeri	ACTMMEY	Leptotrichia	LEP
Actinomyces naeslundii	ACTMNAE	Leptotrichia buccalis	LEPBUC
Actinomyces neuii ssp anitratus	ACTMNEUA	Leuconostoc	LEU
Actinomyces neuii ssp neuii	ACTMNEUN	Leuconostoc argentinum	LEUARG
Actinomyces odontolyticus	ACTMODO	Leuconostoc carnosum	LEUCAR
Actinomyces radingae	ACTMRAD	Leuconostoc citreum	LEUCIT
Actinomyces slackii	ACTMSLA	Leuconostoc gelidum	LEUGEL
Actinomyces species	ACTMSPE	Leuconostoc lactis	LEULAC
Actinomyces turicensis	ACTMTUR	Leuconostoc mesenteroides	LEUMES
Actinomyces viscosus	ACTMVIS	Leuconostoc mesenteroides ssp cremoris	LEUMESC
Aerococcus	AERC	Leuconostoc mesenteroides ssp dextranicum	LEUMESD
Aerococcus species	AERCSPE	Leuconostoc mesenteroides ssp mesenteroides	LEUMESM
Aerococcus urinae	AERCURI	Leuconostoc pseudomesenteroides	LEUPSE
Aerococcus viridans	AERCVIR	Leuconostoc species	LEUSPE
Aeromonas	AERM	Listeria	LIS
Aeromonas allosaccharophila	AERMALL	Listeria grayi	LISGRA
Aeromonas caviae	AERMCAV	Listeria innocua	LISINN
Aeromonas hydrophila	AERMHYD	Listeria ivanovii	LISIVA
Aeromonas hydrophila group	AERMHYDGR	Listeria ivanovii ssp ivanovii	LISIVAI
Aeromonas jandaei	AERMJAN	Listeria ivanovii ssp londoniensis	LISIVAL
Aeromonas media	AERMMED	Listeria monocytogenes	LISMON
Aeromonas salmonicida	AERMSAL	Listeria monocytogenes/innocua	LISMONINN
Aeromonas salmonicida ssp achromogenes	AERMSALA	Listeria murrayi	LISMUR
Aeromonas salmonicida ssp masoucida	AERMSALM	Listeria murrayi/grayi	LISMURGRA
Aeromonas salmonicida ssp salmonicida	AERMSALSA	Listeria seeligeri	LISSEE
Aeromonas salmonicida ssp smithia	AERMSALSM	Listeria species	LISSPE
Aeromonas schubertii	AERMSCH	Listeria welshimeri	LISWEL
Aeromonas sobria	AERMVERS	Listonella	LISO
Aeromonas species	AERMSPE	Listonella anguillarum	LISOANG
Aeromonas trota	AERMTRO	Listonella pelagia	LISOPEL
Aeromonas veronii	AERMVERV	Macrococcus	MAC
Afipia	AFI	Macrococcus caseolyticus	STACAS

Afipia broomeae	AFIBRO
Afipia clevelandensis	AFICLE
Afipia felis	AFIFEL
Agrobacterium	AGR
Agrobacterium radiobacter	AGRRAD
Agrobacterium tumefaciens	AGRTUM
Alcaligenes	ALC
Alcaligenes faecalis	ALCFAE
Alcaligenes faecalis ssp faecalis	ALCFAEF
Alcaligenes faecalis type II	ALCFAEII
Alcaligenes species	ALCSPE
Alloiococcus	ALL
Alloiococcus otitidis	ALLOTI
Anaerobiospirillum	ANAB
Anaerobiospirillum succiniciproducens	ANABSUC
Anaerobiospirillum thomasii	ANABTHO
Anaerorhabdus	ANAR
Anaerorhabdus furcosa	ANARFUR
Arcanobacterium	ARCA
Arcanobacterium bernardiae	ARCABER
Arcanobacterium haemolyticum	ARCAHAE
Arcanobacterium pyogenes	ACTMPYO
Arcobacter	ARCO
Arcobacter butzleri	ARCOBUT
Arcobacter cryaerophilus	ARCOCRY
Arcobacter nitrofigilis	ARCONIT
Arcobacter skirrowii	ARCOSKI
Arthrobacter	ART
Arthrobacter agilis	ARTAGI
Arthrobacter creatinolyticus	ARTCRE
Arthrobacter cumminsii	ARTCUM
Arthrobacter woluwensis	ARTWOL
Aspergillus	ASP
Aspergillus fumigatus	ASPFUM
Aspergillus species	ASPSPE
Atopobium	ATO
Atopobium minutum	ATOMIN
Atopobium parvulum	ATOPAR
Atopobium rimae	LACBRIM
Aureobacterium	AURC
Aureobacterium resistens	AURCRES
Aureobasidium	AUR
Aureobasidium pullulans	AURPUL
Bacillus	BACI
Bacillus amyloliquefaciens	BACIAMY
Bacillus anthracis	BACIANT
Bacillus cereus	BACICER
Bacillus circulans	BACICIR
Bacillus coagulans	BACICOA
Bacillus firmus	BACIFIR
Bacillus licheniformis	BACILIC
Bacillus megaterium	BACIMEG
Bacillus mycoides	BACIMYC
Bacillus pasteurii	BACIPAS
Bacillus pumilus	BACIPUM
Bacillus species	BACISPE
Bacillus sphaericus	BACISPH
Bacillus stearothermophilus	BACISTE
Bacillus subtilis	BACISUB
Bacillus subtilis ssp spizizenii	BACISUBSP
Bacillus subtilis ssp subtilis	BACISUBSU
Bacillus thuringiensis	BACITHU
Bacteroides	BACT
Bacteroides caccae	BACTCAC
Bacteroides capillosus	BACTCAP
Bacteroides coagulans	BACTCOA
Bacteroides distasonis	BACTDIS
Bacteroides distasonis group	BACTDISGR
Bacteroides eggerthii	BACTEGG
Bacteroides forsythus	BACTFOR
Bacteroides fragilis	BACTFRA
Bacteroides fragilis group	BACTFRAGR
Bacteroides merdae	BACTMER
Bacteroides ovatus	BACTOVA
Bacteroides putredinis	BACTPUT
Bacteroides splanchnicus	BACTSPL
Bacteroides stercoris	BACTSTI
Bacteroides tectus	BACTTEC
Bacteroides thetaiotaomicron	BACTTHE
Bacteroides uniformis	BACTUNI
Bacteroides ureolyticus	BACTURE
Bacteroides vulgatus	BACTVUL
Balneatrix	BAL
Balneatrix alpica	BALALP
Bartonella	BAR
Bartonella bacilliformis	BARBAC
Bartonella clarridgeiae	BARCLA
Bartonella elizabethae	BARELI
Bartonella henselae	BARHEN
Bartonella quintana	BARQUI
Bartonella species	BARSPE
Bergeyella	BER
Bergeyella zoohelcum	BERZOO
Bifidobacterium	BIF
Bifidobacterium adolescentis	BIFADO
Bifidobacterium angulatum	BIFANG
Bifidobacterium bifidum	BIFBIF
Bifidobacterium breve	BIFBRE
Bifidobacterium catenulatum	BIFCAT
Bifidobacterium denticolens	BIFDEC
Bifidobacterium dentium	BIFDEN
Bifidobacterium gallicum	BIFGAL
Bifidobacterium infantis	BIFINF
Bifidobacterium inopinatum	BIFINO
Bifidobacterium longum	BIFLON
Bifidobacterium pseudocatenulatum	BIFPSC
Bifidobacterium pseudolongum ssp globosum	BIFPSEG
Malassezia	MAL
Malassezia furfur	MALFUR
Malassezia globosa	MALGLO
Malassezia obtusa	MALOBT
Malassezia pachydermatis	MALPAC
Malassezia restricta	MALRES
Malassezia sloofiae	MALSLO
Malassezia species	MALSPE
Malassezia sympodialis	MALSYM
Mannheimia	MAN
Mannheimia haemolytica	PASHAE
Megamonas	MEGM
Megamonas hypermegale	MEGMHYP
Megasphaera	MEGS
Megasphaera elsdenii	MEGSELS
Methylobacterium	MET
Methylobacterium extorquens	METEXT
Methylobacterium fujisawaense	METFUJ
Methylobacterium mesophilicum	METMES
Methylobacterium species	METSPE
Microbacterium	MICB
Microbacterium arborescens	MICBARB
Microbacterium imperiale	MICBIMP
Micrococcus	MIC
Micrococcus luteus	MICLUT
Micrococcus lylae	MICLYL
Micrococcus species	MICSPE
Micromonas	MICM
Micromonas micros	PEPSMIC
Mitsuokella	MIT
Mitsuokella multiacida	MITMUL
Mobiluncus	MOB
Mobiluncus curtisii	MOBCUR
Mobiluncus mulieris	MOBMUL
Mobiluncus species	MOBSPE
Moellerella	MOE
Moellerella wisconsensis	MOEWIS
Mogibacterium	MOG
Mogibacterium timidum	EUBTIM
Moraxella	MORA
Moraxella (Branhamella) catarrhalis	MORABRACAT
Moraxella atlantae	MORAATL
Moraxella bovis	MORABOV
Moraxella canis	MORACAN
Moraxella caviae	MORACAV
Moraxella cuniculi	MORACUN
Moraxella lacunata	MORALAC
Moraxella lincolnii	MORALIN
Moraxella nonliquefaciens	MORANON
Moraxella osloensis	MORAOSL
Moraxella ovis	MORAOVI
Moraxella species	MORASPE
Morganella	MORG
Morganella morganii	MORGMOR
Morganella morganii ssp morganii	MORGMORM
Morganella morganii ssp morganii biogroup 1	MORGMORM1
Morganella morganii ssp sibonii	MORGMORS
Mycobacterium	MYCB
Mycobacterium abscessus	MYCBABS
Mycobacterium africanum	MYCBAFR
Mycobacterium asiaticum	MYCBASI
Mycobacterium aurum	MYCBAUR
Mycobacterium avium	MYCBAVI
Mycobacterium avium complex	MYCBMAC
Mycobacterium avium ssp avium	MYCBAVIA
Mycobacterium avium ssp paratuberculosis	MYCBAVIP
Mycobacterium avium ssp silvaticum	MYCBAVIS
Mycobacterium bovis	MYCBBOV
Mycobacterium branderi	MYCBBRA
Mycobacterium celatum	MYCBCEL
Mycobacterium chelonae	MYCBCHE
Mycobacterium confluentis	MYCBCON
Mycobacterium farcinogenes	MYCBFAR
Mycobacterium flavescens	MYCBFLA
Mycobacterium fortuitum	MYCBFOR
Mycobacterium fortuitum complex	MYCBFORC
Mycobacterium gadium	MYCBGAD
Mycobacterium gastri	MYCBGAS
Mycobacterium genavense	MYCBGEN
Mycobacterium gordonae	MYCBGOR
Mycobacterium haemophilum	MYCBHAE
Mycobacterium heidelbergense	MYCBHEI
Mycobacterium interjectum	MYCBINJ
Mycobacterium intermedium	MYCBINM
Mycobacterium intracellulare	MYCBINC
Mycobacterium kansasii	MYCBKAN
Mycobacterium leprae	MYCBLEP
Mycobacterium malmoense	MYCBMAL
Mycobacterium marinum	MYCBMAR
Mycobacterium microti	MYCBMIC
Mycobacterium mucogenicum	MYCBMUC
Mycobacterium neoaurum	MYCBNEO
Mycobacterium nonchromogenicum	MYCBNON
Mycobacterium obuense	MYCBOBU
Mycobacterium other than tuberculosis	MYCBMOTT
Mycobacterium peregrinum	MYCBPER
Mycobacterium phlei	MYCBPHL
Mycobacterium rhodesiae	MYCBRHO
Mycobacterium scrofulaceum	MYCBSCR
Mycobacterium shimoidei	MYCBSHI
Mycobacterium simiae	MYCBSIM
Mycobacterium smegmatis	MYCBSME
Mycobacterium species	MYCBSPE
Mycobacterium szulgai	MYCBSZU
Mycobacterium terrae	MYCBTER
Mycobacterium terrae complex	MYCBTERC
Mycobacterium thermoresistibile	MYCBTHE

