Test Reference Guide
Version 6
Volume III: Component Tests

September 2025

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Release Notes

This section details changes between the current version of this guide, dated September 2025, and the most recent version preceding this guide.

Content

- The Test Reference Guide has been substantially updated to represent the Version 6 schema and coding
- Several new tables and many new variables to incorporate pedestrian protection testing functionality into COMDB
- Major changes in V6 regarding video, photos, and reports
- X-Y measurement/channel data is now permitted when the independent coordinate of a measurement is non-uniformly incremental (non-constant delta between adjacent X values)
- Data coordinate system information moved to a common appendix, so as to isolate it for easier reading and maintenance
- New technical support appendix added in Technical Support Information
- Information regarding data submissions through NHTSA's online portal added in an appendix

Codes

- Significant addition to codes for new variables and tables
- Codes for the Component Test Database are now available through the NHTSA API at https://nrd.api.nhtsa.dot.gov/swagger-ui/index.html

Preface

NHTSA's Crash Test Databases (CTD) house engineering data collected from various vehicle safety tests sponsored by NHTSA. The comprehensive database encompasses vehicle crash tests, biomechanics and crash test dummy tests, component level tests, and advanced crash avoidance driver assistance system technology tests. The CTD features a public-facing website (https://www.nhtsa.gov/research-data/research-testing-databases/) enabling public access to query and download test data alongside a dedicated data submission portal (https://portal.nhtsa.gov/) where test labs can efficiently upload and organize their test information for NHTSA approval and publication.

This guide and its companion guides are to be used to create formatted submissions of data collected from automotive safety tests for submission to the NHTSA CTD.

There are four guides:

- **Volume I**: NHTSA Vehicle Test Reference Guide (VEHDB)
- **Volume II**: NHTSA Biomechanical Test Reference Guide (BIODB)
- **Volume III**: NHTSA Component Test Reference Guide (COMDB)
- **Volume IV**: NHTSA Crash Avoidance Test Reference Guide (CADB)

The first step in creating a data submission is to determine which database to use for your test data. The design and partitioning of each database is centered upon the focus of the testing. Test programs focused on the evaluation of the occupant should be submitted to the Biomechanical Database; tests focused on the evaluation of vehicles belong in either the Vehicle Database, Component Database, or Crash Avoidance Database. Refer to the flow chart in Figure 1 - NHTSA Database Selection Flowchart, on the next page, to help determine which database is appropriate for your test.

Several examples may help to illustrate where certain types of tests fit into the databases:

- All regulatory tests shall be submitted to the Vehicle, Component, or Crash Avoidance Database.
- Vehicle-to-vehicle impacts shall be submitted to the Vehicle Database.
- Tests to cadavers/human subjects shall be submitted to the Biomechanics Database.
- Qualification or sled tests with a single dummy evaluating dummy performance (not equipment performance) shall be submitted to the Biomechanics Database.
- Tests featuring a car body on a sled designed to evaluate occupant response could be submitted to either the Biomechanics or Vehicle Database, depending upon the purpose of the test and number of occupants.
- If a test has more than one occupant:
    - It can be submitted to the Vehicle Database as a single test.
    - Or it can submitted to the Biomechanics Database as multiple tests (one for each occupant).
- Crash Avoidance track tests shall be submitted to the Crash Avoidance Database.
- Pedestrian impact tests shall be submitted to the Component Database.
- When searching for tests, it is advised to check all databases for completeness.

In many research cases, it will be difficult to determine whether testing is focused on evaluation of the vehicle or evaluation of the occupant. Always check with the COR in determining which database tests should be submitted.

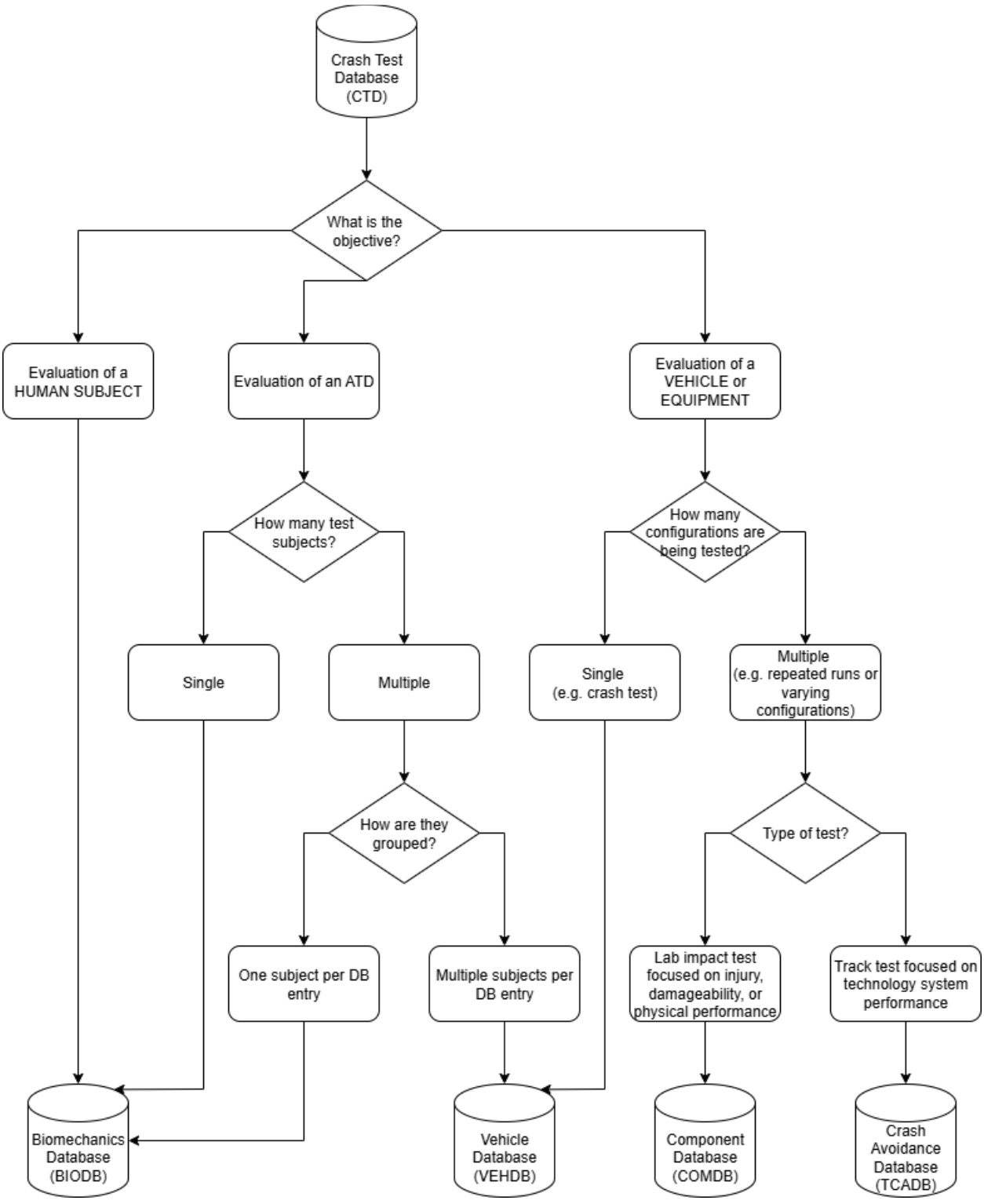

Figure 1 - NHTSA Database Selection Flowchart

You are reading Volume III, the NHTSA Component Test Reference Guide. The Component Database is designed to hold data associated with multiple tests grouped into a single database entry. Often the tests are performed on individual vehicle components or on motor vehicle equipment with no associated vehicle.

Examples include:

- Pedestrian impact testing – where multiple test devices and impacts are used to assess a vehicle
- Motorcycle helmet testing – where a piece, or multiple samples, of motor vehicle equipment is tested in multiple configurations
- Interior impacts – where an impactor is used in a variety of locations to assess multiple vehicle components
- Quasi-Static pull tests – where individual seats from a vehicle are assessed for strength
- Out of position, low risk deployment, and child restraint system – although historically these have been entered into the vehicle database, they could also be entered into the component database due to the multiple configuration nature of testing

A basic entity relationship diagram (ERD) of the component database is shown below. The ERD outlines some basic aspects of the design and functionality of the component database.

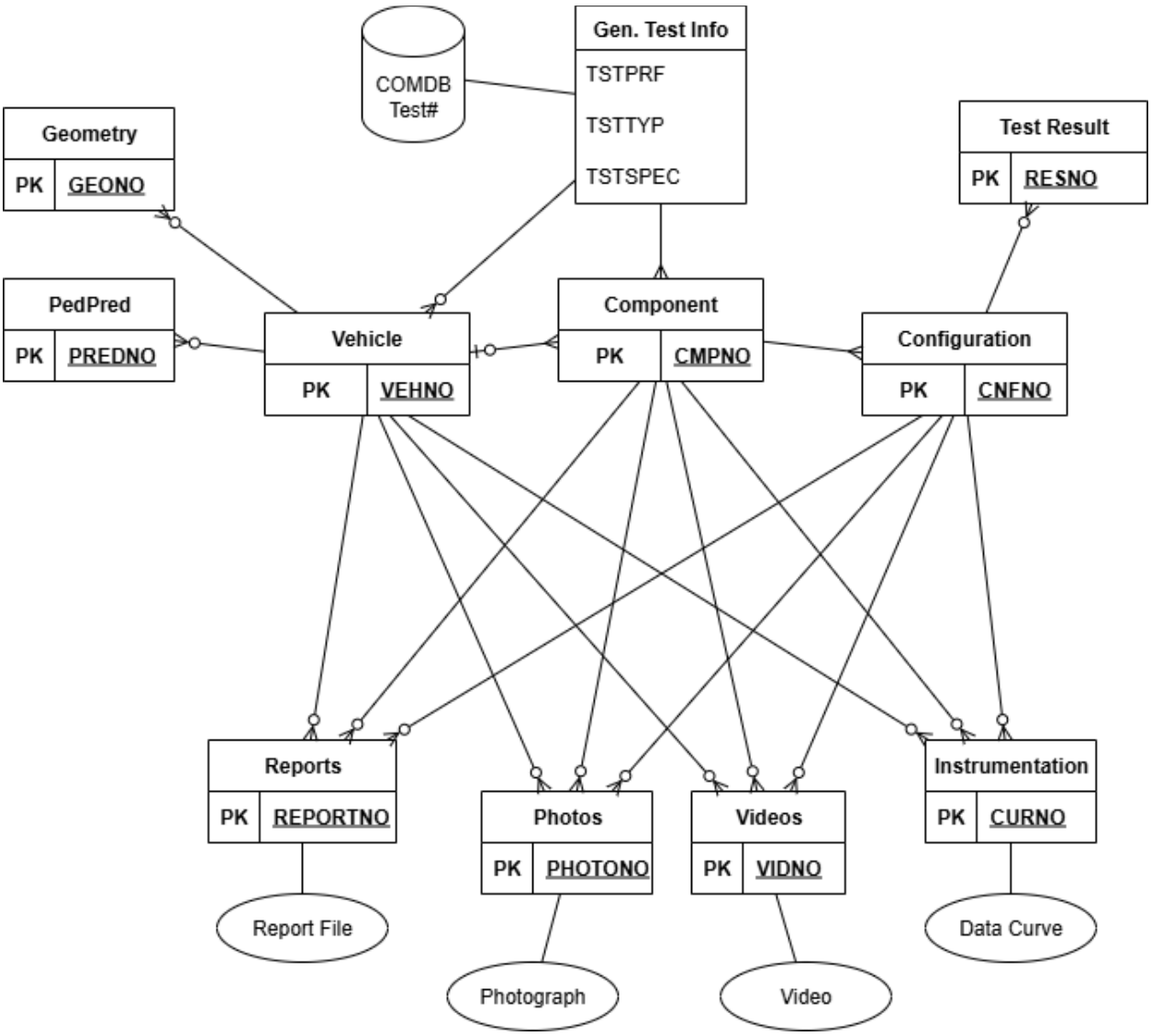

Figure 2 - Entity Relationship Diagram of the Component Database V6

In the above diagram tables are shown in boxes. Media files are shown in ovals. Each COMDB record has a unique test number assigned by the database and a General Test Information table that outlines basic information such as the test performer (e.g. VRTC), test type (e.g. NCAP), and test specification (e.g. pedestrian). Not all COMDB records will have a Vehicle table. If a vehicle is used in testing the Vehicle table will cover relevant details such as the year, make, and model of the vehicle. Vehicles in COMDB may have an associated geometry table and pedestrian prediction table (only for NCAP pedestrian tests).

The main structure of COMDB centers around “Component” and “Configuration” tables. A Component table will define a specific component or test device being utilized or tested. A Configuration table will define the specific test or impact the component is being used in. A single Component table may have multiple associated Configuration tables, such as a pedestrian headform (component) impacting multiple

locations on a vehicle (the configurations). Another example would be a vehicle interior roof (component) being impacted by an FMVSS 201 headform in multiple locations (configurations).

There is also an optional Test Result table that can be used to code specific results from individual impacts, such as the HIC value for head impacts or peak load cell readings.

Media in the COMDB comes in the form of time history curves from instrumentation, pre- and post-test photographs, real-time and high-speed video, and reports. Instrumentation is defined using the metadata in the Instrumentation table along with the actual curve data. The Reports, Photos, and Videos tables primarily organize the associated media to aid the test viewer in organization. Reports, Photos, and Videos may be associated with a specific configuration, such as an impact. Or they may be associated with a specific component, such as a qualification report of a test device used in multiple impacts. Or they may be associated with a specific vehicle, such as CMM markup data of a vehicle prior to the start of a series of tests.

The remainder of this Test Reference Guide will cover creating test submissions to the NHTSA COMDB including formatting data and submitting data submissions using NHTSA's online portal.