Bifidobacterium pseudolongum ssp pseudolo	BIFPSEP
Bifidobacterium species	BIFSPE
Bilophila	BIL
Bilophila wadsworthia	BILWAD
Blastoschizomyces	BLA
Blastoschizomyces capitatus	BLACAP
Bordetella	BOR
Bordetella avium	BORAVI
Bordetella bronchiseptica	BORBROS
Bordetella hinzii	BORHIN
Bordetella holmesii	BORHOL
Bordetella parapertussis	BORPAR
Bordetella pertussis	BORPER
Bordetella trematum	BORTRE
Borrelia	BOI
Borrelia species	BOISPE
Brachyspira	BRAC
Brachyspira aalborgi	BRACAAL
Brachyspira hyodysenteriae	BRACHYO
Brachyspira innocens	BRACINN
Brachyspira pilosicoli	BRACPIL
Bradyrhizobium	BRAD
Bradyrhizobium japonicum	BRADJAP
Brevibacillus	BRES
Brevibacillus brevis	BACIBRE
Brevibacillus laterosporus	BACILAT
Brevibacterium	BREI
Brevibacterium casei	BREICAS
Brevibacterium epidermidis	BREIEPI
Brevibacterium linens	BREILIN
Brevibacterium mcbrellneri	BREIMCB
Brevibacterium species	BREISPE
Brevundimonas	BREU
Brevundimonas diminuta	BREUDIM
Brevundimonas vesicularis	BREUVES
Brucella	BRU
Brucella abortus	BRUABO
Brucella canis	BRUCAN
Brucella melitensis	BRUMEL
Brucella neotomae	BRUNEO
Brucella ovis	BRUOVI
Brucella species	BRUSPE
Brucella suis	BRUSUI
Budvicia	BUD
Budvicia aquatica	BUDAQU
Burkholderia	BUR
Burkholderia caryophylli	BURCAR
Burkholderia cepacia	BURCEP
Burkholderia cepacia (CF)	BURCEPCF
Burkholderia cepacia/Ralstonia pickettii	BURCEPRALPIC
Burkholderia gladioli	BURGLA
Burkholderia glathei	BURGLT
Burkholderia graminis	BURGRA
Burkholderia mallei	BURMAL
Burkholderia multivorans	BURMUL
Burkholderia phenazinium	BURPHE
Burkholderia pseudomallei	BURPSE
Burkholderia pyrrocinia	BURPYR
Burkholderia species/Ralstonia species	BURSPERALSPE
Burkholderia/Ralstonia	BUR/RAL
Buttiauxella	BUTT
Buttiauxella agrestis	BUTTAGR
Buttiauxella ferragutiae	BUTTFER
Buttiauxella gaviniae	BUTTGAV
Butyrivibrio	BUTY
Butyrivibrio crossotus	BUTYCRO
Butyrivibrio fibrisolvens	BUTYFIB
Calymmatobacterium	CALY
Campylobacter	CAM
Campylobacter coli	CAMCOL
Campylobacter concisus	CAMCON
Campylobacter curvus	CAMCUR
Campylobacter fetus	CAMFET
Campylobacter fetus ssp fetus	CAMFETF
Campylobacter fetus ssp venerealis	CAMFETV
Campylobacter gracilis	CAMGRA
Campylobacter helveticus	CAMHEL
Campylobacter hyointestinalis ssp hyointe	CAMHYOH
Campylobacter hyointestinalis ssp lawsoni	CAMHYOL
Campylobacter jejuni	CAMJEJ
Campylobacter jejuni ssp doylei	CAMJEJD
Campylobacter jejuni ssp jejuni	CAMJEJJ
Campylobacter lari	CAMLAR
Campylobacter mucosalis	CAMMUC
Campylobacter rectus	CAMRET
Campylobacter rectus/curvus	CAMRETCUR
Campylobacter showae	CAMSHO
Campylobacter species	CAMSPE
Campylobacter sputorum ssp bubulus	CAMSPUB
Campylobacter sputorum ssp fecalis	CAMSPUF
Campylobacter sputorum ssp paraureolyticu	CAMSPUP
Campylobacter sputorum ssp sputorum	CAMSPUS
Campylobacter upsaliensis	CAMUPS
Candida	CAN
Candida aaseri	CANAAS
Candida albicans	CANALB
Candida boidinii	CANBOI
Candida catenulata	CANCAT
Candida ciferrii	CANCIF
Candida colliculosa	CANCOL
Candida dubliniensis	CANDUB
Candida famata	CANFAM
Candida glabrata	TORGLA
Candida guilliermondii	CANGUI
Candida haemulonii	CANHAE
Candida holmii	CANHOL
Candida inconspicua	CANINC
Mycobacterium triviale	MYCBTRI
Mycobacterium tuberculosis	MYCBTUB
Mycobacterium tuberculosis complex	MYCBTUBC
Mycobacterium ulcerans	MYCBULC
Mycobacterium vaccae	MYCBVAC
Mycobacterium xenopi	MYCBXEN
Mycoplasma	MYCP
Mycoplasma (Group)	MYCOPG
Mycoplasma (Group2)	MYCOP
Mycoplasma buccale	MYCPBUC
Mycoplasma faucium	MYCPFAU
Mycoplasma fermentans	MYCPFER
Mycoplasma gallisepticum	MYCPGAL
Mycoplasma genitalium	MYCPGEN
Mycoplasma hominis	MYCPHOM
Mycoplasma lipophilum	MYCPLIP
Mycoplasma orale	MYCPORA
Mycoplasma penetrans	MYCPPEN
Mycoplasma pirum	MYCPPIR
Mycoplasma pneumoniae	MYCPPNE
Mycoplasma primatum	MYCPPRI
Mycoplasma salivarium	MYCPSAL
Mycoplasma spermatophilum	MYCPSPR
Mycoplasma synoviae	MYCPSYN
Myroides	MYR
Myroides odoratimimus	MYRODI
Myroides odoratus	MYRODA
Myroides odoratus/odoratimimus	MYRODAODI
Neisseria	NEI
Neisseria canis	NEICAN
Neisseria cinerea	NEICIN
Neisseria elongata	NEIELO
Neisseria elongata ssp elongata	NEIELOE
Neisseria elongata ssp glycolytica	NEIELOG
Neisseria elongata ssp nitroreducens	NEIELON
Neisseria flavescens	NEIFLA
Neisseria gonorrhoeae	NEIGON
Neisseria iguanae	NEIIGU
Neisseria lactamica	NEILAC
Neisseria meningitidis	NEIMEN
Neisseria mucosa	NEIMUC
Neisseria polysaccharea	NEIPOL
Neisseria sicca	NEISIC
Neisseria species	NEISPE
Neisseria subflava	NEISUB
Neisseria subflava biovar flava	NEISUBF
Neisseria subflava biovar perflava	NEISUBP
Neisseria subflava biovar subflava	NEISUBS
Neisseria weaveri	NEIWEA
Nesterenkonia	NES
Nesterenkonia halobia	NESHAL
Nocardia	NOCA
Nocardia asteroides	NOCAAST
Nocardia brasiliensis	NOCABRA
Nocardia brevicatena	NOCABRE
Nocardia carnea	NOCACAR
Nocardia farcinica	NOCAFAR
Nocardia nova	NOCANOV
Nocardia otitidiscaviarum	NOCAOTI
Nocardia pseudobrasiliensis	NOCAPSE
Nocardia seriolae	NOCASER
Nocardia species	NOCASPE
Nocardia transvalensis	NOCATRA
Nocardia vaccinii	NOCAVAC
Nocardiopsis	NOCO
Nocardiopsis dassonvillei	NOCODAS
Obesumbacterium	OBE
Obesumbacterium proteus	OBEPRO
Ochrobactrum	OCH
Ochrobactrum anthropi	OCHANT
Oenococcus	OEN
Oenococcus oeni	OENOEN
Oerskovia	OER
Oerskovia species	OERSPE
Oerskovia xanthineolytica	OERXAN
Oligella	OLI
Oligella species	OLISPE
Oligella ureolytica	OLIURO
Oligella urethralis	OLIURT
Ornithobacterium	ORN
Ornithobacterium rhinotracheale	ORNRHI
Paenibacillus	PAE
Paenibacillus alvei	PAEALV
Paenibacillus durus	PAEDUR
Paenibacillus macerans	PAEMAC
Paenibacillus polymyxa	BACIPOL
Pantoea	PAN
Pantoea agglomerans	PANAGG
Pantoea ananatis	ERWANA
Pantoea dispersa	PANDIS
Pantoea stewartii ssp indologenes	PANSTEI
Pantoea stewartii ssp stewartii	PANSTES
Pasteurella	PAS
Pasteurella aerogenes	PASAER
Pasteurella bettyae	PASBET
Pasteurella caballi	PASCAB
Pasteurella canis	PASCAN
Pasteurella dagmatis	PASDAG
Pasteurella gallinarum	PASGAL
Pasteurella multocida	PASMUL
Pasteurella multocida ssp gallicida	PASMULG
Pasteurella multocida ssp multocida	PASMULM
Pasteurella multocida ssp septica	PASMULS
Pasteurella pneumotropica	PASPNE
Pasteurella species	PASSPE
Pasteurella stomatis	PASSTO
Pasteurella trehalosi	PASTRE

Candida kefyr	CANKEF
Candida krusei	CANKRU
Candida lambica	CANLAM
Candida lipolytica	CANLIP
Candida lusitaniae	CANLUS
Candida magnoliae	CANMAG
Candida melibiosica	CANMEL
Candida norvegensis	CANNOR
Candida parakrusei	CANPARK
Candida parapsilosis	CANPARP
Candida pelliculosa	CANPEL
Candida pintolopesii	CANPIN
Candida pulcherrima	CANPUL
Candida rugosa	CANRUG
Candida species	CANSPE
Candida sphaerica	CANSPH
Candida stellatoidea	CANSTE
Candida tropicalis	CANTRO
Candida utilis	CANUTI
Candida valida	CANVAL
Candida viswanathii	CANVIS
Candida zeylanoides	CANZEY
Capnocytophaga	CAP
Capnocytophaga canimorsus	CAPCAN
Capnocytophaga cynodegmi	CAPCYN
Capnocytophaga gingivalis	CAPGIN
Capnocytophaga granulosa	CAPGRA
Capnocytophaga haemolytica	CAPHAE
Capnocytophaga ochracea	CAPOCH
Capnocytophaga species	CAPSPE
Capnocytophaga sputigena	CAPSPU
Cardiobacterium	CAR
Cardiobacterium hominis	CARHOM
Catonella	CATO
Catonella morbi	CATOMOR
CDC	CDC
CDC group DF-3	CDCDF3
CDC group EF-4	CDCEF4
CDC group EF-4a	CDCEF4a
CDC group EF-4b	CDCEF4b
CDC group EO-2	CDCEO2
CDC group EO-3	CDCEO3
CDC group II b	CDCIIb
CDC group II g	CDCIIg
CDC group II h	CDCIIh
CDC group II i	CDCIIi
CDC group IV	CDCIV
CDC group NO-1	CDCNO1
CDC group O-1	CDCO1
CDC group O-2	CDCO2
CDC group OFBA-1	CDCOFBA1
CDC group Vb-3	CDCVb3
CDC group WO-1	CDCWO1
Cedecea	CED
Cedecea davisae	CEDDAV
Cedecea lapagei	CEDLAP
Cedecea neteri	CEDNET
Cedecea species	CEDSPE
Cedecea species 3	CEDSPE3
Cedecea species 5	CEDSPE5
Cellulomonas	CEL
Cellulomonas humilata	ACTMHUM
Cellulomonas turbata	OERTUR
Centipeda	CEN
Centipeda periodontii	CENPER
Chromobacterium	CHRO
Chromobacterium violaceum	CHROVIO
Chryseobacterium	CHRB
Chryseobacterium gleum	CHRBGLE
Chryseobacterium indologenes	CHRBIND
Chryseobacterium meningosepticum	CHRBMEN
Chryseobacterium scophthalmum	CHRBSCO
Chryseomonas	CHRM
Citrobacter	CIT
Citrobacter amalonaticus	CITAMA
Citrobacter braakii	CITBRA
Citrobacter farmeri	CITFAR
Citrobacter freundii	CITFRE
Citrobacter freundii complex	CITFRECX
Citrobacter gillenii	CITSPE10
Citrobacter koseri	CITKOS
Citrobacter murliniae	CITSPE11
Citrobacter rodentium	CITSPE9
Citrobacter sedlakii	CITSED
Citrobacter species	CITSPE
Citrobacter werkmanii	CITWER
Citrobacter youngae	CITYOU
Clostridium	CLO
Clostridium acetobutylicum	CLOACO
Clostridium amniovalericum	CLOAMN
Clostridium argentinense	CLOARG
Clostridium aurantibutyricum	CLOAUR
Clostridium baratii	CLOBAR
Clostridium beijerinckii	CLOBEI
Clostridium bifermentans	CLOBIF
Clostridium botulinum	CLOBOT
Clostridium butyricum	CLOBUT
Clostridium cadaveris	CLOCAD
Clostridium carnis	CLOCAR
Clostridium celatum	CLOCEL
Clostridium cellobioparum	CLOCEO
Clostridium chauvoei	CLOCHA
Clostridium clostridioforme	CLOCLO
Clostridium cochlearium	CLOCOH
Clostridium cocleatum	CLOCOL
Clostridium difficile	CLODIF
Clostridium fallax	CLOFAL
Pasteurella volantium	PASVOL
Pediococcus	PED
Pediococcus acidilactici	PEDACI
Pediococcus damnosus	PEDDAM
Pediococcus dextrinicus	PEDDEX
Pediococcus parvulus	PEDPAR
Pediococcus pentosaceus	PEDPEN
Pediococcus species	PEDSPE
Peptococcus	PEPC
Peptococcus niger	PEPCNIG
Peptostreptococcus	PEPS
Peptostreptococcus anaerobius	PEPSANA
Peptostreptococcus asaccharolyticus	PEPSASA
Peptostreptococcus barnesae	PEPSBAR
Peptostreptococcus harei	PEPSHAR
Peptostreptococcus hydrogenalis	PEPSHYD
Peptostreptococcus indolicus	PEPSIND
Peptostreptococcus ivorii	PEPSIVO
Peptostreptococcus lacrimalis	PEPSLAR
Peptostreptococcus lactolyticus	PEPSLAT
Peptostreptococcus octavius	PEPSOCT
Peptostreptococcus prevotii	PEPSPRE
Peptostreptococcus species	PEPSSPE
Peptostreptococcus tetradius	PEPSTET
Peptostreptococcus vaginalis	PEPSVAG
Photobacterium	PHOB
Photobacterium damselae	PHOBDAM
Photobacterium damselae ssp damselae	PHOBDAMD
Photobacterium damselae ssp piscicida	PHOBDAMP
Photorhabdus	PHOR
Photorhabdus luminescens	PHORLUM
Pichia	PIC
Pichia angusta	PICANG
Pichia anomala	HANANO
Pichia fermentans	PICFER
Plesiomonas	PLE
Plesiomonas shigelloides	PLESHI
Porphyromonas	POR
Porphyromonas asaccharolytica	PORASA
Porphyromonas canoris	PORCAN
Porphyromonas catoniae	PORCAT
Porphyromonas circumdentaria	PORCIR
Porphyromonas endodontalis	POREND
Porphyromonas gingivalis	PORGIN
Porphyromonas levii	PORLEV
Porphyromonas macacae	PORMAC
Pragia	PRA
Pragia fontium	PRAFON
Prevotella	PRE
Prevotella albensis	PREALB
Prevotella bivia	PREBIV
Prevotella brevis	PREBRE
Prevotella bryantii	PREBRY
Prevotella buccae	PREBUE
Prevotella buccalis	PREBUL
Prevotella corporis	PRECOR
Prevotella dentalis	PREDEA
Prevotella denticola	PREDEI
Prevotella disiens	PREDIS
Prevotella enoeca	PREENO
Prevotella heparinolytica	PREHEP
Prevotella intermedia	PREINT
Prevotella loescheii	PRELOE
Prevotella melaninogenica	PREMEL
Prevotella nigrescens	PRENIG
Prevotella oralis	PREORA
Prevotella oris	PREORI
Prevotella oulorum	PREOUL
Prevotella ruminicola	PRERUM
Prevotella tannerae	PRETAN
Prevotella veroralis	PREVER
Prevotella zoogleoformans	PREZOO
Propionibacterium	PROB
Propionibacterium acidipropionici	PROBACI
Propionibacterium acnes	PROBACN
Propionibacterium avidum	PROBAVI
Propionibacterium avidum ssp granulosum	PROBAVIG
Propionibacterium freundenreichii ssp freundenr	PROBFREF
Propionibacterium freundenreichii ssp shermanii	PROBFRES
Propionibacterium granulosum	PROBGRA
Propionibacterium jensenii	PROBJEN
Propionibacterium lymphophilum	PROBLYM
Propionibacterium propionicum	PROBPRO
Propionibacterium species	PROBSPE
Propioniferax	PROF
Propioniferax innocua	PROFINN
Proteus	PROT
Proteus mirabilis	PROTMIR
Proteus myxofaciens	PROTMYX
Proteus penneri	PROTPEN
Proteus species	PROTSPE
Proteus vulgaris	PROTVUL
Proteus vulgaris/penneri	PROTVULPEN
Prototheca	PROH
Prototheca wickerhamii	PROHWIC
Prototheca zopfii	PROHZOP
Providencia	PROV
Providencia alcalifaciens	PROVALC
Providencia heimbachae	PROVHEI
Providencia rettgeri	PROVRET
Providencia rustigianii	PROVRUS
Providencia species	PROVSPE
Providencia stuartii	PROVSTU
Providencia stuartii urea+	PROVSTUUR
Pseudomonas	PSE
Pseudomonas aeruginosa	PSEAER
Pseudomonas aeruginosa (CF)	PSEAERCF