Introduction

Background

In September of 1966, the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381) was signed into law in the United States. The Act specifies that the Secretary of Transportation shall establish appropriate Federal Motor Vehicle Safety Standards that would lead to the reduction of the number of deaths and injuries resulting from motor vehicle accidents. In prescribing standards, the Secretary was to consider: (1) relevant motor vehicle safety data, (2) whether the proposed standard is reasonable, practical, and appropriate for the particular type of motor vehicle equipment for which it is prescribed, and (3) the extent to which such standards contribute to carrying out the purposes of the Act.

In order to meet the above requirements, the National Highway Traffic Safety Administration (NHTSA) has been mandated to develop safety standards. For each proposed regulation, an extensive research program is undertaken to ensure that the proposed standard satisfies the requirements of the Act. For each test conducted for the agency, data is recorded from various transducers mounted to the test dummies or vehicles, high-speed videos are recorded to document the event, still pictures of the test setup are taken, and a written report is generated. Since 1978, these data have been loaded into a data repository, where NHTSA staff and the public can access the data and conduct analysis.

This reference guide has been written for two reasons. The first is to document the format and content requirements for submission of data, photographs, video, and reports to the NHTSA database. The second is to encourage the adoption of this standardized format so that the exchange of data by the safety research community is readily accomplished and ultimately leads to new and better ways for reducing the fatalities and injuries in motor vehicle accidents.

Data Organization

Four types of test data can be submitted to the NHTSA Component database:

- **Electronic Data** (Chapter 2:) - Quantitative information (metadata) about the test setup and results as well as transducer output time-history data.
- **Reports** (Chapter 3:) - Report containing information about the test, such as test setup diagrams test anomalies, and any ancillary data collected as part of the test. Typical formats include MS Word, Excel, and PDF. Other report formats, such as an output from a proprietary diagnostic tool, should be submitted in a digital form approved by the COR.
- **Photos** (Chapter 4:) - Still images captured pre-test, during the event, and post-test. NHTSA prefers JPG format, but other formats may be used with COR approval.
- **Videos** (Chapter 5:) - Pre- or post- event videos of the test. These may be in the form of film, digital video, high speed X-ray, or time sequenced or still images. When possible, these videos should be in standardized containers and able to be played without the need to download additional or proprietary codecs.

Chapter 2: through Chapter 5: of this guide provide instructions for formatting of each the above data types.

Media Formats and Software Tools

The test information should be submitted to NHTSA through the CTD Submission Portal (https://portal.nhtsa.gov). Chapter 1:Media Format and Layout describes details on the layout of directories and files to be submitted.

Other media types may be submitted. If you have data that you wish to submit but which is not specified in this guide, please contact the NHTSA COR responsible for your submission.

Return Policy

Submissions that cannot be processed, or which have too many errors found by the validation system of the software, will be returned to the contractor to be corrected and resubmitted.

Chapter 1: Media Format and Layout

Each submission consists of multiple types of data: descriptive test information defined later in this guide, measurement data digitized from the test instrumentation signal traces, a written report of the testing, and still images and video before, during, and after the test event.

1.1. Media Types and Layout

All submissions should be submitted through NHTSA's public facing Crash Test Database Submission Portal. Contractors should contact their COR for access. Electronic media may be uploaded in a ZIP archive with a directory structure in accordance with the following:

- **Parent directory name** - All data for each submitted test (or group of tests) should be in a parent directory labeled:
  \<TSTREF>\
  <TSTREF> is the value from the TSTREF in Chapter 2: of this guide. So, if TSTREF = 'IMPACT123', then the directory for all data for this test shall be stored in the directory, IMPACT123. Users should avoid illegal filename characters listed below when choosing a value for TSTREF, so as not to interfere with the directory naming convention.
- **Sub-directory naming** – All digital data, reports, photos, and videos shall be submitted in sub-directories. In COMDB each sub-directory is named by the following:
  \<VEHNO>-<CMPNO>-<CNFNO>\
  <VEHNO> and <CMPNO> and <CNFNO> variables are described in Chapter 2: of this guide. Note that each of these variables shall be 3 digits long, so include leading zeros if necessary.
  Media covering all components/configurations shall be in a sub-folder named '000-000-000' or '001-000-000'. This would include items like an overall test report encompassing all impacts or measurements, photographs, or videos of a vehicle as delivered prior to testing. These media files (reports, image thumbnails, videos) will appear on the public site under the "overall" headings.
- **Electronic Data** - In accordance with the format in Chapter 1: and Chapter 2:, the EV6 specification file and associated transducer signal files shall be stored in the sub-directory:
  \<TSTREF>\<VEHNO>-<CMPNO>-<CNFNO>\DATA
- **Reports** - In accordance with Chapter 3:, reports in shall be stored in the sub-directory:
  \<TSTREF>\<VEHNO>-<CMPNO>-<CNFNO>\REPORTS
- **Photographs** – In accordance with Chapter 4:, still images taken before and after the test shall be stored in the sub-directory:
  \<TSTREF>\<VEHNO>-<CMPNO>-<CNFNO>\PHOTOS
- **Videos** - In accordance with Chapter 5:, videos documentation, including high speed video files, shall be stored in the sub-directory:
  \<TSTREF>\<VEHNO>-<CMPNO>-<CNFNO>\VIDEOS

The following special characters are not allowed for file or folder names: '?', '\', '/', ':', '*', '<', '>', '|', '+', '&', '%', '#', '@', '!', '`', '"', '', ''

Figure 3 below shows a graphical example of a COMDB data submission.

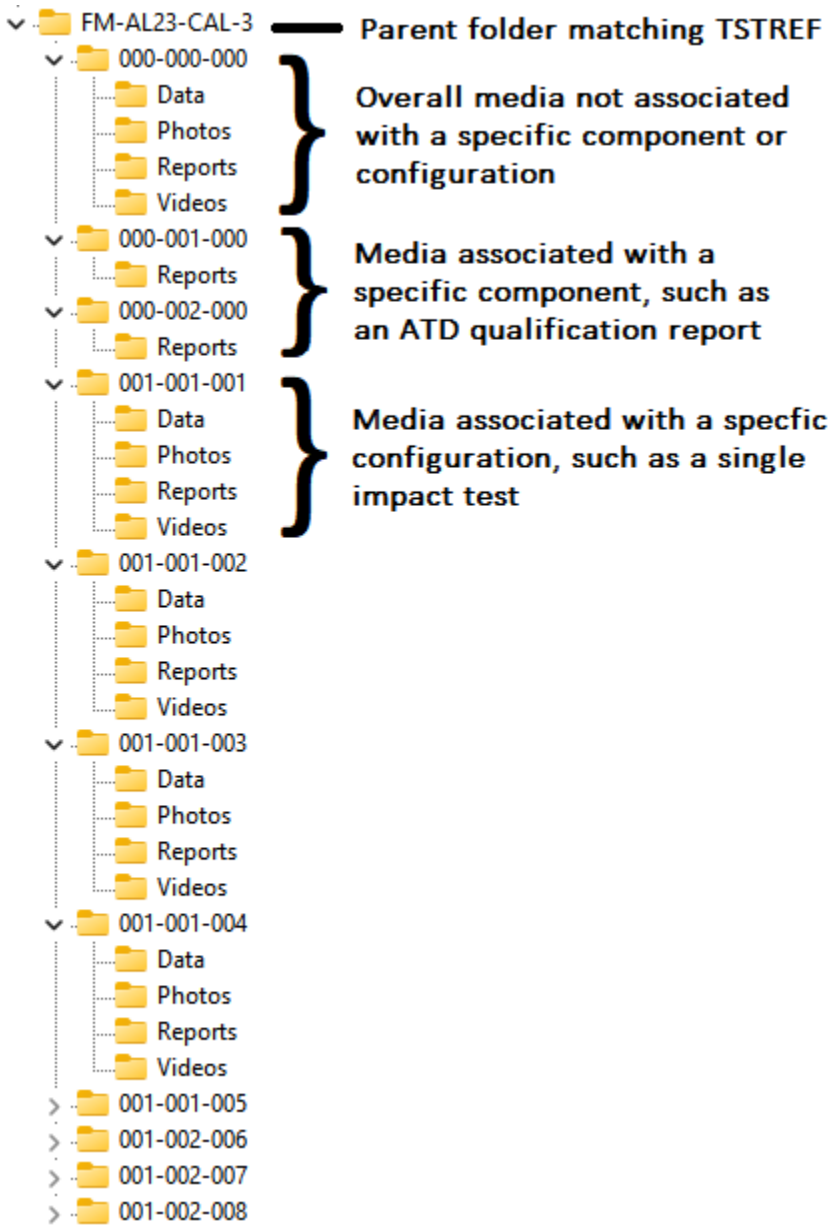

Figure 3 - Folder Structure of COMDB Test Submission

1.2. Data Submission Portal

NHTSA has developed a data submission portal to facilitate preparation of the specification data defined in Chapter 2: Field Specifications and Formats. The portal contains a data validation system and supports manual entry or uploads through JSON or EV6 format.

Once data is entered or imported and validated by the submission portal, the test can be sent to NHTSA for approval. Additional information pertaining to the portal is found in Appendix C: Online Test Submission Portal.

1.3. A Database for NHTSA Codes

For any coded fields defined in this guide, a dictionary relating the coded value to its description is defined by the NHTSADB schema, which is accessible both directly from the PostgreSQL database for internal NHTSA users or through the Crash Test Database API for external users.

Table 1 - Example SQL Query for Internal NHTSA Users

Example SQL Query `select * from nhtsadb.senatt`	
Field	Description
`senatt`	String, short code (usually 1-6 characters)
`senattd`	String, code description
`reference`	Comma-delimited list of databases for which the code is valid
`senatt_comment`	String, additional text describing the associated code/description

Table 2 - Example API Query for External Users

Base URL	https://nrd.api.nhtsa.dot.gov/swagger-ui/index.html
Endpoint	Description
/ncodes	Returns a list of all NHTSADB codes in JSON format: `{ "codeName": [table for which code applies, e.g. senatt] "code": [string, short code] "description": [string, code description] }`
/list/{codeName}	Returns a list of NHTSADB codes for a given table (e.g. senatt) in JSON format: `{ "code": [string, short code] "description": [string, code description] }`
/decode/{codeName}/{code}	Returns description of the input code (e.g. CHLU) from the input table (e.g. senatt) in JSON format: `{ "description": "CHEST - LEFT UPPER" }`
/model/	Returns a list of all vehicle makes and models in JSON format: `{ "make": [code for vehicle make] "model": [code for vehicle model] "makeDescription": [description of vehicle make] "modelDescription": [description of vehicle model] }`
/model/list/{make}	Returns a list of all vehicle models for the input vehicle make (input as the code) in JSON format:

	<pre>{
	"make": [code for vehicle make, matches input]
	"model": [code for vehicle model]
	"makeDescription": [description of vehicle make]
	"modelDescription": [description of vehicle model]
	}</pre>

/model/{make}/{model}	Returns a description of the vehicle make and model for the input vehicle make and model codes in JSON format:
	<pre>{
	"makeDescription": [description of vehicle make]
	"modelDescription": [description of vehicle model]
	}</pre>

Chapter 2: Field Specifications and Formats

As a primer to understanding the following sections please review specification data types. We have categorized specification data to make it easier to model specification data and engineering requirements.

A specification data includes its name, type, unit, range, and order number in an information record. For convenience, it is called a field also. The field name is usually a short name of a test parameter, and it is used as the column name in the database of NHTSA. The unit is optional and predefined. The type and range are validated automatically in editing an EV6 file through the CTD submission portal. All fields are described from sections 2.3 General Test Table to 2.13 Video Table.

2.1. Field Types

- **Text** – A textual string whose content is not strictly governed by a rule, white-space, and a limited set of special characters including [ ] ( ) , : - + and _. This data type usually has a maximum length.
- **Code** – A textual string whose content is limited to a predefined set of coded data that can be found through the API or dropdowns in the CTD Submission Portal. A code has a set length.
- **Integer** – An integer is expressed as one optional sign character (- or +) and one or more numeric characters, or digits, in the range from 0 – 9. The absence of a sign character implies a positive value. Any limits on the magnitude of the integer are defined in the associated field description.
- **Real** – A real (floating point or decimal number) is expressed as one sign character (- or +), one or more numeric characters, or digits, in the range from 0 – 9, a decimal point '.', and one or more numeric characters in the range from 0 – 9. The absence of a sign character implies a positive value.
    - The representation of a real as a textual string may be governed by a rule that specifies a total text length for placement of the sign and decimal number, and relative sizes and format of the mantissa and exponent.
- **Date** – A textual string whose content represents a calendar date in ISO 8601 format: 'YYYY-MM-DD'. The maximum length of a Date is limited to 10 characters.
    - The 'YYYY' portion is a four-digit year (e.g., '2006').
    - The 'MM' portion is the numeric month of the year, padded to a width of two (2) characters with a leading zero, in the range from 1-12 (e.g., January = '01', February = '02', etc.)
    - The 'DD' portion is the numeric day of the month, padded to a width of two (2) characters with a leading zero, in the range from 1 – 31.

2.2. Electronic Data

Specification Data

Test information is submitted to the Component Database using ASCII ("EV6") or JSON format text files which consist of several groups of records, described in the following sections of this manual:

Table 3 - EV6 and JSON Data Groups

Record Type (EV6)	Order (EV6)	Group Name (JSON)
TEST	1	General Test Info
VEHICLE	2	Vehicle Info
COMPONENT	3	Component Info
CONFIGURATION	4	Configuration Info
INSTRUMENTATION	5	Instrumentation Info
PEDPRED	6	Pedestrian Prediction info
GEOMETRY	7	Geometry Info
REPORTS	8	Report Info
PHOTOS	9	Photo Info
VIDEOS	10	Video Info
TESTRESULT	11	Test Result Info

Starting with version 6, JSON is now the preferred format for data submissions and will be the default format used throughout the CTD.

For example, a Component test might consist of specification records for TEST, VEHICLE, COMPONENT, CONFIGURATION, and INSTRUMENTATION.

Unlike the Vehicle or Biomechanics database, a single test in the Component Database can describe multiple impact events or exposures.

A Entity Relationship Diagram of COMDB was shown in Figure 2in the preface.

Record Layout for ASCII Specification File (*.EV6)

The version 6 release of the COMDB includes support for the historical “Entrée” data format, now known as EV6. Although it is supported as described below, JSON is now the preferred format and will be the default format used throughout CTD.

The fields and their positions in each of the specification data records are listed in the sections following this one, starting with Section 2.3 General Test Table. The first line of the ASCII (EV6) specification file should be the string

“----- EV6 -----”

or

“-----”+space+ “EV6”+space+“-----”

The specification file should terminate with the line

“----- END -----”

Within the body of the specification file each section should begin with a “key” line indicating the record type for the data group following the key. These keys have the form

"----- KEY -----"

or

"-----"+space+ "KEY"+space+ "-----"

where KEY is appropriate to a particular record type as listed in Table 3 - EV6 and JSON Data Groups. (e.g. KEY = TEST or KEY = COMPONENT, etc.)

Fields within a record are delimited by the pipe character (|), records are delimited by a line feed.

Fields for which no information is available should contain one blank character. In other words, an empty field begins after the pipe delimiter of the previous field, and consists of a single blank followed by another pipe delimiter.

Comments within the specification file are allowable anywhere in the file, but must start on a new line with the # (pound) sign and end with a line feed.

Specification Data Example: Component

Please note that while the test record in this example appears to span lines, it is continuous and has been wrapped to fit this page.

```
# Source: NHTSA Component Database - Test Number: 80085
# Date: <4/17/2025>
----- EV5 -----
----- TEST -----
VERNO|TITLE|TSTOBJ|TSTDAT|TSTPRF|CONNO|TSTREF|TSTTYP|TSTSPEC|TSTCOM
----- VEHICLE -----
VEHNO|MAKE|MODEL|YEAR|NHTSANO|BODY|TRIM|VIN|CRTEST|VEHCOM|ENGINECONFIG|ENGINDSP|TRANSM|POWERTYPE|DRIVELINE|M
OTORCONFIG|VEHTWT|CURBWT|WHLBAS|VEHLEN|VEHWID|ACTIVEDEV|HOODTOP|HOODAREA|CHILDTESTAREA|ADULTTESTAREA|HICUNLI
MITEDAREA|BUMPER30|BUMPERCG|BUMPERBEAM|BUMPERTESTWIDTH|UBRL|LBRL|IBRL|CORFACT
----- CONFIGURATION -----
VEHNO|CMPNO|CNFNO|CONFIG|TSTDEV|DEVSPD|CMPSPD|ENERGY|DEVCOM|CNTANGXY|CNTANGXZ|CNTLOC1|CNTLOC2|STRUCT|TARGET
X|TARGETY|TARGETZ|GRIDX|GRIDY|TARGETMETHOD|CNTCOM|CFNCOM|IMPACTDATE|TESTTEMP|TESTHUMID|DPPS|FIRETM|IMPACTTM|SE
NSTM|DEPLOYTM|HIT|DPPSCOM
----- COMPONENT -----
VEHNO|CMPNO|CMPNT|CMPTYP|CMPWGT|MODIND|MODDSC|OCCTYP|DUMSIZ|DUMMAN|DUMSN|DUMMOD|DUMDSC|LINK|CMPCOM|
QUALDAT
----- INSTRUMENTATION -----
VEHNO|CMPNO|CNFNO|CURNO|SENTYP|SENLOC|SENATT|AXIS|XUNITS|YUNITS|PREFIL|INSMAN|INSMOD|INSSN|CALDAT|SENXCAL|SENXT
ST|SENSENS|SENSEQN|DASRES|SENRANGEMIN|SENRANGEMAX|CHLRANGE|SENMAXPCT|SENMINPCT|CHLMAXPCT|INIVEL|TINT|TSTART|NU
MPTS|DASTAT|CHSTAT|INSCOM
----- PEDPRED -----
VEHNO|PREDNO|GRIDX|GRIDY|PREDCOLOR|PREDVERSION
----- GEOMETRY -----
VEHNO|GEONO|GEOX|GEOY|GEOZ|LANDMARK|GEONAME|GEOCOMM
----- REPORTS -----
VEHNO|CMPNO|CNFNO|REPORTNO|REPORTDESC|COMMENTS|ORIG_FILENAME
----- PHOTOS -----
VEHNO|CMPNO|CNFNO|PHOTONO|PREPOST|PHOTODESC|PHOTOCOMMENT|ORIG_FILENAME
----- VIDEOS -----
VEHNO|CMPNO|CNFNO|CAMNO|FRAMERATE|VIDDESC|VIDCOM|ORIG_FILENAME
----- TESTRESULT -----
CNFNO|RESNO|RESDESC|RESMETH|RESVAL|RESCOM|T1|T2|TMAX|TMIN
----- END -----
```

Record Layout for JSON Specification File

Alternatively and preferrably, records can be specified in a text file in JSON format.

JSON is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values).

Unlike the EV6 format, the JSON format explicitly names each field along with each value, which allows the fields to be organized in any order convenient to the submitter. Each section starting with Section 2.3 General Test Table is organized in a group, with field names and their values specified as child elements of that group.

Field names and string field values are encapsulated in double-quotes, while floats and integers are not enclosed in double-quotes. Fields for which no information is available can either be included as blanks (“”) or omitted.

JSON Specification Data Example: Component


```
{
"Comments": [],
"Component": {
 "General Test Info": {
    "VERNO": "C6",
    "TSTPRF": "CAL",
    "TITLE": "2021 Ford F-250 FMVSS 228 Research Testing",
    "TSTOBJ": "Lab to Lab Repeatability",
    "TSTDAT": "2022-09-01",
    "CONNO": "693JJ922F00180N",
    "TSTREF": "FM-AL23-CAL-3",
    "TSTTYP": "228",
    "TSTSPEC": "PED",
    "TSTCOM": "Identical tests performed at VRTC",
    },
 "Vehicle Info": [
  {
    "VEHNO": "1",
    "MAKE": "02",
    "MODEL": "69",
    "YEAR": "2021",
    "NHTSANO": "R20210232",
    "BODY": "PU",
    "TRIM": "XLT",
    "VIN": "1FT7W2B68MED4XXXX",
    "CRTEST": "N",
    "ENGINECONFIG": "V8TF",
    "ENGINDSP": "6.2",
    "TRANSM": "A6",
    "POWERTYPE": "ICEG",
    "DRIVELINE": "4WD",
    "MOTORCONFIG": "NA",
    "VEHTWT": "2989",
    "CURBWT": "2989",
    "WHLBAS": "4059",
```

```
   "ACTIVEDEV": "NONE"
  }
 ],
 "Component Info": [
  {
   "VEHNO": "1",
   "CMPNO": "1",
   "CMPNT": "HDHD",
   "CMPTYP": "CD",
   "CMPWGT": "3.5",
   "MODIND": "N",
   "OCCTYP": "NA",
   "DUMSIZ": "NA",
   "DUMMAN": "Humanetics",
   "DUMSN": "D47026",
   "LINK": "UMB",
   "QUALDAT": "2023-03-21"
  },
 ],
 "Configuration Info": [
  {
   "VEHNO": "1",
   "CMPNO": "1",
   "CNFNO": "1",
   "CONFIG": "HDH",
   "TSTDEV": "CDH",
   "DEVSPD": "35.37",
   "CMPSPD": "35.0",
   "CNTANGXY": "50",
   "CNTANGXZ": "0",
   "STRUCT": "HOOD",
   "TARGETX": "-399",
   "TARGETY": "-1",
   "TARGETZ": "-363",
   "GRIDX": "6",
   "GRIDY": "0",
   "TARGETMETHOD": "AIM",
   "CFNCOM": "FM-AL23-058",
   "IMPACTDATE": "2023-10-26",
   "TESTTEMP": "22",
   "TESTHUMID": "46",
   "DPPS": "NA"
  },
 ],
 "Instrumentation Info": [
  {
   "VEHNO": "1",
   "CMPNO": "1",
   "CNFNO": "1",
   "CURNO": "1",
   "SENTYP": "AC",
   "SENLOC": "NA",
   "SENATT": "HDCG",
   "AXIS": "XL",
   "XUNITS": "SEC",
   "YUNITS": "G'S",
```

```
   "PREFIL": "1650",
   "INSMAN": "Kyowa",
   "INSMOD": "ASDE-A-1K",
   "INSSN": "GN4620002",
   "CALDAT": "2023-08-28",
   "SENXCAL": "5",
   "SENXTST": "5",
   "SENSENS": "0.004067",
   "SENSEQN": "mvve",
   "DASRES": "0",
   "SENRANGEMIN": "-2000",
   "SENRANGEMAX": "2000",
   "CHLRANGE": "2000",
   "CHLMAXPCT": "7",
   "INIVEL": "0",
   "TINT": "0.00005",
   "TSTART": "-0.1392",
   "NUMPTS": "7001",
   "DASTAT": "AM",
   "CHSTAT": "P",
   "INSCOM": "Child Head X"
  },
 ],
"Geometry Info": [
 {
   "VEHNO": "1",
   "GEONO": "1",
   "GEOX": "-92.87",
   "GEOY": "1.05",
   "GEOZ": "-254.26",
   "LANDMARK": "LERL",
   "SYMM": "NO",
   "GEONAME": "LERL @ Centerline"
 },
 ],
"Pedestrian Prediction Info": [],
"Test Result Info": [
 {
   "CNFNO": "1",
   "RESNO": "1",
   "RESDESC": "HIC15",
   "RESMETH": "208",
   "RESVAL": "720.84",
   "T1": "1.7",
   "T2": "16"
 },
 ],
"Report Info": [
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   "VEHNO": "1",
   "CMPNO": "1",
   "CNFNO": "1",
   "REPORTNO": "1",
   "REPORTDESC": "Data Plots",
   "ORIG_FILENAME": "FM-AL23-058 - Data.pdf"
 },
```

```
  ],
 "Photo Info": [
  {
   "VEHNO": "1",
   "CMPNO": "1",
   "CNFNO": "1",
   "PHOTONO": "1",
   "PREPOST": "1",
   "PHOTODESC": "Right Oblique",
   "ORIG_FILENAME": "DSC_9909.jpg"
  },
  ],
 "Video Info": [
  {
   "VEHNO": "1",
   "CMPNO": "1",
   "CNFNO": "1",
   "CAMNO": "1",
   "FRAMERATE": "1000",
   "VIDDESC": "Overall Side View",
   "ORIG_FILENAME": "FM-AL23-058 - Video.avi"
  },
  ]
}
}
```


Signal Data

Signal data file contains unfiltered, digitized signal data collected from the sensors used in the tests. The order of signal files is identified by the file extension and corresponds to <CURNO>, the indexed order of the instrumentation information table, e.g. *.001, *.002, *.003, etc. A signal file is made up of ASCII records of 1 data point each, delimited by a line feed character (ASCII decimal 10, hexadecimal \x0a, octal \012). Each data points must represent at least 8 significant figures. If a X-Y signal in which the independent X coordinate is non-uniformly incremental - is supplied, then each signal data consists of 1 data point each with the X coordinate listed first, followed by a single tab character, followed by the associated Y coordinate, and ending with a line feed character. The following two examples express two types of signal data in signal files.

- Signal data for Y coordinate only:
  -.20678625E-02
  0.28532145E-01
  0.28532145E-01
- Signal data for X-Y coordinates:
  -0.025000000 0.0
  -0.024875002 0.0
  -0.024750002 -0.12266

A point expression will allow for any floating-point format, provided that at least 8 significant figures are included, with tab delimited required when two columns of data are submitted.

The title of the ASCII signal files should be the same given to the specification (EV6) file described above followed by a numeric file extension. The file extension should be the curve number of the curve

contained in the file, padded on the left with zeroes to three characters, and should correspond to the curve number in the instrumentation information record set.

If the specification file is named TestABC.EV6, and there are 35 signal (curve) files, the signal files should be named TestABC.001 through TestABC.035.

Table 4 - Signal Filename Examples

Right	TestABC.001	TestABC.012	TestABC.101
Wrong	TestABC.T0	TestABC.12	TestABC.DAT

2.3. General Test Table

The data elements defined below constitute the General Test Information group. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

VERNO – Version Number (mandatory)

Code, 2 characters (C4, C5, C6)

VERNO is automatically populated when uploading data to the CTD portal. The number of this version of the NHTSA Test Reference Guide is a special pre-assigned code (C6).

TITLE – Contract or Study Title (mandatory)

Text, maximum 70 characters

TITLE is a descriptive title of the contract or study. This is often used to search for the test in the database.

TSTOBJ – Test Objectives (optional)

Text

TSTOBJ is a description of the purpose of the test.

TSTDAT – Test Date (mandatory)

Date, ISO 8601 format (YYYY-MM-DD), 10 characters

TSTDAT is the date the test was performed or the date testing began. This field must be filled with a valid date.

TSTPRF – Test Performer (mandatory)

Code

TSTPRF is the code for the name of the organization performing the test.

CONNO – Contract Number (optional)

Text

CONNO is the Department of Transportation contract number assigned by the sponsoring organization.

TSTREF – Test Reference Number (mandatory)

Text

TSTREF is an alphanumeric code number assigned to the test series by the test performer (test lab's internal test number).

TSTTYP – Test Type (mandatory)

Code

TSTTYP indicates the type of test conducted, such as NCAP, Research, Compliance.

TSTSPEC – Test Specification (mandatory)

Code

TSTSPEC indicates the specification the test followed, such as FMVSS 201, FMVSS 228, PedPro.

TSTCOM – Test Commentary (optional)

Text

TSTCOM is used to describe any peripheral test information, for which a code does not exist, including anomalies or problems. Consult with the NHTSA COR if there is information that should be recorded here.