Clostridium felsineum	CLOFEL
Clostridium ghonii	CLOGHO
Clostridium glycolicum	CLOGLY
Clostridium haemolyticum	CLOHAE
Clostridium hastiforme	CLOHAS
Clostridium histolyticum	CLOHIS
Clostridium indolis	CLOIND
Clostridium innocuum	CLOINN
Clostridium irregulare	CLOIRR
Clostridium leptum	CLOLEP
Clostridium limosum	CLOLIM
Clostridium malenominatum	CLOMAL
Clostridium mangenotii	CLOMAN
Clostridium nexile	CLONEX
Clostridium novyi	CLONOV
Clostridium novyi A	CLONOVA
Clostridium novyi B	CLONOVB
Clostridium oceanicum	CLOOCE
Clostridium orbiscindens	CLOORB
Clostridium oroticum	CLOORO
Clostridium paraputrificum	CLOPAR
Clostridium perfringens	CLOPER
Clostridium putrefaciens	CLOPUR
Clostridium putrificum	CLOPUT
Clostridium ramosum	CLORAM
Clostridium sardiniense	CLOSAR
Clostridium sartagoforme	CLOSAT
Clostridium scatologenes	CLOSCA
Clostridium septicum	CLOSEP
Clostridium sordellii	CLOSOR
Clostridium species	CLOSPE
Clostridium sphenoides	CLOSPH
Clostridium spiroforme	CLOSPI
Clostridium sporogenes	CLOSPO
Clostridium sporosphaeroides	CLOSPS
Clostridium subterminale	CLOSUB
Clostridium symbiosum	CLOSYM
Clostridium tertium	CLOTER
Clostridium tetani	CLOTET
Clostridium tyrobutyricum	CLOTYR
Collinsella	COLL
Collinsella aerofaciens	EUBAER
Comamonas	COM
Comamonas terrigena	COMTER
Comamonas testosteroni	COMTES
Coprococcus	COP
Coprococcus catus	COPCAT
Coprococcus comes	COPCOM
Coprococcus eutactus	COPEUT
Corynebacterium	COR
Corynebacterium accolens	CORACC
Corynebacterium afermentans	CORAFE
Corynebacterium afermentans ssp afermenta	CORAFEA
Corynebacterium afermentans ssp lipophilu	CORAFEL
Corynebacterium amycolatum	CORAMY
Corynebacterium amycolatum/minitissimum	CORAMYMIN
Corynebacterium amycolatum/striatum	CORAMYSTR
Corynebacterium argentoratense	CORARG
Corynebacterium auris	CORAUR
Corynebacterium bovis	CORBOV
Corynebacterium coyleae	CORCOY
Corynebacterium cystitidis	CORCYS
Corynebacterium diphtheriae	CORDIP
Corynebacterium diphtheriae ssp belfanti	CORDIPB
Corynebacterium diphtheriae ssp gravis	CORDIPG
Corynebacterium diphtheriae ssp intermedi	CORDIPI
Corynebacterium diphtheriae ssp mitis	CORDIPM
Corynebacterium durum	CORDUR
Corynebacterium flavescens	CORFLA
Corynebacterium genitalium	CORGEN
Corynebacterium genitalium biovar I	CORGENI
Corynebacterium genitalium biovar II	CORGENII
Corynebacterium genitalium biovar III	CORGENIII
Corynebacterium genitalium biovar IV	CORGENIV
Corynebacterium genitalium biovar V	CORGENV
Corynebacterium genitalium biovar VI	CORGENVI
Corynebacterium glucuronolyticum	CORGLC
Corynebacterium imitans	CORIMI
Corynebacterium jeikeium	CORJEI
Corynebacterium kutscheri	CORKUT
Corynebacterium macginleyi	CORMAC
Corynebacterium matruchotii	CORMAT
Corynebacterium minutissimum	CORMIN
Corynebacterium mucifaciens	CORMUC
Corynebacterium mycetoides	CORMYC
Corynebacterium pilosum	CORPIL
Corynebacterium propinquum	CORPRO
Corynebacterium pseudodiphtheriticum	CORPSD
Corynebacterium pseudogenitalium	CORPSG
Corynebacterium pseudogenitalium biovar	CCORPSGC1
Corynebacterium pseudogenitalium biovar	CCORPSGC2
Corynebacterium pseudogenitalium biovar	CCORPSGC3
Corynebacterium pseudogenitalium biovar	CCORPSGC4
Corynebacterium pseudotuberculosis	CORPST
Corynebacterium renale	CORREN
Corynebacterium renale group	CORRENGR
Corynebacterium riegelii	CORRIE
Corynebacterium seminale	CORSEM
Corynebacterium singulare	CORSIN
Corynebacterium species	CORSPE
Corynebacterium striatum	CORSTR
Corynebacterium thomssenii	CORTHO
Corynebacterium ulcerans	CORULC
Corynebacterium urealyticum	CORURE
Corynebacterium variabile	CORVAR
Corynebacterium vitaeruminis	CORVIT
Corynebacterium xerosis	CORXER
Pseudomonas alcaligenes	PSEALC
Pseudomonas fluorescens	PSEFLU
Pseudomonas fluorescens/putida	PSEFLUPUT
Pseudomonas luteola	CHRMLUT
Pseudomonas mendocina	PSEMEN
Pseudomonas monteilii	PSEMON
Pseudomonas oryzihabitans	FLAIORY
Pseudomonas pertucinogena	PSEPER
Pseudomonas pseudoalcaligenes	PSEPSE
Pseudomonas pseudoalcaligenes ssp pseudoalcalig	PSEPSEP
Pseudomonas putida	PSEPUT
Pseudomonas species	PSESPE
Pseudomonas stutzeri	PSESTU
Pseudonocardia	PSEN
Pseudonocardia autotrophica	PSENAUT
Pseudoramibacter	PSER
Pseudoramibacter alactolyticus	EUBALA
Psychrobacter	PSY
Psychrobacter immobilis	PSYIMM
Psychrobacter phenylpyruvicus	MORAPHE
Rahnella	RAH
Rahnella aquatilis	RAHAQU
Ralstonia	RAL
Ralstonia paucula	CDCIVC2
Ralstonia pickettii	BURPIC
Ralstonia pickettii biovar 1	BURPIC1
Ralstonia pickettii biovar 2	BURPIC2
Ralstonia pickettii biovar 3	BURPIC3
Ralstonia solanacearum	BURSOL
Rhodococcus	RHOC
Rhodococcus coprophilus	RHOCCOP
Rhodococcus equi	RHOCEQU
Rhodococcus erythropolis	RHOCERY
Rhodococcus fascians	RHOCFAS
Rhodococcus globerulus	RHOCGLO
Rhodococcus rhodochrous	RHOCRHO
Rhodococcus species	RHOCSPE
Rhodotorula	RHOT
Rhodotorula glutinis	RHOTGLU
Rhodotorula mucilaginosa var mucilaginosa	RHOTMUCM
Rhodotorula rubra	RHOTRUB
Rhodotorula species	RHOTSPE
Rickettsia	RICK
Rickettsia (Group)	RICKG
Riemerella	RIE
Riemerella anatipestifer	RIEANA
Rikenella	RIK
Rikenella microfusus	RIKMIC
Roseomonas	ROS
Roseomonas cervicalis	ROSCER
Roseomonas fauriae	ROSFAU
Roseomonas gilardii	ROSGIL
Roseomonas species	ROSSPE
Rothia	ROT
Rothia dentocariosa	ROTDEN
Rothia mucilaginosa	STOMUC
Ruminococcus	RUM
Ruminococcus albus	RUMALB
Ruminococcus bromii	RUMBRO
Ruminococcus hansenii	STRHAN
Ruminococcus productus	RUMPRO
Saccharomyces	SAC
Saccharomyces cerevisiae	SACCER
Saccharomyces pastorianus	SACPAS
Saccharomyces uvarum	SACUVA
Salmonella	SAL
Salmonella aberdeen	SALABE
Salmonella abortus-equi	SALABOE
Salmonella adelaide	SALADL
Salmonella aderike	SALADR
Salmonella agona	SALAGO
Salmonella alachua	SALALA
Salmonella anatum	SALANA
Salmonella arizonae	SALARI
Salmonella avana	SALAVA
Salmonella bahrenfeld	SALBAH
Salmonella blockley	SALBLO
Salmonella bongori	SALBON
Salmonella braenderup	SALBRA
Salmonella bredeney	SALBRE
Salmonella bunn	SALBUN
Salmonella california	SALCAL
Salmonella carrau	SALCAR
Salmonella cerro	SALCER
Salmonella champaign	SALCHA
Salmonella chittagong	SALCHI
Salmonella choleraesuis	SALCHO
Salmonella choleraesuis ssp arizonae	SALCHOA
Salmonella choleraesuis ssp choleraesuis	SALCHOC
Salmonella choleraesuis ssp diarizonae	SALCHOD
Salmonella choleraesuis ssp houtenae	SALCHOH
Salmonella choleraesuis ssp indica	SALCHOI
Salmonella choleraesuis ssp salamae	SALCHOS
Salmonella cubana	SALCUB
Salmonella dakar	SALDAK
Salmonella daressalaam	SALDAR
Salmonella derby	SALDER
Salmonella dessau	SALDES
Salmonella dublin	SALDUB
Salmonella duesseldorf	SALDUE
Salmonella enteritidis	SALENT
Salmonella fresno	SALFRE
Salmonella gallinarum	SALGAL
Salmonella give	SALGIV
Salmonella haardt	SALHAA
Salmonella hadar	SALHAD
Salmonella hamburg	SALHAM