TESTREVIEWERS – Test Reviewers (mandatory)

Searchable multi-select dropdown

TESTREVIEWERS is the list of personnel at NHTSA that can review CTD submissions. Typically the NHTSA CORs overseeing testing contracts. Please choose the relevant personnel for your project or test submission.

2.4. Vehicle Table

Fields defined below constitute the vehicle information record. A Field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "1", "VEHNO ", "Test Vehicle Identification Number", "integer", and "1 or 2" are its order index in the vehicle information record, its name, its brief description, its type and its range, respectively. Any use of the code for "OTHER" should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

VEHNO – Test Vehicle Number (mandatory)

Integer ≥ 0

VEHNO is the sequential integer that identifies the vehicle. For component testing there will typically be zero or one vehicles. For example, motorcycle helmet testing will have zero vehicles associated with testing and should therefore not have a vehicle table. Seat testing may be performed at a component level without a vehicle, but it would likely be useful to code a vehicle entry for the relevant vehicle.

MAKE – Vehicle Make (mandatory)

Code

MAKE is the manufacturer of the vehicle; for instance, 01 represents a Chevrolet.

MODEL – Vehicle Model (mandatory)

Code

MODEL is the model of the vehicle (e.g. a value of 06 represents an Impala.) A model code cannot be input unless MAKE has a valid input.

YEAR – Vehicle Model Year (mandatory)

Integer ≥ 1900

YEAR is the model year of the vehicle.

NHTSANO – NHTSA Number (mandatory if assigned)

NHTSA pre-assigned Code, 9 characters, or N/A

NHTSANO is the NHTSA test vehicle numbering system, a nine-character alphanumeric identifier assigned to NHTSA-owned/operated vehicles for the purpose of tracking them through purchase, testing and disposal. A pre-assigned NHTSA number accompanies all vehicles delivered for testing under NHTSA contract. Contact your NHTSA COR if you are unsure about this field.

BODY – Body Type (mandatory)

Code, 2 characters or NA

BODY is the body type of the vehicle. A four-door sedan would be coded as 4S.

TRIM – Vehicle Trim (optional)

Text

TRIM the more specific vehicle name including the trim level.

VIN – Vehicle Identification Number (optional)

Text 17 characters

VIN is the identification number of the vehicle that has been assigned by the manufacturer. Leased vehicles should enter partial VINs with the last four digits as XXXX.

If a full and valid VIN number is entered in the online test submission portal, MAKE, MODEL, YEAR, and ENGDSP will auto populate using data from NHTSA's vPIC VIN decoder (https://vpic.nhtsa.dot.gov/).

CRTEST – Crash Test Indicator (mandatory)

Code, 1 character (N-no, Y-yes, U-unknown, X-not applicable)

CRTEST is a marker to indicate whether or not the test item has been previously crash tested.

VEHCOM – Vehicle Commentary (optional)

Text, maximum 70 characters

VEHCOM is used to describe any special features of the vehicle.

ENGINECONFIG – Engine Type and Configuration (optional)

Code

- 3CTF 3 CYLINDER TRANSVERSE FRONT
- 4CIF 4 CYLINDER INLINE FRONT
- 4CLM 4 CYLINDER MID
- 4CLR 4 CYLINDER REAR
- 4CTF 4 CYLINDER TRANSVERSE FRONT
- 5CIF 5 CYLINDER INLINE FRONT
- 5CTF 5 CYLINDER TRANSVERSE FRONT
- 6CIF 6 CYLINDER INLINE FRONT
- 6CTF 6 CYLINDER TRANSVERSE FRONT
- V6IF V6 INLINE FRONT
- V6TF V6 TRANSVERSE FRONT
- V8IF V8 INLINE FRONT
- V8TF V8 TRANSVERSE FRONT
- ROTR ROTARY
- NAPP NOT APPLICABLE
- OTHR OTHER
- UNKN UNKNOWN

ENGINECONFIG represents the engine type of the vehicle and its configuration. 4CIF would represent a four-cylinder inline front engine. Electric vehicles should use code NAPP (not applicable) and be sure to indicate MOTORCONFIG.

ENGDSP – Engine Displacement (optional)

Real, ≥ 0 liters

ENGDSP indicates the engine displacement within the vehicle, measured in liters - for instance, 2.2 LITERS. Electric vehicles leave blank.

TRANSM – Transmission Type (optional)

Code

TRANSM is the type of transmission in the vehicle.

- A2 AUTOMATIC - TWO SPEED TRANSMISSION
- A3 AUTOMATIC - THREE SPEED TRANSMISSION
- A4 AUTOMATIC - FOUR SPEED TRANSMISSION
- A5 AUTOMATIC - FIVE SPEED TRANSMISSION
- A6 AUTOMATIC - SIX SPEED TRANSMISSION
- A7 AUTOMATIC - SEVEN SPEED TRANSMISSION
- A8 AUTOMATIC - EIGHT SPEED TRANSMISSION
- A9 AUTOMATIC - NINE SPEED TRANSMISSION
- AX AUTOMATIC - TEN OR MORE SPEED TRANSMISSION
- CV CONTINUOUSLY VARIABLE TRANSMISSION
- M2 MANUAL - TWO SPEED TRANSMISSION
- M3 MANUAL - THREE SPEED TRANSMISSION
- M4 MANUAL - FOUR SPEED TRANSMISSION
- M5 MANUAL - FIVE SPEED TRANSMISSION
- M6 MANUAL - SIX SPEED TRANSMISSION
- MX MANUAL - OTHER SPEED TRANSMISSION
- OT OTHER
- SS SINGLE SPEED TRANSMISSION
- UN UNKNOWN

POWERTYPE – Power Type (optional)

Code

POWERTYPE is the power or propulsion system used by the vehicle.

- BEVO BATTERY ELECTRIC - OTHER
- BEVL BATTERY ELECTRIC Li-ION ONLY
- HEVL HYBRID ICE GASOLINE AND Li-ION ELECTRIC
- HEVN HYBRID ICE GASOLINE AND Ni-MH ELECTRIC
- HEVO HYBRID ICE GASOLINE AND OTHER ELECTRIC
- HYFC HYDROGEN FUEL CELL
- ICEC INTERNAL COMBUSTION ENGINE - COMPRESSED NATURAL GAS
- ICED INTERNAL COMBUSTION ENGINE - DIESEL
- ICEG INTERNAL COMBUSTION ENGINE - GASOLINE
- ICEP INTERNAL COMBUSTION ENGINE - PROPANE
- ICEO INTERNAL COMBUSTION ENGINE - OTHER

- MHEV MILD HYBRID ELECTRIC VEHICLE
- OTHR OTHER
- PHVN PLUG-IN HYBRID ICE GASOLINE AND Ni-MH ELECTRIC
- PHVL PLUG-IN HYBRID ICE GASOLINE AND Li-ION ELECTRIC
- PHVO PLUG-IN HYBRID OTHER ELECTRIC
- UNKN UNKNOWN

DRIVELINE – Driveline (optional)

Code

DRIVELINE describes the way the vehicle power is transferred to its wheels.

- 4WD FOUR WHEEL DRIVE
- AWD ALL WHEEL DRIVE
- FWD FRONT WHEEL DRIVE
- NAP NOT APPLICABLE
- OTH OTHER
- RWD REAR WHEEL DRIVE
- UNK UNKNOWN

MOTORCONFIG – Motor Configuration (optional)

Code

MOTORCONFIG describes the locations of electric powered motors.

- FT FRONT
- FR FRONT AND REAR
- FM FRONT AND MID
- MD MID
- MR MID AND REAR
- RR REAR
- OT OTHER
- UN UNKNOWN
- NA NOT APPLICABLE

VEHTWT – Vehicle Test Weight (mandatory)

Integer ≥ 0, kilograms

VEHTWT is the measured test weight of the vehicle or the impactor including ATDs, data acquisition, cargo, cameras, and all loads. Enter N/A for non-vehicle tests.

CURBWT – Vehicle Curb Weight (mandatory)

Integer ≥ 0, kilograms

CURBWT is the total weight of a vehicle with standard equipment, all necessary operating consumables (e.g., motor oil and coolant), a full tank of fuel, while not loaded with either passengers or cargo. Enter N/A for non-vehicle tests.

WHLBAS – Wheelbase (mandatory)

Integer ≥ 0, millimeters

WHLBAS is the measured or published value of the vehicle or impactor's wheelbase.

VEHLEN – Vehicle Length (mandatory)

Integer ≥ 0, millimeters

VEHLEN is the measured or published value for the length of the vehicle or impactor.

VEHWID – Vehicle Width (mandatory)

Integer ≥ 0, millimeters

VEHWID is the measured or published maximum width of the vehicle or impactor.

ACTIVEDEV – Active Device for Pedestrian Safety (mandatory for Ped)

Code, 3 characters (POP- pop-up hood, AIR – airbag, NON – none)

ACTIVEDEV denotes if the test vehicle is equipped with an active device meant to reduce pedestrian injury. This field must be coded for pedestrian tests but may be left blank for other tests.

HOODTOP – Area of the "Hood Top" (mandatory for FMVSS 228)

Integer ≥ 1, mm^2

HOODTOP is the measured area of the "hood top" as defined in FMVSS 288. The measurement shall be in millimeters squared.

HOODAREA – Area of the "Hood Area" (mandatory for FMVSS 228)

Integer ≥ 1, mm^2

HOODAREA is the measured area of the "hood area" as defined in FMVSS 288. The measurement shall be in millimeters squared.

CHILDTESTAREA – Area of the "Child Test Area" (mandatory for FMVSS 228)

Integer ≥ 1, mm^2

CHILDTESTAREA is the measured area of the "child test area" as defined in FMVSS 288. The measurement shall be in millimeters squared.

ADULTTESTAREA – Area of the "Adult Test Area" (mandatory for FMVSS 228)

Integer ≥ 1, mm^2

ADULTTESTAREA is the measured area of the "adult test area" as defined in FMVSS 288. The measurement shall be in millimeters squared.

HICUNLIMITEDAREA – Area of the "HIC Unlimited Area" (mandatory for FMVSS 228)

Integer ≥ 1, mm^2

HICUNLIMITEDAREA is the measured area of the "HIC unlimited area" as defined in FMVSS 288. The measurement shall be in millimeters squared.

BUMPER30 – Width of the Bumper – 30° Plane (mandatory for NCAP Ped)

Integer ≥ 1, mm

BUMPER30 is the measured width of the bumper utilizing a 30-degree plane from the NCAP pedestrian test procedure. The measurement shall be in millimeters and is taken without removing the fascia.

BUMPERCG – Width of the Bumper – Corner Gauge (mandatory for NCAP Ped)

Integer ≥ 1, mm

BUMPERCG is the measured width of the bumper utilizing a corner gauge from the NCAP pedestrian test procedure. The measurement shall be in millimeters and is taken without removing the fascia.

BUMPERBEAM – Width of the Bumper – Direct Beam (mandatory for NCAP Ped)

Integer ≥ 1, mm

BUMPERBEAM is the measured width of the bumper beam per the NCAP pedestrian test procedure. The measurement shall be in millimeters and is taken directly by removing the fascia.

BUMPERTESTWIDTH – Bumper Test Width (mandatory for NCAP Ped)

Calculated integer ≥ 0, mm

BUMPERTESTWIDTH is the actual test width used for testing and is the largest of the three bumper measurements – BUMPER30, BUMPERCG, and BUMPERBEAM.

UBRL – Upper Bumper Reference Line Height (mandatory for NCAP Ped)

Integer ≥ 1, mm

UBRL is the height of the Upper Bumper Reference Line (from ground), as measured at the vehicle centerline.

LBRL – Lower Bumper Reference Line Height (mandatory for NCAP Ped)

Integer ≥ 1, mm

LBRL is the height of the Lower Bumper Reference Line (from ground), as measured at the vehicle centerline.

IBRL – Internal Bumper Reference Line Height (mandatory for NCAP Ped)

Integer ≥ 1, mm

IBRL is the height of the Internal Bumper Reference Line (from ground), as measured at the vehicle centerline.

CORFACT – NCAP Head Testing Correction Factor (mandatory for NCAP Ped)

Real (0.001 to 1.999), unitless

CORFACT is the correction factor for head test scoring calculated by comparing the predicted head impactor color with the color of the actual test result. As an equation: Correction Factor = (Sum of Actual Test Scores)/(Sum of Predicted Test Scores).

See PREDVERSION for scoring for each color.

2.5. Component Table

The data elements defined below comprise the Component Information group. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range. The Component Information group comprises all tests of a single test type on the test vehicle. For pedestrian testing the “adult head to hood” test would be one component group, the “child head to hood” would be another component group, and the “adult head cyclist tests” would be yet a third component group. Other test types may only have a single component group with many configurations.

VEHNO – Vehicle Number (mandatory)

Integer ≥ 0

VEHNO is associated vehicle number for this Component Information record. Only zero or a valid VEHNO from the Vehicle Information Table may be used.

CMPNO – Component Number (mandatory)

Sequential Integer > 0

CMPNO is the identifying number of the component being tested. The first such component shall be 1, the second 2, etc.

CMPNT – Component Tested (mandatory)

Code

CMPNT is the component being tested or the test type.

For pedestrian testing:

- HDHD = head to hood test
- LHLE = leg to hood leading edge

- LBUM = leg to bumper
- SENS = sensing test
- CYCL = cyclist head to roof test

CMPTYP – Component Type (mandatory)

Code

CMPTYP is the specific component being used or tested.

For pedestrian testing:

- AH = adult head
- CH = child head
- FP = FlexPLI lower legform
- PD = PDI2 legform
- UL = TRL Upper Legform
- AP = aPLI legform

CMPWGT – Component Weight (mandatory)

Real ≥ 0, kilograms

CMPWGT is the weight of the component in kilograms. If the weight is not known or does not apply, use 0.

MODIND – Modification Indicator (mandatory)

Code, 1 character

MODIND is a marker identifying whether or not the component has been previously modified.

MODDSC – Modification Description (optional)

Text, maximum 70 characters

MODDSC is a description of any modifications to the component. This field applies to any type of component.

OCCTYP – Occupant Type (mandatory)

Code

OCCTYP is the type of test occupant, such as the type of dummy. If an occupant is not used code NA. Code NA for pedestrian testing.

DUMSIZ – Dummy Size Percentile (mandatory for ATDs)

Code

DUMSIZ indicates the size of the dummy test occupant, measured either as a standard size percentile or by age classification for child dummies.

DUMMAN – Dummy Manufacturer (mandatory for ATDs)

Text, maximum 70 characters

DUMMAN is the manufacturer of the test dummy or test device.

DUMSN – Dummy Serial Number (mandatory for ATDs)

Text, maximum 70 characters

DUMSN is the serial number of the test dummy or test device.

DUMMOD – Dummy Modification Description (optional)

Text, maximum 70 characters

DUMMOD is the description of any modifications to the design of the dummy or test device used in the test.

DUMDSC – Description of the Dummy (optional)

Text, maximum 70 characters

DUMDSC use for additional description of the dummy or test device, if necessary.

LINK – Data Link to Recorder (optional)

Code, 3 characters

LINK is the type of data acquisition system used to record the instrumentation installed in the dummy or test item. Use code ODA (Onboard Data Acquisition) if a data acquisition system installed in the test item itself is used to record its instrumentation, UMB (Umbilical Cable) if the test item is connected by an umbilical cable to a data acquisition system, or OTH (Other) and describe in CMPCOM.

CMPCOM – Component Commentary (optional)

Text, maximum 70 characters

CMPCOM is a descriptive field containing any extraneous information needed to define the component. This field should explain any OTHER or N/A codes listed in required fields.

QUALDAT – Qualification Date (optional)

Date (YYYY-MM-DD)

QUALDAT is the date this component ID was qualified (component/impactor/dummy as appropriate).

2.6. Configuration Table

The data elements defined below comprise the Test Configuration Information group. The information in this group completely describes the specific test being performed. There will be at least one, but may be multiple configurations (or tests), such as impact locations, for a single component, such as pedestrian FlexPLI to bumper tests.

VEHNO – Vehicle Number (mandatory)

Integer ≥ 0

VEHNO is associated vehicle number for this Configuration Information record. Only zero or a valid VEHNO from the Vehicle Information Table may be used.

CMPNO – Component Number (mandatory)

Integer > 0

CMPNO is associated component number for this Configuration Information record. Only a valid CMPNO from the Vehicle Information Table may be used.

CNFNO – Configuration Number (mandatory)

Sequential Integer > 0

CNFNO is the number identifying the specific test configuration. The first such test configuration shall be 1, the second 2, etc.

CONFIG – Test Configuration (mandatory)

Code

CONFIG is the specific test configuration, e.g. abdominal compression (static, coded ABD) or guided head-form dynamic impact (coded HDF for FMVSS 201 testing).

For pedestrian testing:

- HDH = head to hood test
- HLE = leg to hood leading edge
- BUM = leg to bumper
- SEN = sensing test
- CYC = cyclist head to roof test

TSTDEV – Test Device (mandatory)

Code

TSTDEV is the test device, such as a linear impactor, static loading device, etc.

For pedestrian testing:

- ADH = adult head
- CDH = child head
- FPL = FlexPLI lower legform
- PDI = PDI2 legform
- ULG = TRL Upper Legform
- APL = aPLI legform

DEVSPD – Actual Device Speed (optional)

Real ≥ 0, km/h

DEVSPD is the speed of the test device at time zero (impact speed).

CMPSPD – Nominal Device Speed (mandatory)

Real ≥ 0, km/h

CMPSPD is the nominal or targeted speed of the device at time zero.

ENERGY – Impact Energy (optional)

Real ≥ 0, Joules

ENERGY is the energy, in Joules, of the impactor at time zero (impact). For NCAP pedestrian upper leg testing this is a function of vehicle geometry. For other tests this may be left blank.

DEVCOM – Test Device Comments (optional)

Text, maximum 70 characters

DEVCOM is a descriptive field for any extra information needed to define the test device. This field should explain any OTHER or NA codes listed in the TSTDEV field.

CNTANGXY – Contact Angle XY Plane (optional)

Integer 0 to 359, degrees

CNTANGXY is the angle of contact between the travel vector of the test device and the XY plane of the vehicle at the impact point. A head on impact is defined as 0 degrees, which is also the reference line for the measurement. This field applies only to dynamic tests. Code NA if not applicable.

For pedestrian impacts this angle will typically be 0 degrees.

CNTANGXZ – Contact Angle XZ Plane (optional)

Integer 0 to 359, degrees

CNTANGXZ is the angle of contact between the travel vector of the test device and the XZ plane of the vehicle at the impact point. A perpendicular impact is defined as 0 degrees, which is also the reference line for the measurement. This field applies only to dynamic tests. Code NA if not applicable.

For pedestrian impacts, this angle will typically be 50 degrees for the child head to hood test, 65 degrees for the adult head to hood test, 0 degrees for the FlexPLI or aPLI to bumper test, 45 degrees for the cyclist head test, and 20 degrees for head impacts forward of the hood leading edge. For the upper legform to hood leading edge test the impact angle will vary based on vehicle geometry and should be measured in degrees relative to the horizontal ground plane.

CNTLOC1 – Contact Location #1 (optional)

Integer ≥ 0, millimeters

CNTLOC1 is the location on the component where contact occurred with the test device. It may also be the attachment location for the test device. CNTLOC1 is the vertical measurement taken from the top of the component to the test device contact point. If the component being tested is a vehicle roof pillar or a dummy component, such as an arm or leg, this measurement may be taken along the local axis of the component. Code NA if not applicable.

For pedestrian head testing CNTLOC1 shall be the nominal wrap around distance targeted if wrap around distance is used for targeting. For head testing done with a grid point system instead of a WAD system this can be blank if not recorded. For pedestrian upper leg testing CNTLOC1 shall be the 775 for the WAD775 target. For pedestrian lower leg testing it shall be the height of the leg impactor off of the ground (typically 75 mm for the FlexPLI and 25 mm for the aPLI).

Table 5 lists examples of contact measurements. Figure 4 shows the contact codes for various points on the dash-panel.

CNTLOC2 – Contact Location #2 (optional)

Integer, millimeters

CNTLOC2 is the location on the component where contact occurred with the test device. It may also be the attachment location for the test device. CNTLOC2 is the horizontal measurement taken from the left edge of the component being tested to the test device contact point. This field supplies additional location data when CNTLOC1 is not enough to uniquely define the contact point.

For pedestrian testing this is the nominal lateral measurement from the vehicle centerline. Passenger (right) side is positive, and driver (left) side is negative.

Table 5 lists examples of contact measurements. Figure 4 shows the contact codes for various points on the dash-panel.

STRUC – Vehicle Structure Contact (mandatory for Ped)

Code

STRUCT is the general vehicle structure contacted by the test device. For pedestrian testing it is understood that more than one structure may be contacted by a single impact, but the test operator shall select the primary structure to code. Some examples:

- LIGHT = Headlight

- BUMP = Bumper
- HOOD = Hood
- QTPN = Quarter Panel
- WIND = Windshield
- COWL = Cowl
- ROOF = Roof
- GRIL = Grille
- APIL = A-pillar

TARGETX – Target Location CMM X Direction (mandatory for Ped)

Integer, millimeters

TARGETX is the precise CMM measurement in the X direction of the target location relative to a known origin. For pedestrian testing the origin shall be at the vehicle centerline at WAD 1000. Positive X is towards the front of the vehicle, per SAE J211.

TARGETY – Target Location CMM Y Direction (mandatory for Ped)

Integer, millimeters

TARGETY is the precise CMM measurement in the Y direction of the target location relative to a known origin. For pedestrian testing the origin shall be at the vehicle centerline at WAD 1000. Positive Y is towards the passenger side (right) of the vehicle, per SAE J211.

TARGETZ – Target Location CMM Z Direction (mandatory for Ped)

Integer, millimeters

TARGETZ is the precise CMM measurement in the Z direction of the target location relative to a known origin. For pedestrian testing the origin shall be at the vehicle centerline at WAD 1000. Positive Z is towards the ground, per SAE J211.

GRIDX – NCAP Grid Point X (mandatory for NCAP Ped)

Integer

GRIDX is the NCAP Grid Point in the X direction (row) as outlined by the NCAP test procedure. For leg testing with no X direction rows this value shall be zero.

GRIDY – NCAP Grid Point Y (mandatory for NCAP Ped)

Integer

GRIDY is the NCAP Grid Point in the Y direction (row) as outlined by the NCAP test procedure. Positive to the passenger (right) side and negative to the driver (left) side. Zero at vehicle centerline.

TARGETMETHOD – Targeting Method (optional)

Code

TARGETMETH is the targeting method used for the pedestrian headform test.

- AIM = Aiming method
- 2DPOFC = 2D point of first contact
- 3DPOFC = 3D point of first contact

CNTCOM – Contact Commentary (optional)

Text, maximum 70 characters

CNTCOM is a descriptive field for any extra information needed to explain the contact. It may be used to describe a reference location for CNTLOC1 and CNTLOC2. If more than one vehicle structure is contacted the test operator can also note what other structure was contacted in addition to coding it in STRUCT.

CFNCOM – Configuration Commentary (optional)

Text, maximum 70 characters

CFNCOM is a descriptive field for any extra information needed to define the test configuration (specific impact test). This field should explain any OTHER or N/A codes listed in the CONFIG field.

IMPACTDATE – Impact Date (mandatory)

Date, ISO 8601 format (YYYY-MM-DD), 10 characters

IMPACTDATE is the date of the impact test.

TESTTEMP – Ambient Temperature (optional)

Real -99 to 99, degrees Celsius

TESTTEMP is the test temperature at the test location. Leave blank if unknown.

TESTHUMID – Relative Humidity (optional)

Real 0 to 100, relative humidity %

TESTHUMID is the test relative humidity percentage at the test location. Leave blank if unknown.

DPPS – Deployable Pedestrian Protection System (mandatory for Ped)

Code, 2 digits

- DPPS notes the presence and status of a deployable pedestrian protection system (e.g. active hood) during the pedestrian head test.
- YS = yes, deployed statically
- YD = yes, deployed dynamically
- NO = DPPS present but not deployed
- NA = DPPS not present

FIRETM – Countermeasure Firing Time (optional)

Integer -99 to 99, milliseconds

FIRETM is the time in milliseconds when the countermeasure was deployed (e.g. active hood). T=0 is when headform is launched. If the countermeasure is deployed well before the impact and not at a specific time (e.g. static deploy) code -99.

IMPACTTM – Impact Time After Launch (optional)

Integer 0 to 99, milliseconds

IMPACTTM is the time after launch, in milliseconds, when the impactor contacts the dynamically deploying hood. For tests without an active hood this can be coded 0 and for tests with a static deployed hood this can be coded 99.

SENSTM – Sensing Time (optional)

Integer 0 to 99, milliseconds

SENSTM is the time in milliseconds it takes the deployable pedestrian protection system to sense contact with the pedestrian. This can be provided by the manufacturer or observed via a sensing test.

DEPLOYTM – Deployment Time (optional)

Integer 0 to 99, milliseconds

DEPLOYTM is the time in milliseconds it takes the deployable pedestrian protection system to fully deploy after being triggered. This can be provided by the manufacturer or observed via a sensing test.

HIT – Head Impact Time (optional)

Integer 0 to 99, milliseconds

HIT is the head impact time in milliseconds for the specific pedestrian size and impact location. This can be provided by the manufacturer via simulation or potentially calculated using a generic formula (future).

DPPSCOM – Deployable Pedestrian Protection System Comments (optional)

Text

DPPSCOM shall be used for any notes or other information needed pertaining to the deployable pedestrian protection system for a specific impact test.

Table 5 - CNTLOC1 and CNTLOC2 Reference Points

Component (CMPNT)	Component Plane or Axis*	Reference Point for Vertical Measurement (CNTLOC1)	Reference Point for Horizontal Measurement (CNTLOC2)
Dash Panel DP01 – DP09	Not applicable	See Figure 4 Enter 0.0	See Figure 4 Enter 0.0

Doors DRLF DRLR DRRF DRRR DRSL DROT (rear door)	X-Z	Top of window frame or window downward to contact point	Outside of rearmost edge of window frame, window or door, forward to contact point DROT: Left edge of door, right to contact point
Pillars PLAL PLAR PLBL PLBR	Z	Top of pillar down longitudinal axis to contact point	Not applicable
HOOD	X-Y	Front edge of hood backward to contact point	Left edge of hood, right to contact point
Seats SEBK	Y-Z	Top edge of seatback downward to contact point	Left edge of seatback, right to contact point
Seat SECU	X-Y	Front edge of seat cushion backward to contact point	Left edge of seat cushion, right to contact point
ATDs CHST	Y-Z	Top of chest or shoulder downward to contact point	Left side of chest, right to contact point
ATDs FEMR TIBA	Z	Top of component down longitudinal axis	Not applicable

*For structures such as the roof, doors, and hood, the plane is approximately parallel to the surface of the component

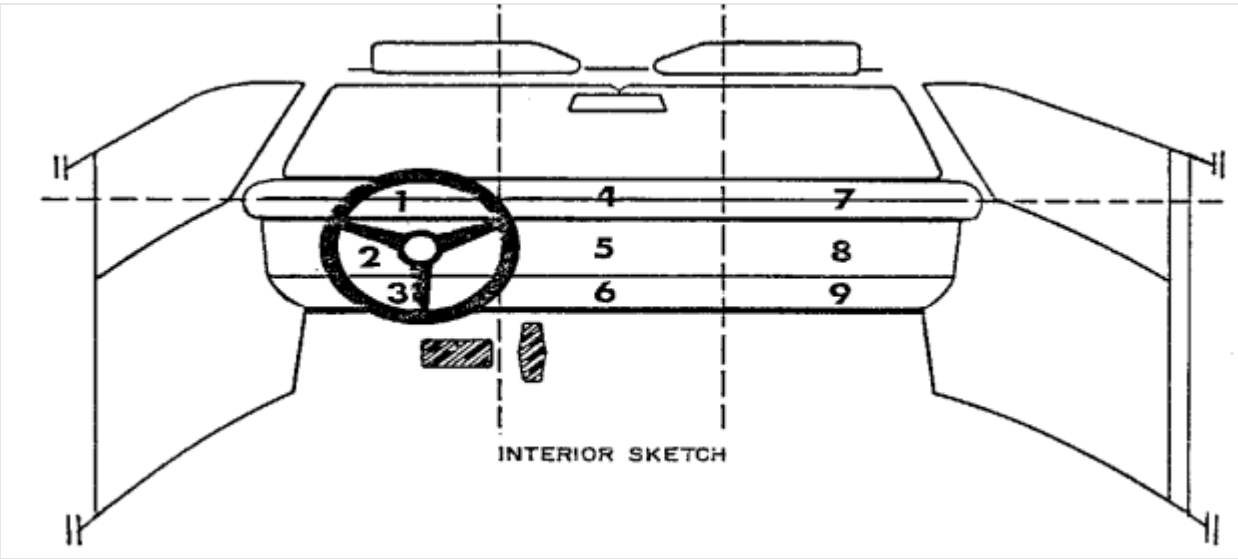

Figure 4 - Reference Points for Contact Locations (CNTLOC1/CNTLOC2)

2.7. Instrumentation Table

Fields defined below constitute the instrumentation information record. A field includes its order index in the record, name, brief description, type and valid range. For example, in the second field, "2", "CURNO", "Curve Number", "integer", and "1 to 999" are its order index in the information record, its name, brief description, its type and its range, respectively. Any use of the code for “OTHER” should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

VEHNO — Vehicle Number (mandatory)

Integer ≥ 0

VEHNO is associated vehicle number for this Instrumentation record. Only zero or a valid VEHNO from the Vehicle Information Table may be used.