Coxiella	COX
Coxiella burnetii	COXBUR
Cryptococcus	CRY
Cryptococcus albidus	CRYALB
Cryptococcus albidus var aerius	CRYALBAE
Cryptococcus albidus var albidus	CRYALBAL
Cryptococcus albidus var diffluens	CRYALBD
Cryptococcus gastricus	CRYGAS
Cryptococcus laurentii	CRYLAU
Cryptococcus luteolus	CRYLUT
Cryptococcus neoformans	CRYNEO
Cryptococcus neoformans var gattii	CRYNEOG
Cryptococcus neoformans var neoformans	CRYNEON
Cryptococcus species	CRYSPE
Cryptococcus terreus	CRYTER
Cryptococcus uniguttulatus	CRYUNI
Deinococcus	DEI
Deinococcus radiodurans	DEIRAD
Delftia	DELF
Delftia acidovorans	COMACI
Dermabacter	DERB
Dermabacter hominis	DERBHOM
Dermacoccus	DERC
Dermacoccus nishinomiyaensis	MICNIS
Dermatophilus	DERT
Dermatophilus congolensis	DERTCON
Desulfomonas	DESM
Desulfomonas pigra	DESMPIG
Desulfovibrio	DESV
Desulfovibrio species	DESVSPE
Dialister	DIA
Dialister pneumosintes	BACTPNE
Dichelobacter	DIC
Dichelobacter nodosus	DICNOD
Dietzia	DIE
Dietzia maris	DIEMAR
DO NOT USE	STRINS
Dolosigranulum	DOL
Dolosigranulum pigrum	DOLPIG
Edwardsiella	EDW
Edwardsiella hoshinae	EDWHOS
Edwardsiella ictaluri	EDWICT
Edwardsiella tarda	EDWTAR
Edwardsiella tarda biogroup 1	EDWTAR1
Eggerthella	EGG
Eggerthella lenta	EUBLEN
Ehrlichia	EHR
Ehrlichia chaffeensis	EHRCHA
Ehrlichia equi	EHREQU
Ehrlichia sennetsu	EHRSEN
Eikenella	EIK
Eikenella corrodens	EIKCOR
Empedobacter	EMP
Empedobacter brevis	EMPBRE
Enterobacter	ENTB
Enterobacter aerogenes	ENTBAER
Enterobacter aerogenes/cloacae	ENTBAERCLO
Enterobacter amnigenus	ENTBAMN
Enterobacter amnigenus biogroup 1	ENTBAMN1
Enterobacter amnigenus biogroup 2	ENTBAMN2
Enterobacter asburiae	ENTBASB
Enterobacter cancerogenus	ENTBCAN
Enterobacter cloacae	ENTBCLO
Enterobacter dissolvens	ENTBDIS
Enterobacter gergoviae	ENTBGER
Enterobacter hormaechei	ENTBHOR
Enterobacter intermedius	ENTBINT
Enterobacter kobei	ENTBKOB
Enterobacter nimipressuralis	ENTBNIM
Enterobacter sakazakii	ENTBSAK
Enterobacter species	ENTBSPE
Enterococcus	ENTC
Enterococcus avium	ENTCAVI
Enterococcus avium HRE	ENTCAVIHR
Enterococcus casseliflavus	ENTCCAS
Enterococcus casseliflavus HRE	ENTCCASHR
Enterococcus casseliflavus Van C	ENTCCASVC
Enterococcus casseliflavus/gallinarum	ENTCCASGAL
Enterococcus cecorum	ENTCCEC
Enterococcus columbae	ENTCCOL
Enterococcus dispar	ENTCDIS
Enterococcus durans	ENTCDUR
Enterococcus durans HRE	ENTCDURHR
Enterococcus durans/faecium	ENTCDURFAI
Enterococcus faecalis	ENTCFAA
Enterococcus faecalis HRE	ENTCFAAHR
Enterococcus faecalis Van A	ENTCFAAVA
Enterococcus faecalis Van B	ENTCFAAVB
Enterococcus faecalis VRE	ENTCFAAVR
Enterococcus faecium	ENTCFAI
Enterococcus faecium HRE	ENTCFAIHR
Enterococcus faecium Van A	ENTCFAIVA
Enterococcus faecium Van B	ENTCFAIVB
Enterococcus faecium VRE	ENTCFAIVR
Enterococcus flavescens	ENTCFLA
Enterococcus gallinarum	ENTCGAL
Enterococcus gallinarum Van C	ENTCGALVC
Enterococcus hirae	ENTCHIR
Enterococcus hirae/faecium	ENTCHIRFAI
Enterococcus malodoratus	ENTCMAL
Enterococcus mundtii	ENTCMUN
Enterococcus pseudoavium	ENTCPSE
Enterococcus raffinosus	ENTCRAF
Enterococcus raffinosus Van A	ENTCRAFVA
Enterococcus saccharolyticus	ENTCSAC
Enterococcus solitarius	ENTCSOL
Enterococcus species	ENTCSPE
Salmonella heidelberg	SALHEI
Salmonella illinois	SALILL
Salmonella infantis	SALINF
Salmonella inverness	SALINV
Salmonella java	SALJAA
Salmonella javiana	SALJAI
Salmonella kirkee	SALKIR
Salmonella kunduchi	SALKUN
Salmonella kvittingfoss	SALKVI
Salmonella lansing	SALLAN
Salmonella litchfield	SALLIT
Salmonella liverpool	SALLIV
Salmonella london	SALLON
Salmonella luciana	SALLUC
Salmonella manhattan	SALMAN
Salmonella meleagridis	SALMEL
Salmonella memphis	SALMEM
Salmonella michigan	SALMIC
Salmonella minneapolis	SALMIA
Salmonella minnesota	SALMIS
Salmonella montevideo	SALMON
Salmonella muenchen	SALMUE
Salmonella newington	SALNEI
Salmonella newport	SALNEP
Salmonella nottingham	SALNOT
Salmonella ohio	SALOHI
Salmonella onderstepoort	SALOND
Salmonella oranienburg	SALORA
Salmonella paratyphi A	SALPARA
Salmonella paratyphi B	SALPARB
Salmonella poona	SALPOO
Salmonella pullorum	SALPUL
Salmonella quinhon	SALQUI
Salmonella rubislaw	SALRUB
Salmonella saintpaul	SALSAI
Salmonella schwarzengrund	SALSCH
Salmonella senftenberg	SALSEN
Salmonella species	SALSPE
Salmonella tallahassee	SALTAL
Salmonella thompson	SALTHO
Salmonella typhi	SALTYP
Salmonella typhimurium	SALTYPM
Salmonella virginia	SALVIR
Salmonella westerstede	SALWES
Salmonella worthington	SALWOR
Sarcina	SAR
Sarcina species	SARSPE
Sarcina ventriculi	SARVEN
Sebaldella	SEB
Sebaldella termitidis	SEBTER
Selenomonas	SEL
Selenomonas artemidis	SELART
Selenomonas dianae	SELDIA
Selenomonas flueggei	SELFLU
Selenomonas infelix	SELINF
Selenomonas noxia	SELNOX
Selenomonas sputigena	SELSPU
Serratia	SER
Serratia entomophila	SERENT
Serratia ficaria	SERFIC
Serratia fonticola	SERFON
Serratia grimesii	SERGRI
Serratia liquefaciens	SERLIQ
Serratia marcescens	SERMAR
Serratia odorifera	SERODO
Serratia odorifera 1	SERODO1
Serratia odorifera 2	SERODO2
Serratia plymuthica	SERPLY
Serratia proteamaculans ssp proteamaculans	SERPROP
Serratia proteamaculans ssp quinovora	SERPROQ
Serratia rubidaea	SERRUB
Serratia species	SERSPE
Shewanella	SHE
Shewanella algae	SHEALG
Shewanella putrefaciens	SHEPUT
Shewanella putrefaciens biovar 1	SHEPUT1
Shewanella putrefaciens biovar 2	SHEPUT2
Shewanella putrefaciens biovar 3	SHEPUT3
Shigella	SHI
Shigella boydii	SHIBOY
Shigella dysenteriae	SHIDYS
Shigella flexneri	SHIFLE
Shigella sonnei	SHISON
Shigella species	SHISPE
Simonsiella	SIM
Simonsiella muelleri	SIMMUE
Skermania	SKE
Skermania piniformis	SKEPIN
Slackia	SLA
Slackia exigua	EUBEXI
Slackia heliotrinireducens	PEPSHEL
Sphingobacterium	SPHB
Sphingobacterium multivorum	SPHBMUL
Sphingobacterium multivorum/thalpophilum	SPHBMULTHA
Sphingobacterium species	SPHBSPE
Sphingobacterium spiritivorum	SPHBSPI
Sphingobacterium thalpophilum	SPHBTHA
Sphingomonas	SPHM
Sphingomonas capsulata	SPHMCAP
Sphingomonas paucimobilis	SPHMPAU
Spirochete	SPRC
Spirochete (Group)	SPRCG
Sporobolomyces	SPOB
Sporobolomyces salmonicolor	SPOBSAL
Staphylococcus	STA
Staphylococcus arlettae	STAARL
Staphylococcus aureus	STAAUE

Enterococcus sulfureus	ENTCSUL
Erwinia	ERW
Erwinia persicina	ERWPER
Erysipelothrix	ERY
Erysipelothrix rhusiopathiae	ERYRHU
Erysipelothrix tonsillarum	ERYTON
Escherichia	ESC
Escherichia blattae	ESCBLA
Escherichia coli	ESCCOL
Escherichia coli AD	ESCCOLAD
Escherichia coli atypical	ESCCOLATY
Escherichia coli H2S+	ESCCOLHS
Escherichia coli inactive	ESCCOLINA
Escherichia coli serotype O111	ESCCOL0111
Escherichia coli serotype O157	ESCCOL0157
Escherichia fergusonii	ESCFER
Escherichia hermannii	ESCHER
Escherichia vulneris	ESCVUL
Eubacterium	EUB
Eubacterium barkeri	EUBBAR
Eubacterium biforme	EUBBIF
Eubacterium brachy	EUBBRA
Eubacterium combesii	EUBCOM
Eubacterium contortum	EUBCON
Eubacterium cylindroides	EUBCYL
Eubacterium dolichum	EUBDOL
Eubacterium eligens	EUBELI
Eubacterium formicigenerans	EUBFOR
Eubacterium hadrum	EUBHAD
Eubacterium hallii	EUBHAL
Eubacterium limosum	EUBLIM
Eubacterium minutum	EUBMIN
Eubacterium moniliforme	EUBMON
Eubacterium multiforme	EUBMUL
Eubacterium nitritogenes	EUBNIT
Eubacterium nodatum	EUBNOD
Eubacterium ramulus	EUBRAM
Eubacterium rectale	EUBREC
Eubacterium saburreum	EUBSAB
Eubacterium saphenum	EUBSAP
Eubacterium siraeum	EUBSIR
Eubacterium species	EUBSPE
Eubacterium sulci	FUSSUL
Eubacterium tenue	EUBTEN
Eubacterium tortuosum	EUBTOR
Eubacterium ventriosum	EUBVEN
Eubacterium yurii ssp margaretiae	EUBYURM
Eubacterium yurii ssp schtitka	EUBYURS
Eubacterium yurii ssp yurii	EUBYURY
Ewingella	EWI
Ewingella americana	EWIAME
Exiguobacterium	EXI
Exiguobacterium acetylicum	EXIACE
Facklamia	FAC
Facklamia hominis	FACHOM
Fibrobacter	FIB
Fibrobacter succinogenes	FIBSUC
Filifactor	FILF
Filifactor alocis	FUSALO
Filobasidiella	FIL
Filobasidiella neoformans	FILNEO
Finegoldia	FIN
Finegoldia magna	PEPSMAG
Flavimonas	FLAI
Flavobacterium	FLAO
Flavobacterium mizutaii	FLAOMIZ
Flavobacterium species	FLAOSPE
Francisella	FRA
Francisella novicida	FRANOV
Francisella philomiragia	FRAPHI
Francisella tularensis	FRATUL
Francisella tularensis ssp holarctica	FRATULH
Francisella tularensis ssp tularensis	FRATULT
Fungi	FUNGI
Fungi (Group)	FUNGIG
Fusobacterium	FUS
Fusobacterium gonidiaformans	FUSGON
Fusobacterium mortiferum	FUSMOR
Fusobacterium naviforme	FUSNAV
Fusobacterium necrogenes	FUSNEG
Fusobacterium necrophorum	FUSNEC
Fusobacterium necrophorum ssp funduliform	FUSNECF
Fusobacterium necrophorum ssp necrophorum	FUSNECN
Fusobacterium nucleatum	FUSNUC
Fusobacterium nucleatum ssp animalis	FUSNUCA
Fusobacterium nucleatum ssp fusiforme	FUSNUCF
Fusobacterium nucleatum ssp nucleatum	FUSNUCN
Fusobacterium nucleatum ssp polymorphum	FUSNUCP
Fusobacterium nucleatum ssp vincentii	FUSNUCV
Fusobacterium perfoetens	FUSPEF
Fusobacterium periodonticum	FUSPER
Fusobacterium prausnitzii	FUSPRA
Fusobacterium russii	FUSRUS
Fusobacterium ulcerans	FUSULC
Fusobacterium varium	FUSVAR
Gardnerella	GAR
Gardnerella vaginalis	GARVAG
Gemella	GEM
Gemella bergeri	GEMBER
Gemella haemolysans	GEMHAE
Gemella morbillorum	GEMMOR
Gemella sanguinis	GEMSAN
Gemella species	GEMSPE
Geotrichum	GEO
Geotrichum candidum	GEOCAN
Geotrichum species	GEOSPE
Globicatella	GLO
Staphylococcus aureus MR	STAAUEMR
Staphylococcus aureus ssp anaerobius	STAAUEAN
Staphylococcus aureus ssp aureus	STAAUEAU
Staphylococcus aureus Van I	STAAUEVI
Staphylococcus aureus Van R	STAAUEVR
Staphylococcus auricularis	STAAUI
Staphylococcus capitis	STACAI
Staphylococcus capitis ssp capitis	STACAIC
Staphylococcus capitis ssp ureolyticus	STACAIU
Staphylococcus caprae	STACAP
Staphylococcus carnosus	STACAR
Staphylococcus carnosus ssp carnosus	STACARC
Staphylococcus carnosus ssp utilis	STACARU
Staphylococcus chromogenes	STACHR
Staphylococcus chromogenes/hyicus	STACHRHYI
Staphylococcus coag negative	STACNEG
Staphylococcus cohnii	STACOH
Staphylococcus cohnii ssp cohnii	STACOHC
Staphylococcus cohnii ssp urealyticum	STACOHU
Staphylococcus delphini	STADEL
Staphylococcus epidermidis	STAEPI
Staphylococcus epidermidis MR	STAEPIMR
Staphylococcus equorum	STAEQU
Staphylococcus felis	STAFEL
Staphylococcus gallinarum	STAGAL
Staphylococcus haemolyticus	STAHAE
Staphylococcus haemolyticus MR	STAHAEMR
Staphylococcus hominis	STAHOM
Staphylococcus hominis MR	STAHOMMR
Staphylococcus hominis ssp hominis	STAHOMH
Staphylococcus hominis ssp novobiosepticus	STAHOMN
Staphylococcus hyicus	STAHYI
Staphylococcus intermedius	STAINT
Staphylococcus kloosii	STAKLO
Staphylococcus lentus	STALEN
Staphylococcus lugdunensis	STALUG
Staphylococcus lutrae	STALUT
Staphylococcus muscae	STAMUS
Staphylococcus pasteuri	STAPAS
Staphylococcus piscifermentans	STAPIS
Staphylococcus pulvereri	STAPUL
Staphylococcus saccharolyticus	STASAC
Staphylococcus saprophyticus	STASAP
Staphylococcus saprophyticus MR	STASAPMR
Staphylococcus saprophyticus ssp bovis	STASAPB
Staphylococcus saprophyticus ssp saprophyticus	STASAPS
Staphylococcus schleiferi	STASCH
Staphylococcus schleiferi ssp coagulans	STASCHC
Staphylococcus schleiferi ssp schleiferi	STASCHS
Staphylococcus sciuri	STASCI
Staphylococcus sciuri ssp carnaticus	STASCIC
Staphylococcus sciuri ssp rodentium	STASCIR
Staphylococcus sciuri ssp sciuri	STASCIS
Staphylococcus simulans	STASIM
Staphylococcus simulans MR	STASIMMR
Staphylococcus species	STASPE
Staphylococcus species MR	STASPEMR
Staphylococcus vitulinus	STAVIT
Staphylococcus warneri	STAWAR
Staphylococcus warneri MR	STAWARMR
Staphylococcus xylosus	STAXYL
Stenotrophomonas	STE
Stenotrophomonas africana	STEAFR
Stenotrophomonas maltophilia	STEMAL
Stenotrophomonas maltophilia (CF)	STEMALCF
Stomatococcus	STO
Stomatococcus species	STOSPE
Streptobacillus	STRB
Streptobacillus moniliformis	STRBMON
Streptococcus	STR
Streptococcus acidominimus	STRACI
Streptococcus agalactiae	STRAGA
Streptococcus alactolyticus	STRALA
Streptococcus anginosus	STRANG
Streptococcus bovis	STRBOV
Streptococcus bovis I	STRBOVI
Streptococcus bovis II	STRBOVII
Streptococcus canis	STRCAN
Streptococcus constellatus	STRCON
Streptococcus criceti	STRCRC
Streptococcus cristatus	STRCRS
Streptococcus downei	STRDOW
Streptococcus dysgalactiae	STRDYS
Streptococcus dysgalactiae ssp dysgalactiae	STRDYSDY
Streptococcus dysgalactiae ssp equisimilis	STRDYSEM
Streptococcus equi	STREQU
Streptococcus equi ssp equi	STREQUE
Streptococcus equi ssp zooepidemicus	STREQUZ
Streptococcus equinus	STREQN
Streptococcus ferus	STRFER
Streptococcus gordonii	STRGOR
Streptococcus group C	STRGRC
Streptococcus group C/G	STRGRCG
Streptococcus group CFG	STRGRCFG
Streptococcus group E	STRGRE
Streptococcus group F	STRGRF
Streptococcus group G	STRGRG
Streptococcus group L	STRGRL
Streptococcus hyointestinalis	STRHYO
Streptococcus iniae	STRINI
Streptococcus intermedius	STRINR
Streptococcus macedonicus	STRMAC
Streptococcus milleri group	STRMILGR
Streptococcus mitis	STRMIT
Streptococcus mitis group	STRMITGR
Streptococcus mitis/pneumoniae	STRMITPNE
Streptococcus mutans	STRMUT