CMPNO — Component Number (mandatory)

Integer > 0

CMPNO is associated component number for this Instrumentation record. Only a valid CMPNO from the Component Information Table may be used.

CNFNO — Configuration Number (mandatory)

Integer > 0

CNFNO is associated configuration number for this Instrumentation record. Only a valid CNFNO from the Configuration Information Table may be used.

CURNO — Curve Number (mandatory)

Sequential Integer > 0

CURNO is the sequential number (1,2,3…) assigned to a specific sensor and data curve.

SENTYP — Sensor Type (mandatory)

Code, 2 characters

SENTYP indicates the type of sensor used for collecting the measurements at the time of the test, such as AC for accelerometer.

SENLOC — Sensor Location (optional)

Code, 2 characters

SENLOC indicates the general location of the test occupant or corresponding occupant restraint to which the sensor is attached. Code NA if not on an ATD.

SENATT — Sensor Attachment (mandatory)

Code, 4 characters

SENATT indicates where the sensor is attached. For example, the code APLR would be entered for an attachment on the right A-pillar and HDCG is located in the head center of gravity.

AXIS — Axis Direction of the Sensor (mandatory)

Code, 2 characters

AXIS is the axis direction for sensors measuring vector quantities as described in Appendix A: Data Coordinate System. The global coordinate systems are vehicle fixed; the local systems are local within the vehicle global system. With respect to the vehicle longitudinal axis, X is positive forward, Y is positive right, (toward the passenger's door) and Z is positive down. These can differ depending on the component. For example, with the steering assembly, positive X is down the column axis and Y is positive right (toward the passenger's door).

AXIS is always applicable when the measurement is a vector quantity such as acceleration, force, velocity, and so forth. Note that the head accelerometer array is a local coordinate system. The distance, d, is the length of the arm between HD90 and HD9Y, measured along the Y arm. The reporting of this value of d is described in the INSCOM. The length of the X arm and the Z arm are reported in the same manner.

For all sensors attached to moving bodies, including but not limited to dummies, cadavers, or other surrogates, AXIS is coded as a local coordinate system (e.g. XL). For any sensor attached to a fixed reference frame, such as the laboratory or ground coordinate system, AXIS is coded as a global coordinate system (e.g. XG).

XUNITS — X Units- Time or 'Independent Axis' Units (mandatory)

Code, up to 3 characters

XUNITS indicates either the unit of time for time series sensor data (e.g. 'SEC'), or the units of the independent coordinate of a non-time series signal (e.g. If a load is applied in a controlled fashion to produce a deflection, the load is the independent coordinate, and the deflection is the dependent coordinate).

YUNITS — Y Units- Data Measurement Units (mandatory)

Code, up to 3 characters

YUNITS indicates the units used to measure the signal of the sensor data.

PREFIL — Pre-filter Frequency (mandatory)

Integer ≥ 0

PREFIL is the cutoff frequency in Hz of a low-pass filter (digital or analog) applied to the signal. For unknown or not applicable, code 0.

INSMAN — Manufacturer of the Instrument (optional)

Text

INSMAN describes the manufacturer of the sensor or instrument.

INSMOD — Model of the Instrument (optional)

Text

INSMOD describes the model of the sensor or instrument.

INSSN — Serial Number of the Instrument (optional)

Text

INSSN describes the serial number of the sensor or instrument.

CALDAT — Calibration Date (optional)

Date, ISO 8601 format (YYYY-MM-DD), 10 characters

CALDAT is the most recent calibration date of the instrument. Don't leave it blank, please.

SENXCAL — Sensor Excitation, Calibration (mandatory)

Real, volts

SENXCAL is the excitation voltage that was used during the sensor's last calibration, expressed in volts. Enter the exact value from the calibration sheet, do not round. Enter 0 if unknown or not applicable.

SENXTST — Sensor Excitation, Test (mandatory)

Real, volts

SENXTST is the excitation voltage that was used during the test, expressed in volts. Report the exact value from the DAS configuration, do not round.

SENSENS — Sensor Sensitivity (mandatory)

Real

SENSENS is the sensor sensitivity value determined during the sensor's last calibration. Enter exact value from the DAS configuration, do not round. SENSENS is expressed by the equation format defined in SENSEQN,

SENSEQN — Sensor Sensitivity Equation (optional)

Code, up to 4 characters

SENSEQN is the sensor sensitivity equation format used to determine the relationship between raw voltage and engineering units. Default is mv/V/engineering units, where the engineering units are stored in YUNITS.

Optional codes are:

- MVVE – mv/V/engineering units
- MVE - mv/engineering units
- OTH – as defined in INSCOM

DASRES — Data Acquisition System Resolution (optional)

Integer ≥ 0, bits

DASRES is the data acquisition system analog to digital convertor resolution used for this channel, expressed in bits.

SENRANGEMIN — Sensor Range Minimum (optional)

Integer

SENRANGEMIN is the low end of the total range for the sensor system only, independent of data acquisition system (DAS) settings. SENRANGEMIN should be in the same units as the data channel. Computed channels coded as DASTAT=CM should leave this field blank.

For sensors with ratings symmetric about zero, code SENRANGEMIN as the minimum value of the usable range. For example, a load cell with a range of –10,000 N to 10,000 N has a SENRANGEMIN of -10000.

For sensors not symmetric about zero, code SENRANGEMIN as the lowest value of the usable range. For example, a Hybrid III chest potentiometer with a range of -60 mm to 10 mm has a SENRANGEMIN of -60. A sensor with a range of 20 mm to 70 mm has a SENRANGEMIN of 20.

For any other configurations (including RibEye signals), code SENRANGEMIN as N/A.

SENRANGEMAX — Sensor Range Maximum (optional)

Integer

SENRANGEMAX is the high end of the total range for the sensor system only, independent of data acquisition system (DAS) settings. SENRANGEMAX should be in the same units as the data channel. Computed channels coded as DASTAT=CM should leave this field blank.

For sensors with ratings symmetric about zero, code SENRANGEMAX as the maximum value of the usable range. For example, a load cell with a range of –10,000 N to 10,000 N has a SENRANGEMAX of 10000.

For sensors not symmetric about zero, code SENRANGEMAX as the highest value of the usable range. For example, a Hybrid III chest potentiometer with a range of -60 mm to 10 mm has a SENRANGEMAX of 10. A sensor with a range of -70 mm to -20 mm has a SENRANGEMAX of -20.

For any other configurations (including RibEye signals), code SENRANGEMIN as N/A.

CHLRANGE — Channel Range (optional)

Integer

CHLRANGE is the maximum value that can be measured by the channel as used in the test, after DAS setup, as reported by the DAS. CHLRANGE should be in the same units as the data channel. Computed channels coded as DASTAT=CM should code this field as "0"

SENMAXPCT — Sensor Maximum Percentage (optional)

Integer

SENMAXPCT is the maximum value of the data recorded from this channel during the test, prior to post-processing, divided by SENRANGEMAX and expressed as a percentage.

It may exceed 100% in cases where CHLRANGE is set larger than SENRANGEMAX. Computed channels coded as DASTAT=CM should code this field as "0".

SENMINPCT — Sensor Minimum Percentage (optional)

Integer

SENMINPCT is the minimum value of the data recorded from this channel during the test, prior to post-processing, divided by SENRANGEMIN and expressed as a percentage.

It may exceed 100% in cases where CHLRANGE is set larger than SENRANGEMIN. Computed channels coded as DASTAT=CM should code this field as "0".

CHLMAXPCT — Channel Maximum Percentage (mandatory)

Integer

CHLMAX is the maximum absolute value of the data recorded from this channel during the test, prior to post-processing, divided by CHLRANGE and expressed as a percentage.

It will not exceed 100%. Computed channels coded as DASTAT=CM should code this field as "0".

INIVEL — Initial Velocity (mandatory)

Real, kilometers per hour

INIVEL is the initial (time zero) velocity of the sensor along its axis and applies only to linear accelerometers. If the sensor is a load cell attached to a barrier, the entry for this data should be zero (0.0).

TINT — Time Sampling Interval (mandatory)

Real ≥ 0

TINT is the sampling interval, or amount of time between data points, for channel data with a uniform sampling rate. The units of TINT are defined by XUNITS.

TSTART — Time of First Sample (mandatory)

Real

TSTART is the time of the first sample in the units defined by XUNITS.

NUMPTS — Number of Points (mandatory)

Integer ≥ 0

NUMPTS is the total number of data points for this channel. See below examples in Table 6 and Table 7.

Table 6 - Examples of NUMPTS

Independent Axis Description	XUNITS	TINT	TSTART	NUMPTS
10 kHz, 0.05 seconds before impact to 0.3 seconds after impact	SEC	0.0001	-0.05	3501
12.5 kHz, 0.1 seconds before impact to 0.5 seconds after impact	SEC	0.00008	-0.1	7501
20 kHz, 0.05 seconds before impact to 0.3 seconds after impact	SEC	0.00005	-0.05	7001
8 kHz, 0.05 seconds before impact to 0.3 seconds after impact	SEC	0.000125	-0.05	2801
10 kHz, 100 milliseconds before impact to 500 milliseconds after impact	MS	0.1	-100	6001
Non-uniform sampling over 1000 data points	SEC	0		1000

The first example in Table 6 above would represent the following signal data:

Table 7 - Example Signal Data for NUMPTS

Time (sec)	Y-axis Data (example)	Data Point Index
-0.0500	0.580	1
-0.0499	-2.674	2
-0.0498	3.444	3
…	…	…
-0.0001	11.773	499
0.0000	3.300	500
0.0001	3.033	501
…	…	…
0.2999	-6.387	3500
0.3000	3.463	3501

DASTAT — Data Status (optional)

Code

DASTAT indicates the status of the data as it appears in the data submission. This data is used to indicate a signal which is invalid (code MN for meaningless), or which becomes questionable or invalid part of the

way through a signal (code CF and explained in INSCOM). If a signal is computed, DASTAT is CM; however, if any of the source signals used in the computation were questionable or invalid, DASTAT is CQ. An example of a computed signal would be the resultant acceleration or the rotational acceleration of the head measured with a nine linear accelerometer array. The default value for this variable is AM (As Measured).

CHSTAT — Channel Status (optional)

Code

CHSTAT indicates whether the data channel is primary (P) or redundant (R). If, for example, the dummy is instrumented with a backup tri-axial accelerometer in the head, the redundant channels should be labeled R. S is used to specify a substitute channel. The occupant's HIC value would be calculated using the primary head channels, labeled P.

INSCOM — Instrumentation Commentary (optional)

Text, maximum 70 characters

INSCOM is any further commentary on an instrumentation information record and its correlated signal data, including any unusual conditions affecting the data or a reference to a document that describes problems with a particular curve. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well.

For Head 9 array accelerometers, INSCOM contains dimensions that precisely locate the given instrument. The HD90, X-axis accelerometer, will locate the center of the Head 9 array relative to the head CG; then the entry in INSCOM for HD90 would read: CG: X: 33MM, Y: 2.5MM, Z: -5.0 MM.

The X-axis of HD9Y, HD9X, and HD9Z will contain the distance, d (See: Figure 7 - Nine-Accelerometer Coordinate System), which is the length of the arm. Units must be shown. For example, if the Y arm is 110 mm long, then the entry in INSCOM for HD9Y, X direction would read: Y-ARM: 110 MM.

2.8. Geometry Table

The Geometry Information table is mandatory for pedestrian testing and describes the geometry and markup of the vehicle's front end. It is used to record landmarks such as the Wrap Around Distances (WADs), hood area, and bumper test width.

VEHNO — Vehicle Number (mandatory)

Integer > 0

VEHNO is associated vehicle number for this Geometry record. Only a valid VEHNO from the Vehicle Information Table may be used, typically 1.

GEONO- Geometry Measurement Identification Number (mandatory for pedestrian testing)

Integer > 0

GEONO is the sequential number (1,2,3…) assigned to a specific geometry measurement.

GEOX- Location X Coordinate (mandatory for pedestrian testing)

Real, millimeters

GEOX is the X axis measurement in millimeters as taken with a CMM. Unless otherwise specified for pedestrian testing, the vehicle centerline at WAD 1000 is (0,0,0). X is positive towards the vehicle front.

GEOY- Location Y Coordinate (mandatory for pedestrian testing)

Real, millimeters

GEOY is the Y axis measurement in millimeters as taken with a CMM. Unless otherwise specified for pedestrian testing, the vehicle centerline at WAD 1000 is (0,0,0). Y is positive towards the passenger side (right side) of the vehicle.

GEOZ – Location Z Coordinate (mandatory for pedestrian testing)

Real, millimeters

GEOZ is the Z axis measurement in millimeters as taken with a CMM. Unless otherwise specified for pedestrian testing, the vehicle centerline at WAD 1000 is (0,0,0). Z is positive towards the ground.

LANDMARK – Landmark applicable to geometry measurement (mandatory for pedestrian testing)

Code

LANDMARK specifies what item the associated X, Y, Z measurements describe. For example, hood leading edge, WAD 1000, bumper corner, ground definition, or hood perimeter.

- WAD775 – used for points along the WAD 775
- WAD930 – used for points along the WAD 930
- WAD1000 – used for points along the WAD 1000
- WAD1700 – used for points along the WAD 1700
- WAD2100 – used for points along the WAD 2100
- WAD2500 – used for points along the WAD 2500
- PERIMETER – used for points on the outer perimeter
- OFFSET – used for points on the 82.5 mm offset
- LERL – used for points on the leading edge reference line
- SRL – used for points on the side reference line
- RRL – used for points on the rear reference line
- LBRL – used for points on the lower bumper reference line
- UBRL – used for points on the upper bumper reference line
- IBRL – used for points on the internal bumper reference line
- IBRLFASCIA – used for points on the internal bumper reference line transferred to the external fascia

- FCORN – used for points on the front corner - the intersection of the leading edge reference line and side reference line
- RCORN – used for points on the rear corner - the intersection of the rear reference line and side reference line
- WCORN – used for points on the windshield rear corner - the intersection of the windshield rear reference line and side reference line
- BCORN – used for points on the corner of the bumper
- WRRL – used for points on the windshield rear reference line
- IMPACT – used for impact point locations
- 520MM – used for points 520 mm from the ground

GEONAME – Point Name (optional)

Text

GEONAME is the descriptive name of the point being measured, such as “LERL @ -400”.

GEOCOMM – Comments (optional)

Text

GEOCOMM should be used for any comments or notes about the measurement described such as a point being on a discontinuity or a complex measurement taken in an unusual way or a non-common point.

2.9. Pedestrian Prediction Table

The Pedestrian Prediction table is mandatory for NCAP pedestrian testing and records the manufacturer’s predicted scores for each impact location. It contains links to the Component Info and Test Configuration tables so that points that have a physical test result can be compared to the predicted test result.

VEHNO — Test Vehicle Identification Number (mandatory for NCAP pedestrian testing)

Integer > 0

VEHNO is the reference number for a particular vehicle. For PedPro testing this number should always be 1.

PREDNO – Pedestrian Prediction Identification Number (mandatory for NCAP pedestrian testing)

Integer > 0

PREDNO is the sequential number (1,2,3…) assigned to a specific pedestrian prediction value.

GRIDX — Grid Point X Direction (mandatory for NCAP pedestrian testing)

Integer

GRIDX links the prediction value to the Configuration table along with the GRIDY value. For headform tests the X value shall match the grid location as marked up on the vehicle. For legform tests performed in a line, the GRIDX value shall be 0.

GRIDY — Grid Point Y Direction (mandatory for NCAP pedestrian testing)

Integer

GRIDY links the prediction value to the Configuration table along with the GRIDX value. For headform and legform tests the Y value shall match the grid location as marked up on the vehicle. As per the sign convention tests on the passenger side (right side) of the vehicle are positive and tests on the driver side (left side) of the vehicle are negative.

PREDCOLOR — Color Range Prediction (mandatory for NCAP pedestrian testing)

Code

PREDCOLOR is the predicted color range for the specific impact point as provided by the vehicle manufacturer.

- Green
- Yellow
- Orange
- Brown
- Red
- Default Red
- Default Green
- Blue

PREDVERSION — Prediction Version (mandatory for NCAP pedestrian testing)

Code (2024NCAP)

PREDVERSION is the criteria version used for generating the predicted color. At time of writing there is only one version, that specified by the 2024 NCAP notice.

Table 8 - Headform Predicted Colors and Scoring

Predicted Color Band	HIC15 Range	Acceptable HIC15 Range
Green (1.000 points)	HIC15 < 650	HIC15 < 722.22
Yellow (0.750 points)	650 ≤ HIC15 < 1,000	590.91 ≤ HIC15 < 1,111.11
Orange (0.500 points)	1000 ≤ HIC15 < 1,350	909.09 ≤ HIC15 < 1,500
Brown (0.250 points)	1350 ≤ HIC15 < 1,700	1,227.27 ≤ HIC15 < 1,888.89
Red	1,700 ≤ HIC15	1,545.45 ≤ HIC15

(0.000 points)		

2.10. Test Result Table

Fields defined below constitute the test result information record, which fulfills two different but related needs: 1) to document critical timed test results, or 2) to document injury assessment values calculated from ATD measurements.

Test result records are generally optional, but may be mandatory for testing under a given contract, test procedure, or research program. Please confirm with the COR or similar NHTSA contact. If test result entries are required or desired, please follow the mandatory/optional guidelines provided below for each field.

CNFNO — Configuration Number (mandatory)

Integer > 0

CNFNO is associated configuration number for this Test Result record. Only a valid CNFNO from the Configuration Information Table may be used.

RESNO — Test Result Number (mandatory)

Integer > 0

RESNO is the sequential number assigned to each resulting metric.

RESDESC — Test Result Name/Description (mandatory)

Code

RESDESC defines the injury criterion or other result coded in this record. Examples:

- HIC15 = Head Injury criteria 15-millisecond window
- BRIC = Brain injury criterion
- NIJ = Neck injury criterion
- FEMURZ = Peak axial femur (z-axis) compression force
- HIC36 = HIC 36 ms
- ACL = ACL elongation
- PCL = PCL elongation
- MCL = MCL elongation
- LCL = LCL elongation
- KACCEL = Knee acceleration
- TIB1 = Tibia Upper Force
- TIB2 = Tibia Upper Middle Force
- TIB3 = Tibia Lower Middle Force
- TIB4 = Tibia Lower Force
- MAXTIBMO = Maximum Tibia Moment

- SUMF = Sum of Upper Legform Forces
- FEM1 = Femur Moment Upper
- FEM2 = Femur Moment Middle
- FEM3 = Femur Moment Lower
- MAXFEMMO = Maximum Femur Moment
- SENS = Sensing Result

RESMETH —Test Result Calculation Method (optional)

Code

RESMETH defines the method of injury criterion calculation for the RESDESC criterion for this record. Examples:

- 208 = FMVSS No. 208 (49 CFR § 571.208)
- 228 = FMVSS No. 228 Pedestrian Head
- NCAP = New Car Assessment Program 2011- (73 FR 40015)
- PEDNCAP = New Car Assessment Program Pedestrian Final Decision (2024)
- THORICR = THOR-50M Injury Criteria Report (https://www.regulations.gov/document/NHTSA-2019-0106-0008)
- OTHER = Describe in INJCOM

RESVAL —Test Result Value (mandatory)

Real

RESVAL describes the value of the injury assessment metric defined in RESDESC and calculated based on the method described by RESMETH. Units are implied based on the combination of RESDESC and RESMETH.

RESCOM — Test Result Commentary (optional)

Text

RESCOM is used to describe the injury. Some examples are: FRACTURES OF RIBS R-7 AND R-8 or LACERATION OF THE LARYNX.

If “OTHER” is selected for any coded fields in this record, please explain here.

T1 — Test Result Time 1 (optional)

Real, milliseconds

T1 is used if the injury described in RESDESC has a T1 and T2 value (e.g. HIC). The value should correspond to the time zero in the accompanying time history data.

T2 — Test Result Time 2 (optional)

Real, milliseconds

T2 is used if the injury described in RESDESC has a T1 and T2 value (e.g. HIC). The value should correspond to the time zero in the accompanying time history data.

TMAX – Test Result Time Maximum (optional)

Real, milliseconds

TMAX is used if the injury or result described in RESDESC has maximum value at a specific time (e.g. NIJ). The value should correspond to the time zero in the accompanying time history data.

TMIN – Test Result Time Minimum (optional)

Real, milliseconds

TMIN is used if the injury or result described in RESDESC has minimum value at a specific time (e.g. chest compression). The value should correspond to the time zero in the accompanying time history data.

2.11. Report Table

Fields defined below constitute the report information record.

VEHNO — Test Vehicle Number (mandatory)

Integer ≥ 0

VEHNO is the number that identifies the vehicle that is subject of the report. VEHNO should be coded 0 if the report pertains to multiple vehicles in the test.

CMPNO — Component Number (mandatory)

Integer ≥ 0

CMPNO is the associated component number for this report. Code a 0 (zero) for a report that covers multiple components (e.g. an “overall” test report with more than one component).

CNFNO — Configuration Number (mandatory)

Integer ≥ 0

CNFNO is the number identifying the specific test configuration for the component depicted in the report. Code “0” if the report covers multiple configurations.

REPORTNO — Report Number (mandatory)

Sequential Integer ≥ 0

REPORTNO is the sequential number (1,2,3…) assigned to a specific report.

REPORTDESC — Report Description (mandatory)

Text

REPORTDESC is the description of the report such as “Final Report” or “One-Page Summary, Flex-PLI, Bumper center-line.” Please follow guidelines for report descriptions in the relevant laboratory test procedures.

REPORT_FILENAME —Report Filename (mandatory)

Text

REPORT_FILENAME is the original filename with extension for this report. Filenames, including extensions, are case sensitive.

COMMENTS — Report Commentary (optional)

Text

COMMENTS should be used to inform the user of any problems or noteworthy items related to the report such as “revised report, re-submitted 2023-12-04”

2.12. Photo Table

Fields defined below constitute the photo information record.

For overall setup images that document the overall vehicle and test setup, code CMPNO = 0 and CNFNO = 0. Such photos may showcase the vehicle setup, vehicle markup, modifications to the vehicle, the test equipment setup, and the dummy or impactor setup.

VEHNO — Test Vehicle Identification Number (mandatory)

Integer ≥ 0

VEHNO is the associated vehicle number from the Vehicle Table for this photo. Code a 0 (zero) for non-vehicle test photos such as those for motorcycle helmets. Also code 0 (zero) for photos that cover multiple vehicles.

CMPNO — Component Number (mandatory)

Integer ≥ 0

CMPNO is the associated component number from the Component Table for this photo. Code 0 (zero) for photos that cover multiple components, such as “as delivered” vehicle photos.

CNFNO — Configuration Number (mandatory)

Integer ≥ 0

CNFNO is the associated configuration number from the Configuration Table for this photo. Code 0 (zero) for photos that cover multiple configurations, such as vehicle photos showing the overall markup of pedestrian tests.

PHOTONO — Photo Number (mandatory)

Sequential Integer > 0

PHOTONO is the sequential number (1,2,3…) assigned to a specific photo.

PREPOST — Pre or Post Test Photo (mandatory)

Code

PREPOST is the indicator that the photo represents the pretest or posttest condition of what is being photographed. 0 = Other, 1 = Pre, 2 = Post.

PHOTODESC — Photo Description (mandatory)

Text

PHOTODESC is the description of the photo such as “Left Side Overall Pretest” or “Closeup of Damage Posttest.” Please follow guidelines for photo descriptions in the relevant laboratory test procedures.

PHOTO_FILENAME — Original Photo Filename (mandatory)

Text

PHOTO_FILENAME is the original filename with extension of the photo. Filenames, including extensions, are case sensitive.

COMMENTS — Photo Commentary (optional)

Text

COMMENTS should be used to inform the user of any problems or noteworthy items related to the photograph such as “door shut after photo was taken” or “photo missing.”

2.13. Video Table

Fields defined below constitute the video information record. A field includes its order index in the record, name, brief description. Each video included with the test should have a corresponding entry in this table.

VEHNO — Test Vehicle Identification Number (mandatory)

Integer ≥ 0

VEHNO is the associated vehicle number for this video. Code a 0 (zero) for non-vehicle test videos such as those for motorcycle helmets. Also code 0 (zero) for videos that cover multiple vehicles.

CMPNO — Component Number (mandatory)

Integer ≥ 0

CMPNO is the associated component number for this video. Code 0 (zero) for videos that cover multiple components, such as an "as delivered" vehicle video walk around.

CNFNO — Configuration Number (mandatory)

Integer ≥ 0

CNFNO is the associated configuration number for this video. Code 0 (zero) for videos that cover multiple configurations, such as a video showing the overall markup of pedestrian tests.

VIDNO — Video Number (mandatory)

Sequential Integer

VIDNO is the sequential number (1,2,3…) assigned to a specific video.

FRAMERATE — Video Framerate (mandatory)

Integer ≥ 0, frames per second

FRAMERATE is number of frames per second the specific video recorded the event. Typically 24, 30, or 60 for a real time video of the event, or 1,000 for a high speed video of the event.

VIEWDESC — Video Description (mandatory)

Text

VIDDESC is the description of the camera view such as "Left Side Overall" or "Real Time Closeup." Please follow guidelines for video descriptions in the relevant laboratory test procedures.

VIDEO_FILENAME — Original Video Filename (mandatory)

Text

VIDEO_FILENAME is the original filename with extension of the video. Filenames, including extensions, are case sensitive.

COMMENTS — Video Commentary (optional)

Text

COMMENTS should be used to inform the user of any problems or noteworthy items related to the video file such as "video lost after 40ms" or "triggered early."