Globicatella sanguinis	GLOSAN
Gordonia	GOR
Gordonia aichiensis	GORAIC
Gordonia amarae	GORAMA
Gordonia bronchialis	GORBRO
Gordonia rubropertincta	GORRUB
Gordonia sputi	GORSPU
Gordonia terrae	GORTER
Gram + Bacilli	G+B
Gram + Bacteria	+
Gram + Cocci	G+C
Gram + Coccobacilli	G+CB
Gram - Bacilli	G-B
Gram - Bacteria	-
Gram - Cocci	G-C
Gram - Coccobacilli	G-CB
Gram - Diplococci	G-DC
Granulicatella	GRAN
Granulicatella adiacens	STRADJ
Haemophilus	HAE
Haemophilus aphrophilus	HAEAPH
Haemophilus aphrophilus/paraphrophilus	HAEAPHPAR
Haemophilus ducreyi	HAEDUC
Haemophilus haemoglobinophilus	HAEHAG
Haemophilus haemolyticus	HAEHAL
Haemophilus influenzae	HAEINF
Haemophilus influenzae biogroup aegyptius	HAEINFA
Haemophilus influenzae biotype I	HAEINFI
Haemophilus influenzae biotype II	HAEINFII
Haemophilus influenzae biotype III	HAEINFIII
Haemophilus influenzae biotype IV	HAEINFIV
Haemophilus influenzae biotype V	HAEINFV
Haemophilus influenzae biotype VI	HAEINFVI
Haemophilus influenzae biotype VIII	HAEINFVIII
Haemophilus parahaemolyticus	HAEPAH
Haemophilus parainfluenzae	HAEPAI
Haemophilus parainfluenzae biotype I	HAEPAII
Haemophilus parainfluenzae biotype II	HAEPAIII
Haemophilus parainfluenzae biotype III	HAEPAIIII
Haemophilus parainfluenzae biotype IV	HAEPAIIV
Haemophilus paraphrophilus	HAEPAP
Haemophilus parasuis	HAEPAS
Haemophilus segnis	HAESEG
Haemophilus somnus	HAESOM
Haemophilus species	HAESPE
Hafnia	HAF
Hafnia alvei	HAFALV
Hafnia alvei group 1	HAFALV1
Hallella	HAL
Hallella seregens	HALSER
Halomonas	HALO
Halomonas aquamarina	ALCFAEH
Hansenula	HAN
Hansenula polymorpha	HANPOL
Hansenula saturnas	HANSAT
Helcococcus	HELC
Helcococcus kunzii	HELCKUN
Helicobacter	HELI
Helicobacter acinonychis	HELIACI
Helicobacter cinaedi	HELICIN
Helicobacter felis	HELIFEL
Helicobacter fennelliae	HELIFEN
Helicobacter muridarum	HELIMUR
Helicobacter mustelae	HELIMUS
Helicobacter nemestrinae	HELINEM
Helicobacter pullorum	HELIPUL
Helicobacter pylori	HELIPYL
Histoplasma	HIS
Histoplasma capsulatum	HISCAP
Issatchenkia	ISS
Issatchenkia orientalis	ISSORI
Johnsonella	JOH
Johnsonella ignava	JOHIGN
Jonesia	JON
Jonesia denitrificans	JONDEN
Kingella	KIN
Kingella denitrificans	KINDEN
Kingella kingae	KINKIN
Kingella oralis	KINORA
Kingella species	KINSPE
Klebsiella	KLE
Klebsiella granulomatis	CALYGRA
Klebsiella ornithinolytica	KLEORN
Klebsiella oxytoca	KLEOXY
Klebsiella oxytoca/pneumoniae	KLEOXYPNE
Klebsiella planticola	KLEPLA
Klebsiella pneumoniae ssp ozaenae	KLEPNEO
Klebsiella pneumoniae ssp pneumoniae	KLEPNEP
Klebsiella pneumoniae ssp rhinoscleromati	KLEPNER
Klebsiella species	KLESPE
Klebsiella terrigena	KLETER
Kloeckera	KLO
Kloeckera apiculata	KLOAPI
Kluyvera	KLU
Kluyvera ascorbata	KLUASC
Kluyvera cryocrescens	KLUCRY
Kluyvera georgiana	KLUGEO
Kluyvera species	KLUSPE
Kluyveromyces	KLUM
Kluyveromyces lactis	KLUMLAC
Kluyveromyces marxianus	KLUMMAR
Kocuria	KOC
Kocuria kristinae	MICKRI
Kocuria rosea	MICROS
Kocuria varians	MICVAR
Kurthia	KUR
Kurthia gibsonii	KURGIB
Streptococcus mutans group	STRMUTGR
Streptococcus oralis	STRORA
Streptococcus parasanguinis	STRPAR
Streptococcus pleomorphus	STRPLE
Streptococcus pneumoniae	STRPNE
Streptococcus pneumoniae Pen I	STRPNEPI
Streptococcus pneumoniae Pen R	STRPNEPR
Streptococcus porcinus	STRPOR
Streptococcus pyogenes	STRPYO
Streptococcus ratti	STRRAT
Streptococcus salivarius	STRSAL
Streptococcus salivarius group	STRSALGR
Streptococcus sanguinis	STRSAN
Streptococcus sanguinis group	STRSANGR
Streptococcus sobrinus	STRSOB
Streptococcus species	STRSPE
Streptococcus suis	STRSUI
Streptococcus thermophilus	STRTHE
Streptococcus uberis	STRUBE
Streptococcus vestibularis	STRVES
Streptococcus viridans group	STRVIRGR
Succinivibrio	SUC
Succinivibrio dextrinosolvens	SUCDEX
Sutterella	SUTE
Sutterella wadsworthensis	SUTEWAD
Suttonella	SUT
Suttonella indologenes	SUTIND
Tatumella	TAT
Tatumella ptyseos	TATPTY
Tetragenococcus	TET
Tetragenococcus halophilus	TETHAL
Tissierella	TIS
Tissierella praeacuta	TISPRA
Torulopsis	TOR
Torulopsis candida	TORCAN
Torulopsis pintolopesii	TORPIN
Trabulsiella	TRA
Trabulsiella guamensis	TRAGUA
Trichosporon	TRI
Trichosporon aquatile	TRIAQU
Trichosporon beigelii	TRIBEI
Trichosporon pullulans	TRIPUL
Tsukamurella	TSU
Tsukamurella inchonensis	TSUINC
Tsukamurella paurometabola	TSUPAU
Tsukamurella pulmonis	TSUPUL
Tsukamurella tyroinosolvens	TSUTYR
Tsukamurella wratislaviensis	TSUWRA
Turicella	TUR
Turicella otitidis	TUROTI
Unidentified organism	UNIORG
Unspecified	UNS
Ureaplasma	URE
Ureaplasma urealyticum	UREURE
Vagococcus	VAG
Vagococcus species	VAGSPE
Veillonella	VEI
Veillonella atypica	VEIATY
Veillonella dispar	VEIDIS
Veillonella parvula	VEIPAR
Veillonella species	VEISPE
Vibrio	VIB
Vibrio alginolyticus	VIBALG
Vibrio cholerae	VIBCHO
Vibrio cincinnatiensis	VIBCIN
Vibrio fluvialis	VIBFLU
Vibrio furnissii	VIBFUR
Vibrio harveyi	VIBHAR
Vibrio hollisae	VIBHOL
Vibrio metschnikovii	VIBMET
Vibrio mimicus	VIBMIM
Vibrio parahaemolyticus	VIBPAR
Vibrio species	VIBSPE
Vibrio vulnificus	VIBVUL
Weeksella	WEE
Weeksella virosa	WEEVIR
Weeksella virosa/Bergeyella zoohelcum	WEEVIRBERZOO
Weeksella/Bergeyella	WEE/BER
Weissella	WEI
Weissella confusa	WEICON
Weissella paramesenteroides	WEIPAR
Wolinella	WOLI
Wolinella succinogenes	WOLISUC
Xenorhabdus	ZEN
Xenorhabdus beddingii	XENBED
Xenorhabdus bovienii	XENBOV
Xenorhabdus nematophilus	XENNEM
Xenorhabdus poinarii	XENPOI
Yamadazyma	YAM
Yamadazyma guilliermondii	YAMGUI
Yarrowia	YAR
Yarrowia lipolytica	YARLIP
Yeast	YST
Yeast (Group)	YSTG
Yeast-like	YSTL
Yeast-like (Group)	YSTLG
Yersinia	YER
Yersinia aldovae	YERALD
Yersinia bercovieri	YERBER
Yersinia enterocolitica	YERENT
Yersinia enterocolitica group	YERENTGR
Yersinia frederiksenii	YERFRE
Yersinia intermedia	YERINT
Yersinia kristensenii	YERKRI
Yersinia mollaretii	YERMOL
Yersinia pestis	YERPES
Yersinia pseudotuberculosis	YERPSE

Kurthia zopfii	KURZOP	Yersinia rohdei	YERROH
Kytococcus	KYT	Yersinia ruckeri	YERRUC
Kytococcus sedentarius	MICSED	Yersinia species	YERSPE
Lactobacillus	LACB	Yokenella	YOK
Lactobacillus acidophilus	LACBACI	Yokenella regensburgei	YOKREG
Lactobacillus brevis	LACBBRE	Zygosaccharomyces	ZYG
Lactobacillus buchneri	LACBBUC	Zygosaccharomyces bailli	ZYGBAI
Lactobacillus casei	LACBCAS	Zygosaccharomyces species	ZYGSPE

14. Appendix E – BD Instrument Specifics

14.1. BACTEC MGIT 960

BACTEC MGIT 960 supports ASTM E_1394 Logical Protocol and ASTM E_1381 Physical Protocol.

14.1.1. Configurable Options

LIS Enable –acceptable values are ENABLE or DISABLE. Used to enable the LIS interface within the instruments. The instrument defaults to DISABLE.

Baud Rate – acceptable values are 1200, 2400, 4800, 9600, 19200. The instrument defaults to 9600.

Data Bits – acceptable values are 7 and 8. The instrument defaults to 8.

Stop Bits – acceptable values are 1 and 2. The instrument defaults to 1.

Parity - acceptable values are ODD, EVEN, and NONE. The instrument defaults to NONE.

Upload Results – acceptable values are SOLICITED and UNSOLICITED. The instrument defaults to UNSOLICITED. In unsolicited mode the instrument automatically uploads results as tests are completed. The instrument in solicited mode waits for LIS to request the results.

Consumable Tracking – acceptable values include ENABLE or DISABLE. The instrument defaults to DISABLE. Enabling this option causes the instrument to automatically send a specimen's test status to the LIS when a specimen has been scanned-in the instrument for the first time (ONGOING) or scanned-out of the instrument (REMOVED) (automatic transfer when UPLOAD_RESULT option set to UNSOLICITED).

Orphan Result – acceptable values include ENABLE and DISABLE. The instrument defaults to DISABLE. Enabling this option causes the instrument to report results for tests that do NOT have an accession number associated with them.

Packed Frames – acceptable values include ENABLE and DISABLE. The instrument defaults to ENABLE. Enabling this option allows message frames sent to the LIS to support multiple records per frame ("packed"). When Disabled, only one record is tranmitted per frame.

14.1.2. Message Content

Field List

The BACTEC MGIT 960 shall exchange fields with the LIS per the following table:

Header Record Field Name	ASTM Pos.	Direction
Sender Name	H, 5, 1, 1	U
Version Number	H, 13, 1, 1	U
Message Date/Time	H 14, 1, 1	U

Order Record Field Name	ASTM Pos.	Direction
Accession Number	O, 3, 1, 1	U
Isolate Number	O, 3, 1, 2	U

Order Record Field Name	ASTM Pos.	Direction
Test ID	O, 5, 1, 4	U

Result Record Field Name	ASTM Pos.	Direction
Result Type Code	R, 3, 1, 4	U
Test/Consumable Sequence Number	R, 3, 1, 5	U
Antibiotic	R, 3, 1, 6	U
Antibiotic Concentration	R, 3, 1, 7	U
Antibiotic Concentration Units	R, 3, 1, 8	U
Test Status	R, 4, 1, 1	U
Result Data 1		
BACTEC MGIT 960 Growth Units	R, 4, 1, 2	U
Result Data 3		
AST susceptibility (Interpreted)	R, 4, 1, 4	U
Preliminary/Final Status	R, 9, 1, 1	U
Test Start Date/Time	R, 12, 1, 1	U
Result/Status Date/Time	R, 13, 1, 1	U
Instrument Type	R, 14, 1, 1	U
Protocol Length	R, 14, 1, 3	U
Instrument Number	R, 14, 1, 4	U
Instrument Location	R, 14, 1, 5	U

Request Record Field Name	ASTM Pos.	Direction
Request Starting Patient Id	Q, 3, 1, 1	
Request Starting Accession Number	Q, 3, 1, 2	D
Request Starting Sequence Number	Q, 3, 1, 3	D
Request Ending Patient Id	Q, 4, 1, 1	
Request Ending Accession Number	Q, 4, 1, 2	
Request Ending Sequence Number	Q, 4, 1, 3	
Request Test Id	Q, 5, 1, 1	D
Request Test Status	Q, 5, 1, 2	D
Request Instrument Type	Q, 5, 1, 3	
Request Instrument Number	Q, 5, 1, 4	
Request Result Qualifier	Q, 5, 1, 5	D
Request Time Qualifier	Q, 6, 1, 1	
Starting Date/Time	Q, 7, 1, 1	D
Ending Date/Time	Q, 8, 1, 1	D
Request Information Status Code	Q, 13, 1, 1	

Terminator Record Field Name	ASTM Pos.	Direction
Termination Code	L, 3, 1, 1	U/D

Field Descriptions

Header Fields

General

Patient Fields

BACTEC MGIT 960 does not support patient information and therefore always transmits an empty Patient record.

Order Fields

Accession Number (O, 3, 1, 1) – The unique alphanumeric string that identifies a specimen. This field can be up to 20 characters long. (e.g. Acc123).

Isolate Number (O, 3, 1, 2) – Specimen's assigned isolate number.

Test Id (O, 5, 1, 4) –MGIT 960 transmits **MGIT_960_GND** for Growth and Detection specimens or **MGIT_960_AST** for AST sets.

Result Fields

Result Id Code (R, 3, 1, 4) – transmits **GND_MGIT** for growth and Detection specimens or **AST_MGIT** for AST sets.

Test Sequence Number (R, 3, 1, 5) – specimen's assigned sequence number (barcode) that is always be 12 digits.

Drug Abbreviation (R, 3, 1, 6) – Antibiotic abbreviation used for a drug within an AST set.

Drug Concentration (R, 3, 1, 7) – Drug concentration used for a drug within an AST set.

Drug Units of Measurement (R, 3, 1, 8) – Drug units of measurement used for a drug within an AST set.

Test Status LIS Code (R, 4, 1, 1) – BACTEC MGIT 960 transmits the following specimen status:

INST_ONGOING
INST_POSITIVE
INST_NEGATIVE
INST_COMPLETE
INST_REMOVED (for Ongoing Removed only)
INST_ERROR

It should be noted that Result records are not transmitted for G&D specimens that are in error. However, Result records are transmitted for AST set specimens that are in error because an AST set in error is considered a completed status. An AST set in error cannot return to an Ongoing state. A G&D specimen in error requires the users to resolve the before it returns to an Ongoing or Completed state.

Result Data (R, 4, 1, 2) – The BACTEC MGIT 960 instrument measures Mycobacterial growth. The instrument assigns a numerical value to quantify the amount of growth in a tube. This growth value is placed in the second component for any results generated by

this instrument, one of either **GND_MGIT** or **AST_MGIT** tests. This field is never more than 5 characters long.

AST SIR Status (R, 4, 1, 4) – The BACTEC MGIT 960 instrument transmits an **'S'** for susceptible, **'I'** for Indeterminate (not currently used), or an **'R'** for resistant.

Result Status Code (R, 9, 1, 1) – Always a **'P'** for Premliminary result.

Start Date/Time (R, 12, 1, 1) – This is the date and time that the test was first started or entered into an instrument. This field is formatted as described in the ASTM E_1394 specification in section 6.6.2.

> The BACTEC MGIT 960 AST tests are run in reusable plastic carriers. The plastic carrier contains a sequence number that uniquely identifies the tube carrier. This is the sequence number transmitted with results up to the LIS. However, it is possible that a single plastic carrier could be used more than once for a particular access number. If the LIS intends to allow these carriers to be used more than once for the same access number, then the LIS should take note of the test start date/time. The test start date/time, with the sequence number, uniquely identifies a test and its result.
>
> MGIT AST test information downloaded from the LIS is checked for this start date/time. If this field is filled, meaning that existing results are being copied back to the EpiCenter, the EpiCenter tries to use it to match an existing test in its database. New test orders should not fill this field. If the test sequence number and entry date/time don't match an existing test, or are blank, then the EpiCenter considers it a new test order.

Test Result Date/Time (R, 13, 1, 1) – The instrument's date and time that the specimen completed its test.

- For an INST_ONGOING specimen this field is empty.
- For an INST_POSITIVE specimen this is the time the specimen went positive.
- For an INST_NEGATIVE specimen this is the time the specimen went negative (calculated by adding the protocol length with the start time).
- For an INST_REMOVED specimen, this is the time the specimen was removed from the instrument.
- For an INST_COMPLETE specimen this is the time the AST set completed.
- For an INST_ERROR specimen this is the time the AST set went into error (this is considered a completed status).

Instrument Type (R, 14, 1, 1) – transmits a **'MGIT960'**.

Protocol Length (R, 14, 1, 3) – the specimen's assigned protocol length.

Instrument Number (R, 14, 1, 4) –the user configured instrument number that ranges from 1 to 99.

Instrument Location (R, 14, 1, 5) – the specimen's location within the instrument. For example, Drawer A, Row D, Column 12 would be represented as "A/D12".

Request Fields

The ASTM 1394 protocol defines this as a Request Information Record message. A download Request record is also known as a "Query". The only type of download "Query" request that the Firefly instrument accepts is a request for test results. A Terminator record with a termination code of "F" or "Q" is used to signal the last packet of a query response. If a query request was invalid, the instrument interface responds

with only the Terminator record with a termination code of "Q". If the instrument interface can not locate any specimens in the active or history databases that meet the query criteria, it responds with only the Terminator record with a termination code of "F". **Note, that the BACTEC MGIT 960 instrument does NOT request data from an LIS.**

A query contains a set of request parameters that are used to determine which specimen(s) to access. The following tables define the ASTM 1394 Request record fields that are transmitted from the LIS in an Download message and the MGIT 960 statuses that correspond to the StatusId field.

Accession Number (Q, 3, 1, 2) – The unique alphanumeric string that identifies a specimen. This field can be up to 20 characters long. (e.g. Acc123). The use of "**ALL**" or no definition indicates that the Accession # is not used as a search parameter in the query.

Sequence Number (Q, 3, 1, 3) – specimen's assigned sequence number (barcode) that is always be 12 digits. The use of "**ALL**" or no definition indicates that the Sequence # is not used as a search parameter in the query.

Test ID (Q, 5, 1, 1) – The BACTEC 960 instrument accepts the test ids **MGIT_960_GND**, **MGIT_960_AST**, or **ALL** and return the test results for those test types currently in the instrument. The keyword **ALL** returns both GND and AST test results that are currently in the instrument.

Test Status Id (Q, 5, 1, 2) – The status of the specimens being requested. This field is only evaluated if the Test ID field contains valid data. No definition indicates that the specimen status is not used as a search parameter.

The following Test Statuses are used when requesting test results for specimens:

INST_ONGOING (G&D and AST)
INST_POSITIVE
INST_NEGATIVE
INST_COMPLETE (G&D and AST)

Qualifier (Q, 5, 1, 5) – optional qualifier '**MOD**' that indicates that the request is for specimen results that have been modified/changed since last request.

Beginning Time (Q, 7, 1, 1) – the beginning time and date used when requesting data that occurred within a specified time range.

End Time (Q, 8, 1, 1) – the ending time and date used when requesting data that occurred within a specified time range.

When a "Time Range" has been specified in a Query (Begin Time and/or End Time fields), the time field from the instrument's database that is used for comparison is dependent upon the Query's "TestId" field as follows,

INST_ONGOING - Time the specimen was scanned into instrument.
INST_POSITIVE - Time the specimen went positive.
INST_NEGATIVE - Time the specimen went negative.
INST_REMOVED - Time the specimen was removed.
INST_COMPLETE - Time the AST set specimen completed.
INST_ERROR - Time the AST set specimen went into error.

Terminator Fields

General

14.1.3. Example ASTM 1394 Protocol

The following are examples of various instrument message transmissions that conform to the Becton Dickinson Common LIS Interface using the ASTM 1394 protocol.

MGIT960 G&D specimen that has been entered into an instrument, but has NOT been tested:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||410 316-
4000||||P|V1.00|19981019184200
P|1
O|1|0970038018||^^^MGIT_ 960_GND
R|1|^^^GND_MGIT^430109967349|INST_ONGOING^0|||||P|||||MGIT960^^42^1^B/A01
L|1|N
```

MGIT960 G&D specimen that has been tested and is still active in the instrument:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
P|1
O|1|0970038018||^^^MGIT_960_GND
R|1|^^^GND_MGIT^430109967349|INST_ONGOING^123|||||P|||19960502115414|
19960507115414|MGIT960^^42^1^B/A01
L|1|N
```

MGIT960 G&D specimen that has been tested POSITIVE:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
P|1
O|1|0970038018||^^^MGIT_960_GND
R|1|^^^GND_MGIT^430109967349|INST_POSITIVE^1234|||||P|||19960502115414|
19960509123456|MGIT960^^42^1^B/A01
L|1|N
```

MGIT960 G&D specimen that has been tested NEGATIVE:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
P|1
O|1|0970038018||^^^MGIT_960_GND
R|1|^^^GND_MGIT^430109967349|INST_NEGATIVE^12|||||P|||19960502115414|
19960509123456|MGIT960^^42^1^1B/A01
L|1|N
```

MGIT960 AST specimens that have been entered into an instrument, but has NOT been tested:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
P|1
O|1|0970038018^1||^^^MGIT_960_AST
R|1|^^^AST_MGIT^439309967349^EMB^5.0^ug/ml|INST_ONGOING^0|||||P|||||
MGIT960^^^13^B/A02
R|2|^^^AST_MGIT^439309967349^RIF^1.0^ug/ml|INST_ONGOING^0|||||P|||||
MGIT960^^^13^B/A03
L|1|N
```

MGIT960 AST specimens from an AST set that have been tested and are still active in the instrument:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
```

```
P|1
O|1|0970038018^1||^^^MGIT_960_AST
R|1|^^^AST_MGIT^439309967349^EMB^5.0^ug/ml|INST_ONGOING^123|||||P|||
19960502115414|19960502115414|MGIT960^^^13^B/A02
R|2|^^^AST_MGIT^439309967349^RIF^1.0^ug/ml|INST_ONGOING^12|||||P|||
19960502115414|19960502115414|MGIT960^^^13^B/A03
L|1|N
```

MGIT960 AST specimens that have completed testing:

```
H|\^&|||Becton Dickinson|7 Loveton Circle^Sparks^MD^21152||
410 316-4000||||P|V1.00|19981019184200
P|1
O|1|0970038018^1||^^^MGIT_960_AST
R|1|^^^AST_MGIT^439309967349^EMB^5.0^ug/ml|INST_COMPLETE^1234^R|||||P|||
19960502115414|19960502115414|MGIT960^^^13^B/A02
R|2|^^^AST_MGIT^439309967349^RIF^1.0^ug/ml|INST_COMPLETE^12^S|||||P|||
19960502115414|19960502115414|MGIT960^^^13^B/A03
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting all specimen results for a period of time**.

```
H|\^&||||||||||||19990208000001
Q|1|^ALL^ALL||ALL||19980502123000|19980613123000
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting only ONGOING specimen results for a period of time**.

```
H|\^&||||||||||||19990208000001
Q|1|^ALL^ALL||INST_ONGING||19980502123000|19980613123000
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting all specimen results which have been assigned the specified Accession #.**

```
H|\^&||||||||||||19990208000001
Q|1|^Access1234||ALL
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting a specimen result which has been assigned the specified Sequence #.**

```
H|\^&||||||||||||19990208000001
Q|1|^^430109967349||ALL
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting all specimen results which have been modified/changed since the last request.**

```
H|\^&||||||||||||19990208000001
Q|1|||ALL^^^MOD
L|1|N
```

A Request Record (Query) sent from an LIS to a MGIT960 instrument **requesting all G&D specimen results that went Positive between January 2, 1999 at 15:34:00 and January 3, 1999 at 15:34:00.**

```
H|\^&||||||||||||19990208000001
Q|1|||MGIT_GND^INST_POSITIVE||19990102123400|19990103123400
L|1|N
```

14.2. BDProbeTec ET & Viper SP

BDProbeTec ET supports ASTM E_1394 Logical Protocol and ASTM E_1381 Physical Protocol.

BDProbeTec ET does not send results for specimens without accession or specimen numbers. As such the instrument does not allow LIS communication to be enabled unless the instrument Specimen Tracking/Accession Barcoding feature is enabled. The feature is enabled from a configuration screen.

14.2.1. Configurable Options

Comm Port Number – is a dedicated communication port on the instrument and therefore is not configurable.

Baud Rate – acceptable values are 2400, 4800, 9600, 14400, 19200, 38400. The instrument defaults to 9600.

Data Bits – acceptable values are 7 and 8. The instrument defaults to 8.

Stop Bits – acceptable values are 1 and 2. The instrument defaults to 1.

Parity - acceptable values are ODD, EVEN, and NONE. The instrument defaults to NONE.

Upload Mode – acceptable values are SOLICITED and UNSOLICITED. The instrument defaults to UNSOLICITED. The instrument in unsolicited mode uploads results as tests are completed. The instrument in solicited mode waits for the LIS to request the results.

Low Positive Status Upload – select 1 to enable the option or 0 to disable the option on BDProbeTec ET. Check to enable the option on Viper SP. If the option is enabled, a MOTA value greater than or equal to 2,000 and less than 10,000 will produce an **INST_LOW_POS Test Status LIS Code (R,4,1,1)**. Disabled is the default.

14.2.2. Message Content

Field List

Header Record Field Name	ASTM Pos.	Direction
Sender Name	H, 5, 1, 1	U
Version Number	H, 13, 1, 1	U
Message Date/Time	H 14, 1, 1	U

Order Record Field Name	ASTM Pos.	Direction
Accession Number	O, 3, 1, 1	U
Test ID	O, 5, 1, 4	U
Specimen Action Code	O, 12, 1, 1	U

Result Record Field Name	ASTM Pos.	Direction
Result Type Code	R, 3, 1, 4	U
Test/Consumable Sequence Number	R, 3, 1, 5	U
Test Status	R, 4, 1, 1	U

Result Record Field Name	ASTM Pos.	Direction
Result Data 1		
ProbeTecET/Viper SP Alg.Results	R, 4, 1, 2	U
Test Start Date/Time	R, 12, 1, 1	U
Result/Status Date/Time	R, 13, 1, 1	U
Instrument Type	R, 14, 1, 1	U
Media/Assay Type	R, 14, 1, 2	U
Instrument Number	R, 14, 1, 4	U
Instrument Location	R, 14, 1, 5	U
QC Type	R, 14, 1, 6	U
QC Kit Lot Number	R, 14, 1, 7	U

Request Record Field Name	ASTM Pos.	Direction
Request Starting Patient Id	Q, 3, 1, 1	
Request Starting Accession Number	Q, 3, 1, 2	
Request Starting Sequence Number	Q, 3, 1, 3	
Request Ending Patient Id	Q, 4, 1, 1	
Request Ending Accession Number	Q, 4, 1, 2	
Request Ending Sequence Number	Q, 4, 1, 3	
Request Test Id	Q, 5, 1, 1	D
Request Test Status	Q, 5, 1, 2	
Request Instrument Type	Q, 5, 1, 3	
Request Instrument Number	Q, 5, 1, 4	
Request Result Qualifier	Q, 5, 1, 5	D
Request Time Qualifier	Q, 6, 1, 1	
Starting Date/Time	Q, 7, 1, 1	
Ending Date/Time	Q, 8, 1, 1	
Request Information Status Code	Q, 13, 1, 1	

Terminator Record Field Name	ASTM Pos.	Direction
Termination Code	L, 3, 1, 1	U/D

Field Descriptions

Header Fields

General

Patient Fields

BDProbeTec ET does not support patient information and therefore always transmits an empty Patient record.
P|1

Order Fields

Accession Number (O, 3, 1, 1) – The unique alphanumeric string that identifies a specimen. This field can be up to 20 characters long. (e.g. Acc123) This is a required field for processing specimen and test information. The instrument excludes the

following special characters from being entered in the accession / specimen number field and therefore never transmits them: * ? [ ] #

Test Id (O, 5, 1, 4) –BDProbeTec ET transmits **BD_PROBETEC_GND** for the test id code field.

Specimen Action Code (O, 12, 1, 1) - In the special case when no accession / specimen number is transmitted then the Specimen Action Code is designated 'Q' as an indicator to treat the result as a QC result.

P|1
O|1|Accession_789 | | ^ ^ ^BD_PROBETEC_GND

P|1
O|1| | | ^ ^ ^BD_PROBETEC_GND| | | | | |Q

Result Fields

Result Id Code (R, 3, 1, 4) – BDProbeTec ET always transmits '**GND_PROBETEC**' for the result id code.

Test Sequence Number (R, 3, 1, 5) – Designates the assay kit lot number and is always 9 digits.

Test Status LIS Code (R, 4, 1, 1) – BDProbeTec ET transmits the following specimen status:
INST_POSITIVE
INST_LOW_POS (If enabled, see Configurable Options)
INST_NEGATIVE
INST_INDETERMINATE
INST_EQUIVOCAL

The instrument transmits the following QC status:
INST_QC_PASS
INST_QC_FAIL

Algorithmic Results (R, 4, 1, 2) – (future)

Test Start Date/Time (R, 12, 1, 1) – BDProbeTec ET transmits the instrument's date and time that the specimen started its test. Time zone is not included.

Test Result Date/Time (R, 13, 1, 1) – BDProbeTec ET transmits the instrument's date and time that the specimen ended its test. Time zone is not included. Typically, the test result date and time are 1 hour after the test start date and time.

Instrument Type (R, 14, 1, 1) – BDProbeTec ET transmits a **'PROBETEC'** for its instrument type.

Media (Assay) Type (R, 14, 1, 2) – BDProbeTec ET transmits the following assay types:

1 – CT assay (Viper SP)
2 – GC assay (Viper SP)
3 – Intentionally skipped
4 – DTB assay
5 – ctb assay
6 – mac assay
7 – kan assay
8 – Intentionally skipped
9 – CF assay
10 – LP assay
11 – MP assay

12 – tCF assay
13 – tMP assay
14 – dCT assay (Viper SP)
15 – dGC assay (Viper SP)
16 – SCV assay

The list of assay types will expand as further assays are supported on the BDProbeTec ET instrument.

Protocol Length (R, 14, 1, 3) – BDProbeTec ET currently has a 1 hour test time and therefore does not transmit a protocol length.

Instrument Number (R, 14, 1, 4) – BDProbeTec ET transmits the user configured instrument number that ranges from 1 to 99.

Instrument Location (R, 14, 1, 5) – BDProbeTec ET transmits a plate number from 1 to 30, followed by a 96 microwell location of row (A-H), then column (1-12)

Viper SP transmits a plate number from 1 to 60, followed by a 96 microwell location of row (A-H), then column (1-12).

QC Type (R, 14, 1, 6) – BDProbeTec ET transmits a '+' or '-' if the parent Order record designates a QC result to indicate what type of QC, positive or negative QC.

QC Kit Lot Number (R, 14, 1, 7) – BDProbeTec ET transmits a value only if parent order record is designated as a QC test.

P|1
O|1|Accession_789 | | ^ ^ ^BD_PROBETEC_GND
R|1| ^ ^ ^ GND_PROBETEC ^000120299|INST_NEGATIVE| | | | | |
|19981019153400|19981019163400| PROBETEC ^1^^3^14A10

P|1
O|1| | | ^ ^ ^BD_PROBETEC_GND| | | | | |Q
R|1| ^ ^ ^ GND_PROBETEC ^000120299|INST_QC_PASS| | | | | |
|19981019153400|19981019163400| PROBETEC ^1^^3^14H12^+^000031500

Request Fields

The ASTM 1394 protocol defines this as a Request Information Record message. A download Request record is also known as a "Query". The only type of download "Query" request that the BD ProbeTec ET instrument accepts is a request for test results. The BD Probetec ET instrument will accept "query" requests in either the SOLICITED or UNSOLICITED settings for the Upload Mode as described above under Configurable Options. **Note, that the BD PROBETEC ET instrument does NOT request data from an LIS.**

Test ID (Q, 5, 1, 1) – BDProbeTec ET accepts the following test name: **BD_PROBETEC_GND**. The keyword **ALL** can also be used to return all of the test results currently in the instrument.

Q|1| | |BD_PROBETEC_GND

Q|1| | |ALL

Result Qualifier (Q, 5, 1, 5) – BDProbeTec ET accepts the following result qualifiers:

MOD – All available results that have not been previously transmitted to the LIS.

Q|1| | |BD_PROBETEC_GND^^^^MOD

Terminator Field

General

14.2.3. Example ASTM 1394 Protocol

The following are examples of valid requests for test results from the LIS to the BD PROBETEC ET instrument that conform to the Becton Dickinson Common LIS Interface using the ASTM 1394 protocol:

A Request Record (Query) sent from an LIS to a BD PROBETEC ET instrument **r equesting all test results currently in the instrument**.

H|\^&

Q|1|||ALL

L|1|N

A Request Record (Query) sent from an LIS to a BD PROBETEC ET instrument **requesting all available test results that have not been previously transmitted to the LIS.**

H|\^&

Q|1||| BD_PROBETEC_GND^^^^MOD

L|1|N

14.3. BD Phoenix 100

BD Phoenix 100 supports ASTM E_1394 Logical Protocol and ASTM E_1381 Physical Protocol.

14.3.1. Configurable Options

The BD Phoenix 100 provides 3 groups of Configurable Options for customizing the LIS Interface.

General Options

Results Upload Options

Communications Setup

The instrument also provides an Organism Configuration Screen and an Antimicrobial Configuration Screen for editing LIS Codes.

14.3.1.1.General Options

Send Interpretation Results

Acceptable values are CHECKED and UNCHECKED. When CHECKED, final SIR values are included in the AST result record. The instrument defaults to CHECKED.

Unsolicited Queries

Acceptable values are CHECKED and UNCHECKED. When CHECKED, the instrument shall issue a query to the LIS at the time the panel is physically placed in the instrument if the panel is missing an organism id. The instrument defaults to UNCHECKED.

Send When Placed In Instrument

Acceptable values are CHECKED and UNCHECKED. When CHECKED, the instrument shall send a result upload to the LIS at the time the panel is physically placed in the instrument. The instrument defaults to CHECKED.

14.3.1.2.Results Upload Options

There are five results upload options, only one of which can be CHECKED at a time.

Solicited

Acceptable values are CHECKED and UNCHECKED. When CHECKED the instrument waits for the LIS to request the results The instrument defaults to UNCHECKED.

Send On Finalization

Acceptable values are CHECKED and UNCHECKED. When CHECKED the instrument shall send results to the LIS when the panel is finalized or a modification has been made to a finalized panel. The instrument defaults to UNCHECKED.

Send On Completion

Acceptable values are CHECKED and UNCHECKED. When CHECKED the instrument shall send results to the LIS when the panel's status transitions to COMPLETE or a modification has been made to a COMPLETE panel . The instrument defaults to CHECKED.

Send as Available

Acceptable values are CHECKED and UNCHECKED. When CHECKED the instrument shall send results to the LIS when the panel's status transitions to COMPLETE or the panel has partial results. Partial results are when at least one MIC value is determined for an AST or ID/AST panel or the organism ID is determined for an ID/AST panel. The instrument defaults to UNCHECKED.

Send at Fixed Time

Acceptable values are CHECKED and UNCHECKED. When CHECKED the instrument shall send results to the LIS when the panel's status transitions to COMPLETE and send panels with partial results to the LIS at the Fixed Time. When the Fixed Time is reached, any panel that is ONGOING and has partial results shall be uploaded to the LIS with a Test Status of INST_PARTIAL_COMPLETE. The instrument defaults to UNCHECKED.

14.3.1.3.Communications Setup

NOTE: Modifying any of the following options will result in the instrument rebooting.

Baud Rate

Acceptable values are 2400, 4800, 9600, 14400,19200,38400. The instrument defaults to 9600.

Data Bits

Acceptable values are 7 and 8. The instrument defaults to 8.

Parity

Acceptable values are ODD, EVEN, and NONE. The instrument defaults to NONE.

Stop Bits

Acceptable values are 1 and 2. The instrument defaults to 1.

Packed Frames

Acceptable values are YES and NO. Selecting YES allows message frames sent to the LIS to support multiple records per frame ("packed"). When NO is selected, only one record is transmitted per frame. The instrument defaults to YES.

14.3.1.4.Organism and Antimicrobial Configuration Screens

Except for antimicrobials listed in special messages and BDXpert Rules within comment fields, all referrals to organism IDs and antimicrobials in LIS communications use the LIS Codes stored in the instrument which are set to default values per Appendix C and Appendix D. These codes can be edited to a different value.

14.3.2. Modes of Communications

Download refers to communications from the LIS to the instrument and upload refers to communications from the instrument to the LIS. NOTE: The total size of a message downloaded to the instrument should not exceed 100k characters.

Note: New in version V5.02, results for orphan panels and QC panels are not uploaded to the LIS unless the panels satisfy the criteria of an LIS query.

The BD Phoenix 100 shall support the following modes of communications with an LIS:

Result Uploads

The BD Phoenix 100 shall upload results according to the CHECKED Results Upload Option. For AST sets, several result records shall be sent in a single message. Each result record shall report the results for a single drug in the AST set. For ID/AST combo tests, an ID result record is sent as the first result record, and the AST result records follow

Query Uploads

The BD Phoenix 100 shall upload queries if the Unsolicited Queries Option is CHECKED.

Order Downloads

The BD Phoenix 100 instrument shall accept order downloads. All orders must include either a Test ID or a Sequence Number, a valid Accession number and a valid Isolate Number. An order consisting of a valid Consumable Sequence Number and valid Accession\Isolate Number shall be saved to the instrument database as a PENDING panel. If an organism ID is included with the order and the consumable sequence number is for an ID/AST combo panel, the ID side of the panel will be disabled. Orders without the Consumable Sequence Number shall be saved in the instrument, BUT must be associated to a Consumable Sequence Number via the LIS Login Screen prior to being saved to the instrument database. If an organism ID is included with the order, the ID side of the panel will have to be disabled prior to saving the panel to the database. Orders with invalid data shall be rejected by the instrument. See the Phoenix User Manual (RE: LIS Order Cancelled Messages) for more information regarding cancelled LIS orders.

If an order is received with an organism ID that is either unknown to the instrument or is an unclaimed organism, the order will still be saved to the database or saved for future association with a Consumable Sequence Number, BUT the organism ID will be replaced with Invalid Organism Received.

If an order is downloaded with a sequence number that already exists in the instrument and all populated order fields are valid, the panel record is populated/overwritten with the order fields. Modifications shall not be accepted for Finalized panels.

An order field with all spaces will be treated as “missing”. Leading or trailing spaces are trimmed.

Query Downloads

The BD Phoenix 100 instrument shall accept download queries. The instrument shall accept queries on the following fields: Result Qualifier, Start Time, End Time, Request

Time Qualifier, Sequence Number, Test ID, Status and Accession. Queries with invalid data shall be rejected by the instrument. See the Phoenix User Manual (RE: LIS Query Assembly Messages) for more information regarding invalid queries.

14.3.3. Message Content

The BD Phoenix 100 shall exchange fields with the LIS per the following table:

Field List

The BD Phoenix 100 shall exchange fields with the LIS per the following table:

Header Record Field Name	ASTM Pos.	Direction
Sender Name	H, 5, 1, 1	U
Version Number	H, 13, 1, 1	U
Message Date/Time	H 14, 1, 1	U

Order Record Field Name	ASTM Pos.	Direction
Accession Number	O, 3, 1, 1	U/D
Isolate Number	O, 3, 1, 2	U/D
Organism	O, 3, 1, 3	U/D
Test ID	O, 5, 1, 4	U/D
Test/Consumable Sequence Number	O, 5, 1, 5	U/D
Priority	O, 6, 1, 1	U/D
Report Type	O, 26, 1, 1	U

Result Record Field Name	ASTM Pos.	Direction
Result Type Code	R, 3, 1, 4	U
Test/Consumable Sequence Number	R, 3, 1, 5	U
Antibiotic	R, 3, 1, 6	U
Test Status	R, 4, 1, 1	U
Result Data 1		
AST MIC for AST MIC Result	R, 4, 1, 2	U
Organism ID for ID Result	R, 4, 1, 2	U
Result Data 2		
AST susceptibility (Final)	R, 4, 1, 3	U
Profile Number for ID Test	R, 4, 1, 3	U
Result Data 3		
Resistance Marker 1	R, 4, 1, 4	U
Result Data 4		
Resistance Marker 2	R, 4, 1, 5	U
Result Data 5		
Resistance Marker 3	R, 4, 1, 6	U
Result Data 6		
Resistance Marker 4	R, 4, 1, 7	U
Result Data 7		
Resistance Marker 5	R, 4, 1, 8	U
Resistance Marker 6	R, 4, 1, 9	U
Resistance Marker 7	R, 4, 1, 10	U
Resistance Marker 8	R, 4, 1, 11	U
Resistance Marker 9	R, 4, 1, 12	U

Result Record Field Name	ASTM Pos.	Direction
Resistance Marker 10	R, 4, 1, 13	U
Preliminary/Final Status	R, 9, 1, 1	U
Test Start Date/Time	R, 12, 1, 1	U
Result/Status Date/Time	R, 13, 1, 1	U
Test Complete Date/Time	R, 13, 2, 1	U
Instrument Type	R, 14, 1, 1	U
Instrument Number	R, 14, 1, 4	U
Instrument Location	R, 14, 1, 5	U

Comment Record Field Name	ASTM Pos.	Direction
Comment Text	C, 4, 1, 1	U
Comment Type	C, 5, 1, 1	U

Request Record Field Name	ASTM Pos.	Direction
Request Starting Accession Number	Q, 3, 1, 2	U/D
Request Starting Sequence Number	Q, 3, 1, 3	U/D
Request Test Id	Q, 5, 1, 1	D
Request Test Status	Q, 5, 1, 2	D
Request Result Qualifier	Q, 5, 1, 5	D
Request Time Qualifier	Q, 6, 1, 1	D
Starting Date/Time	Q, 7, 1, 1	D
Ending Date/Time	Q, 8, 1, 1	D

Terminator Record Field Name	ASTM Pos.	Direction
Termination Code	L, 3, 1, 1	U/D

Field DescriptionsPatient Fields

BD Phoenix 100 does not support patient demographics and therefore shall send an empty Patient record.

Order Fields

Accession Number (O, 3, 1, 1) - Maximum field length: 20 characters. A unique alphanumeric string that identifies a specimen.

Isolate Number (O, 3, 1, 2) - Maximum field length: 2 characters. Allowable range: 1-20. The number associated with an isolate.

Organism (O, 3, 1, 3) - Maximum field length: 20 characters. LIS code of the organism ID. The organism ID for an ID panel or an ID/AST panel is the User ID if it exists or if a User ID does not exist and the panel has a single Instrument ID it is the Instrument Organism ID. The organism ID for an AST panel is the User ID if it exists or if a User ID does not exist and the panel has been auto associated it is the Instrument Organism ID. Organism IDs and their corresponding LIS codes can be viewed/edited in the instrument's Organism Configuration Screen

For QC Panels the organism ID shall be the Test Strain.

Test ID (O, 5, 1, 4) - Maximum field length: 20 characters. Populated with the panel format abbreviation as shown on the panel's barcode label. Appendix B contains a sample list.

Test/Consumable Sequence Number (O, 5, 1, 5) - 12 digit numeric string identifying the instrument consumable.

Priority (O, 6, 1, 1) - Maximum field length: 1 character. This field is defined in the ASTM E_1394 specification. Currently only the values 'A' for Critical, 'R' for Normal and blank for default normal or no change are supported.

Report Type (O, 26, 1, 1) – This field is defined in the ASTM E_1394 specification. When a cancelled order is sent back to the LIS the report type is 'X'.

Result Fields

The BD Phoenix 100 uploads shall consist of AST results and ID results. The information contained in the generic "Data Fields" depends on the type of result being reported. AST Result records contain antimicrobial and susceptibility information. ID Result records contain organism and Resistance Marker information.

Result ID Code (R, 3, 1, 4) A BD defined code that indicates the type of information in the result record. The keyword **AST_MIC** indicates results for a MIC based Antimicrobial Susceptibility Test and the keyword **ID** indicates identification results.

Test/Consumable Sequence Number (R, 3, 1, 5) – 12 digit numeric string identifying the instrument consumable. **Antimicrobial (R, 3, 1, 6) (*AST Results*) Populated** with the LIS code corresponding to the antimicrobial. Antimicrobials and their corresponding LIS codes can be viewed/edited in the instrument's Antimicrobial Configuration Screen. This field can be up to 20 characters long.

Test Status LIS Code (R, 4, 1, 1) For non QC panels this field is populated with one of the statuses listed in Appendix B. For QC panels that are ONGOING or PENDING , the status is reported as for non QC panels, however, for COMPLETED panels the status is INST_QC_PASS or INST_QC_FAIL.

Result Data Field 1

The contents of the Result Data fields vary depending on the type of result being reported, as described below.

Minimum Inhibitory Concentration (R, 4, 1, 2) (*MIC based AST Result*) For AST tests that produce MIC values; this field contains the minimum antibiotic concentration that inhibits growth of the tested organism. This field can be up to 20 characters long and is assumed to contain a number in ug/ml.

This field may contain signed MIC values such as "<=4" or ">8", MIC values for compound antimicrobials such as "0.5/4"or "<=0.5/16" as well as the following:

"?" - Ongoing
"C" - Antimicrobial is Rapid Completed ***(For nonQC tests in V4.01 and later)***
"X" - Error

Note: For QC panels, MIC values of X will be uploaded to the LIS for V4.01. The uploaded MIC values for QC panels are 'blank' in previous software versions.

Organism (R, 4, 1, 2) (*ID Results Only*) LIS code of the organism ID. The organism ID for an ID panel or an ID/AST panel is the User ID if it exists or if a User ID does not exist and the panel has a single Instrument ID it is the Instrument Organism ID. The organism ID for an AST panel containing a resistance marker, otherwise the organism ID

is only included in the order record. Organism IDs and their corresponding LIS codes can be viewed/edited in the instrument's Organism Configuration Screen. This field can be up to 20 characters long.

Result Data Field 2

AST Susceptibility, Final (R, 4, 1, 3) (*AST results only*) This is a code that indicates the organism's susceptibility to the antibiotic specified in this record. The acceptable values for this field are, blank, S, I, R, N, X representing MIC is pending, susceptible, intermediate, resistant, not susceptible and error respectively.

Result Data Field 3

Resistance Marker 1 (R, 4, 1, 4) (*ID results*) This represents a Resistance Marker associated with the organism identified in the ID result record. This field can be up to 8 characters long. Examples of Resistance Markers and their corresponding LIS codes are listed below.

Extended Spectrum B-Lactamase	**RM_ESBL**
Methicillin Resistant Staphylococcus	**RM_MRSA**
Streptomycin HLAR	**RM_HLSR**
B-Lactamase in Gram Positive Cocci	**RM_GP_BL**
Vancomycin Resistant Enterococci	**RM_VRE**
Gentamicin HLAR	**RM_HLGR**
High Level Kanamycin Resistant	**RM_HLKR**
Streptococcus MLSb Phenotype	**RM_MLSB**
Streptococcus Macrolide Efflux Phenotype	**RM_MEFF**
High Level Penicillin Resistant S. Pneumoniae	**RM_HLPRSP**
Low Level Penicillin Resistant S. Pneumoniae	**RM_LLPRSP**
High Level Mupiricin Resistant Staphylococcus	**RM_HLMUP**

Result Data Field 4

Resistance Marker 2 (R, 4, 1, 5) (*ID results*) This represents a Resistance Marker associated with the organism identified in the ID result record. This field can be up to 8 characters long. Examples of Resistance Markers and their corresponding LIS codes are listed under **Result Data Field 3**.

Result Data Field 5

Resistance Marker 3 (R, 4, 1, 6) (*ID results*) This represents a Resistance Marker associated with the organism identified in the ID result record. This field can be up to 8 characters long. . Examples of Resistance Markers and their corresponding LIS codes are listed under **Result Data Field 3**.

Resistance Marker 4-10 (R, 4, 1, 7-13) (*ID results*) This represents a Resistance Marker associated with the organism identified in the ID result record. This field can be up to 8 characters long. . Examples of Resistance Markers and their corresponding LIS codes are listed under **Result Data Field 3**.

Preliminary/Final Status (R, 9, 1, 1) This field contains either a "**P**" for preliminary status or an "**F**" for final status, which occurs when the panel is finalized at the instrument.

Start Date/Time (R, 12, 1, 1) This is the date and time that the panel was physically placed in the instrument. This field is represented in the YYYYMMDDHHMMSS format.

Result/Status Date/Time (R, 13, 1, 1) This is the date and time that the panel's status transitioned to COMPLETE. This field is represented in the YYYYMMDDHHMMSS format.

Test Complete Date/Time (R, 13, 2, 1) (*ID results*) This is the date and time that the ID panel obtained an ID. **(AST results)** This is the date & time that a drug obtained a valid MIC. This field is represented in the YYYYMMDDHHMMSS format.

Instrument Type (R, 14, 1, 1) Identifies the instrument with the keyword PHOENIX.

Instrument Number (R, 14, 1, 4) Instrument number between 1 and 99.

Instrument Location (R, 14, 1, 5) Indicates the panel position inside the instrument as a 3 character string represented in TierStation format. Tier values are A-D and station values are 1-25. This field is empty for PENDING panels.

Request Fields**Starting Access Number (Q, 3, 1, 2)** - Maximum field length: 20 characters. This field should be populated if the request is for either a single specimen or for a range of specimens. If accession number is not to be used as a search criterion for requested data, then this field can be left blank. Populating this field with the keyword ALL queries for all panels in the instrument database that meet the remaining criteria.

Starting Sequence Number (Q, 3, 1, 3) - Required field length: 12 digit consumable ID value. This field should be populated if the request is for a single panel. If sequence number is not to be used as a search criterion for requested data, then this field can be left blank. Populating this field with the keyword ALL queries for all panels in the instrument database that meet the remaining criteria.

Test ID (Q, 5, 1, 1) - Maximum field length: 20 characters. This field should be populated with the test type (ID, AST_MIC). The BD Phoenix 100 accepts the keywords **ID** and **AST_MIC** as valid test types as well as the pre-defined test names. See appendix B for examples. Populating this field with the keyword **ALL** queries for all panels in the instrument database that meet the remaining criteria.

Test Status (Q, 5, 1, 2) The BD Phoenix 100 instrument accepts queries for panels with a status as follows:

- **INST_ONGOING**, panels with an onging status that may or may not yet contain results.
- **INST_COMPLETE**, panels with a complete, rapid complete, in attention ignored, in attention complete, QC pass, or QC fail status
- **INST_RAPID_COMPLETE,** panels with a rapid complete status
- **INST_PARTIAL_COMPLETE,** panels with an onging status that have obtained results.
- **INST_QC_PASS**, QC panels with a passed QC status
- **INST_QC_FAIL**, QC panels with a failed QC status

Result Qualifier (Q, 5, 1, 5) The only acceptable value for this field is the keyword **MOD** to request only results that have been modified since the last request.

Time Qualifier (Q, 6, 1, 1) - Maximum field lenth: 1 character. The acceptable values for this field are **'S'** which indicate the following date time fields refer to test start times or **'R'** which indicate the following date time fields can refer to result/status times.

Starting Date/Time (Q, 7, 1, 1) The starting date/time (inclusive) of the data requested represented in the YYYYMMDDHHMMSS format.

Ending Date/Time (Q, 8, 1, 1) The ending date/time (inclusive) of the data requested represented in the YYYYMMDDHHMMSS format.

Comment Fields

The BD Phoenix 100 sends comment strings for BdXpert rule text and special messages.

The following is an example of a comment record containing a rule where <310> is the rule number and (AMX, ATM, CAZ) is a list of the affected antimicrobials.

C|1| |<310> BDXpert Rule 310 text.(AMX, ATM, CAZ)|E

Special Messages are messages that indicate a special condition for a BD Phoenix 100 panel.

The following is an example of a comment record containing a special message with a list of the affected antimicrobials.

C|1| | Special message text.(AM, CAZ)|T

Comment Text (C, 4, 1, 1) – The text to be used for the patient, specimen or isolate comment. This field can be up to 1600 characters long.

Comment Type (C, 5, 1, 1) – The type of comment record. This field should be an **E, or T** for BDXpert rule, or special message comments respectively.

Terminator Field

General

14.3.4. Example ASTM 1394 Protocol

Result Upload Examples

Example of a rejected order

H|\^&|||Becton Dickinson|||||||V1.0|20031110093857

P|1

O|1|~!@#$^1||^^^CT04N||||||||||||||||||X

C|1||LIS Order Cancelled: Invalid Accession Number Field|T

L|1|N

Example of a "Send When Placed in Instrument" result upload

H|\^&|||Becton Dickinson|||||||V1.0|20031110101102

P|1

O|1|IDAST 1^1||^^^GNIDAST 951^429510000001|R

R|1|^^^ID^429510000001|INST_ONGOING|||||P|||20031110101102||PHOENIX^^^1^C7

R|2|^^^AST_MIC^429510000001^AM|INST_ONGOING^?^ |||||P|||
20031110101102||PHOENIX^^^1^C7

R|3|^^^AST_MIC^429510000001^AN|INST_ONGOING^?^ |||||P|||
20031110101102||PHOENIX^^^1^C7

R|4|^^^AST_MIC^429510000001^AMC|INST_ONGOING^?^ |||||P|||
20031110101102||PHOENIX^^^1^C7

L|1|N

Example of a result upload for an ID panel

H|\^&|||Becton Dickinson|||||||V1.0|20031110102747

P|1

O|1|ID 1^1^ALCPIE||^^^GNID 952^429520000001|R

R|1|^^^ID^429520000001|INST_COMPLETE^ALCPIE|||||P|||20031110101102|
20031110102747\20031110102747|PHOENIX^^^1^D7

L|1|N

Example of result uploaded to an LIS with the Send Interpretation Results option UNCHECKED

H|\^&|||Becton Dickinson|||||||V1.0|20031110114736

P|1

O|1|IDAST 1^1^SHISPE||^^^GNIDAST 951^429510000001|R

R|1|^^^ID^429510000001|INST_COMPLETE^SHISPE|||||P|||20031110112648|
20031110114736\20031110114735|PHOENIX^^^1^A7

R|2|^^^AST_MIC^429510000001^AM|INST_COMPLETE^<=4^S|||||P|||
20031110112648|20031110114736\20031110114735|PHOENIX^^^1^A7

R|3|^^^AST_MIC^429510000001^AN|INST_COMPLETE^<=4^S|||||P|||
20031110112648|20031110114736\20031110114735|PHOENIX^^^1^A7

R|4|^^^AST_MIC^429510000001^AMC|INST_COMPLETE^<=4/2^S|||||P|||
20031110112648|20031110114736\20031110114735|PHOENIX^^^1^A7

L|1|N

Example of a result upload for an ID/AST panel with special messages, resistance markers and the Send Interpretation Results option UNCHECKED

H|\^&|||Becton Dickinson|||||||V1.0|20031110150803

P|1

O|1|ABC^1^ENTCFAA||^^^CT01P^424940000029|R

C|1||The MICs for this antibiotic and species combination are not reported by the Phoenix system. An alternate method should be utilized.(RA)|T

C|2||Fill failures were detected with this antibiotic and no MIC can be determined. The isolate should be retested.(CF)|T

R|1|^^^ID^424940000029|INST_IN_ATTN_COMPLETE^ENTCFAA^^**RM_VRE^RM_HLSR^RM_HLGR**|||||P|||20031110145645|20031110150803|PHOENIX^^^1^C5

R|2|^^^AST_MIC^424940000029^AM|INST_IN_ATTN_COMPLETE^>32|||||P|||20031110145645|20031110150803\20031110150802|PHOENIX^^^1^C5

R|3|^^^AST_MIC^424940000029^AZM|INST_IN_ATTN_COMPLETE^>8|||||P|||20031110145645|20031110150803\20031110150802|PHOENIX^^^1^C5

R|4|^^^AST_MIC^424940000029^CAZ|INST_IN_ATTN_COMPLETE^>64|||||P|||20031110145645|20031110150803\20031110150802|PHOENIX^^^1^C5

R|5|^^^AST_MIC^424940000029^CC|INST_IN_ATTN_COMPLETE^>8|||||P|||20031110145645|20031110150803\20031110150802|PHOENIX^^^1^C5

L|1|N

Query Upload Examples

Example of an Unsolitcited Query uploaded due to a missing organism id

H|\^&|||Becton Dickinson|||||||V1.0|20031110151943

Q|1|^InvOrg^429530000072

L|1|N

Order Download Examples

Example of a download order for a critical panel

H|\^&|||

P|1

O|1|Critical^1||^^^GNID 952|A

L|1|N

Query Download Examples

For test start times between Nov 10,2003 at 09:00:00 and Nov 10,2003 at 16:00:00

H|\^&

Q|1||||S|20031110090000|20031110160000

L|1|N

For test result times after Nov 10,2003 at 09:00:00

H|\^&

Q|1||||S|20031110090000||

L|1|N

For panels that have partial results and have been modded since the last request

H|\^&

Q|1|||^INST_PARTIAL_COMPLETE^^^MOD

L|1|N

For the panel with 429530000072 sequence number

H|\^&

Q|1|^^429530000072||

L|1|N

For ALL accession numbers

H|\^&

Q|1|||ALL|||

L|1|N