Chapter 3: Test Report Format

At least one summary report should be generated for each test to be submitted. The reports shall be submitted in the zip file in the relevant directories:

\<TESTREF>\<VEHNO>-<CMPNO>-<CNFNO>\REPORTS\

where <TSTREF> has the same value as TSTREF in Section 2.3 General Test Table of this guide.

The filenames of the reports must match the <ORIG_FILENAME> field in the Report Info table. Filenames, including extensions, are case sensitive.

The overall or summary report shall preferably be a format approved the NHTSA COR and will included the contents specified by the COR. What follows is an example of items included in a typical summary report.

- A cover page including,
  - Title of Study
  - Test Performer
  - Test Reference Number (EV6 specification file - TSTREF)
  - Contract Number
  - Test Date
- In the main body of the test report, the following items shall be included:
  - A text description and diagram/pictures of the test setup.
  - A table of all injury criteria reported in the EV6 specification file.
  - A complete description of specimen necropsy (cadaver and animal tests only).
  - Description of camera views and type of media (film/video).
  - Information which could not be included in the EV6 specification file, and that the test engineer and/or COR deem appropriate or important to mention.
- Appendix A:, including the following information:
  - A diagram describing the coordinate system.
  - A table describing load cell manipulations for positive values.
- Appendix B: contains a plot of each curve submitted exactly as it should appear in the database. The plots will be compared with the signal data loaded into the database to ensure that the signals the test laboratory intends to enter into the NHTSA database are not corrupted during the submission and loading process. Each plot should display the maximum and minimum values of the signal and their respective event times.
- Appendix C: contains a list of the instrumentation associated with each channel, including transducer, sampling rate, signal conditioning, units and axis.

The COR or test engineer is encouraged to include any other information that they feel is necessary to make the report meaningful and the quality control process easier. However, the COR or test engineer may not eliminate any of the five (5) minimum requirements outlined above. Multiple reports may be submitted in addition to the summary report to provide additional information about the test.

Chapter 4: Photos

Photos of the test before and after the event shall be submitted on the submission media as noted in Section 1.1 Media Types and Layout.

\<TESTREF>\<VEHNO>-<CMPNO>-<CNFNO>\PHOTOS\

where <TSTREF> has the same value as TSTREF in Section 2.3 General Test Table of this guide.

The filenames of the photos must match the <ORIG_FILENAME> field in the Photo Info table. Filenames, including extensions, are case sensitive.

File names should be descriptive. Naming convention is at the discretion of the COR, with the exception that standard file extensions shall be applied to all files as appropriate to the content type of each file. For the first image, choose a representative image that reflects an overview of the test performed, so that the test mode can be easily identified.

As an example, TIFF format image files should be named with a file extension of

.tif

while JPEG format image files should be named with a file extension of

.jpg

Digital images shall be submitted in a format approved by the NHTSA COR.

If you have other image data that you wish to submit but which is not specified in this guide, please coordinate with the NHTSA COR.

Chapter 5: Videos

The procedures for capturing and formatting videos of the impact event are described below. Procedures for images captured high-speed video are outlined below, as well as generic procedures for other event video types.

Video files shall be submitted under the directory

\<TESTREF>\<VEHNO>-<CMPNO>-<CNFNO>\VIDEOS\

where <TSTREF> has the same value as TSTREF in Section 2.3 General Test Table of this guide.

The filenames of the videos must match the <ORIG_FILENAME> field in the Video Info table. Filenames, including extensions, are case sensitive.

The only content requirements of the high-speed video camera image view specified in this guide are:

- Somewhere in the image view there should be text denoting the TSTREF described in Section 2.3 General Test Table.
- Some type of visible time mark should be present to indicate time zero for the test. This time zero should correspond with the time zero on the data acquisition system.
- Somewhere within the image, the time at which the image was captured shall also be displayed.

For each camera view, digital movie files shall be encoded using the H.264 codec in an MP4 container using a pixel format for "YUV" color space with 4:2:0 chroma subsampling. Any deviation from this video format must be agreed upon by the laboratory and the COR.

See below for an example FFMPEG command line:

> ffmpeg.exe -i [input path] -c:v libx264 -preset slow -pix_fmt yuv420p -crf 18 -c:a copy [output filename].mp4

An example video encoded as described above shall be submitted to the COR. After review and approval from the COR, the Contractor may omit submission of the video frames as individual image files.

If the movie files are only available in a non-standard container or codec, the laboratory shall submit sequential bitmap image files.

5.1. Sequential Bitmap Image Files

Some high-speed video systems output sequential raster image files, with the frame number denoted within the filename of each file. Each file shall be numbered using the following file naming convention:

F<frame number>.<file format extension>

where

<frame number> is the integer sequential frame number of each image. A minus (-) should prefix the <frame number> for images captured before the start of the event.

<file format extension> is TIF for TIFF format image files, JPG for JPEG format image files, GIF for GIF format image files, and BMP for Windows bitmap files.

If you have other video data that you wish to submit but which is not specified in this guide, please coordinate with the NHTSA COR.

Appendix A: Data Coordinate System

Starting with Version 4 of the NHTSA Test Reference Guides, all submissions will conform to latest version of SAE J211/1 Instrumentation for Impact Test. Please refer to SAE J211 for a complete description of the coordinate system and signal polarities for vehicle occupants.

A.1. Using the Coordinate System Correctly

The rules for determining the sign conventions described below will enable anyone involved in NHTSA-sponsored testing to determine the proper sign and coordinate axis for any measured quantity.

All coordinate systems are orthogonal, three-dimensional, and right-handed. The global coordinate systems for the vehicle and the test occupants are shown in Figure 5and Figure 6. The coordinate system for the nine-accelerometer head array is shown in Figure 7, along with the proper SENATT codes.

Follow the latest version of SAE J1733 to ensure the polarity of the sensor output from various dummy manipulations when using this coordinate system.

A.2. Vehicle Global Coordinate System

- X is positive forward
- Y is positive right (toward the passenger side door)
- Z is positive down

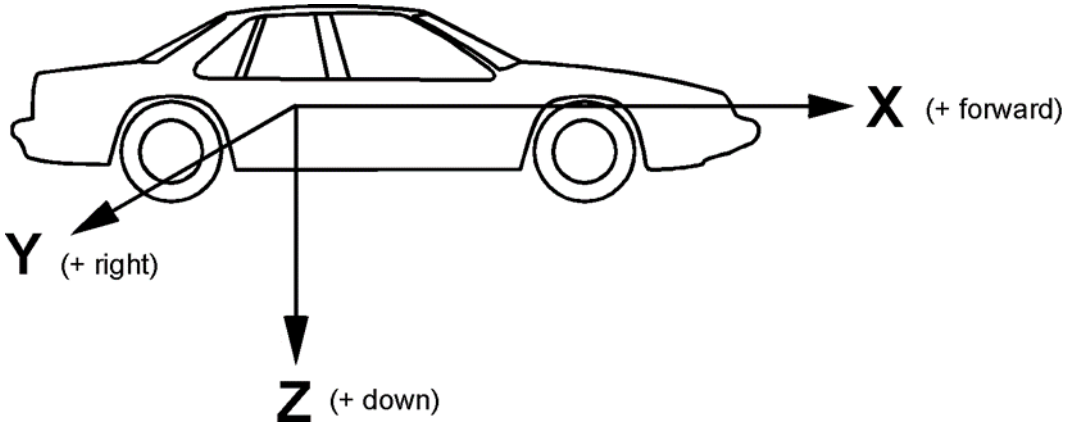

Figure 5 - Vehicle Global Coordinate System

Occupant Global Coordinate System

- X is positive forward (posterior to anterior)
- Y is positive right
- Z is positive down

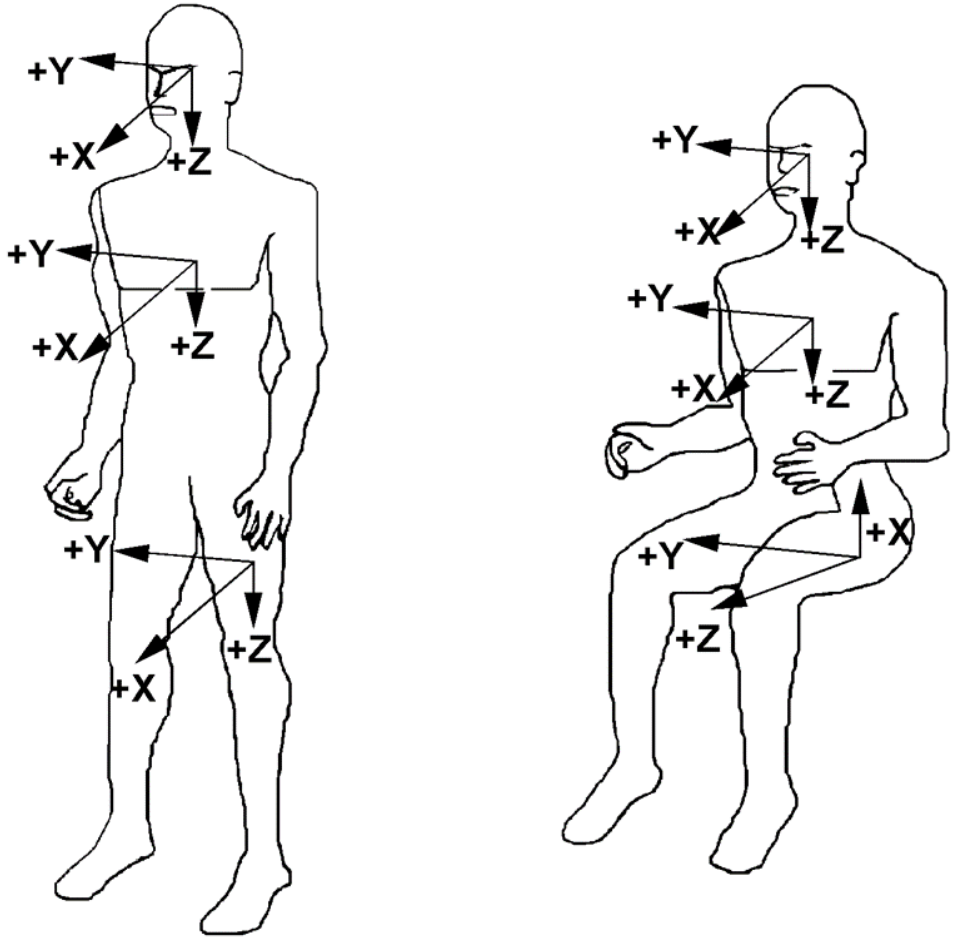

Figure 6 - Occupant Global Coordinate System

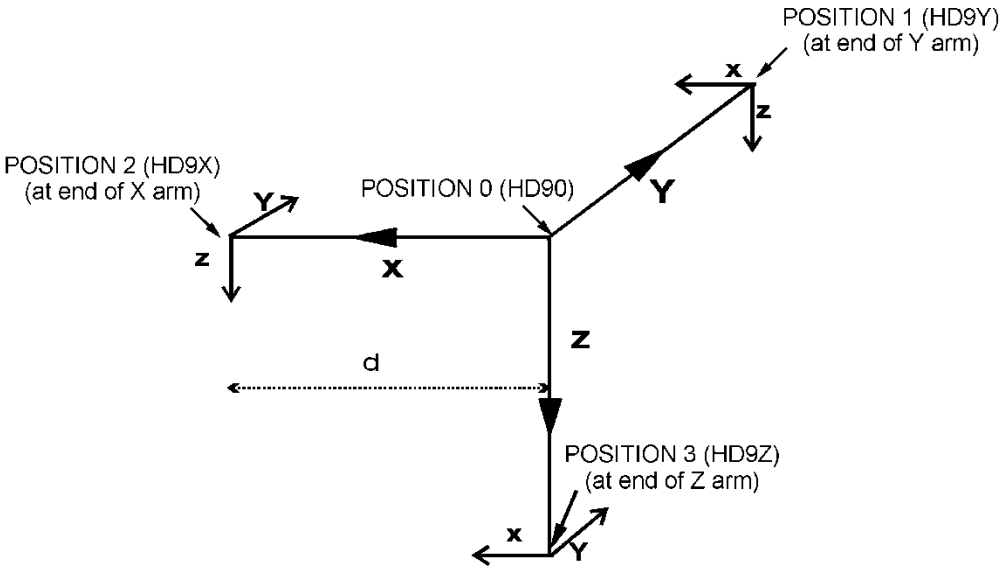

Figure 7 - Nine-Accelerometer Coordinate System

Appendix A:

Appendix B: Technical Support Information

B.1. Reference Guide Updates and Software Updates

NHTSA maintains websites for the NHTSA Test Reference Guides and Signal Analysis Tools software. The latest versions of the guides and the software are made available at:

https://www.nhtsa.gov/databases-and-software/entree-windows

Because the NHTSA crash test database and signal analysis tools are a constantly evolving resource it may happen that the links noted above do not work correctly. In the event that this does occur please utilize the available SEARCH feature on NHTSA.gov to search for "NHTSA Test Reference Guides" and "Crash Test Database Signal Analysis Tools".

B.2. Requesting Assistance or Reporting a Problem

In the event that a user of the Test Reference Guides requires technical support with using the guides, or has questions about the content of the guides, support is offered via e-mail. Simply send a message to the address: CTDHelpdesk@dot.gov.

Users with access to the DOT network should instead utilize the CTD helpdesk for support: https://collab.nhtsa.dot.gov/jira/servicedesk/customer/portal/7/create/79.

Appendix C: Online Test Submission Portal

NHTSA maintains a crash test database submission portal where contract test laboratories can efficiently upload and organize CTD submissions for COR review, approval, and publishing. The online submission portal features a robust notification system to ensure timely communication and updates between test lab users and NHTSA staff.

External test lab users may access the portal at https://portal.nhtsa.gov/

Internal NHTSA users may access the portal at: https://nrd-internal-portal.nhtsa.dot.gov/

Both internal and external users will need an account for access. Accounts can be created by emailing the CTD help desk team at CTDHelpdesk@dot.gov.

The following illustrates the process for publishing test data in COMDB using the portal submission process.

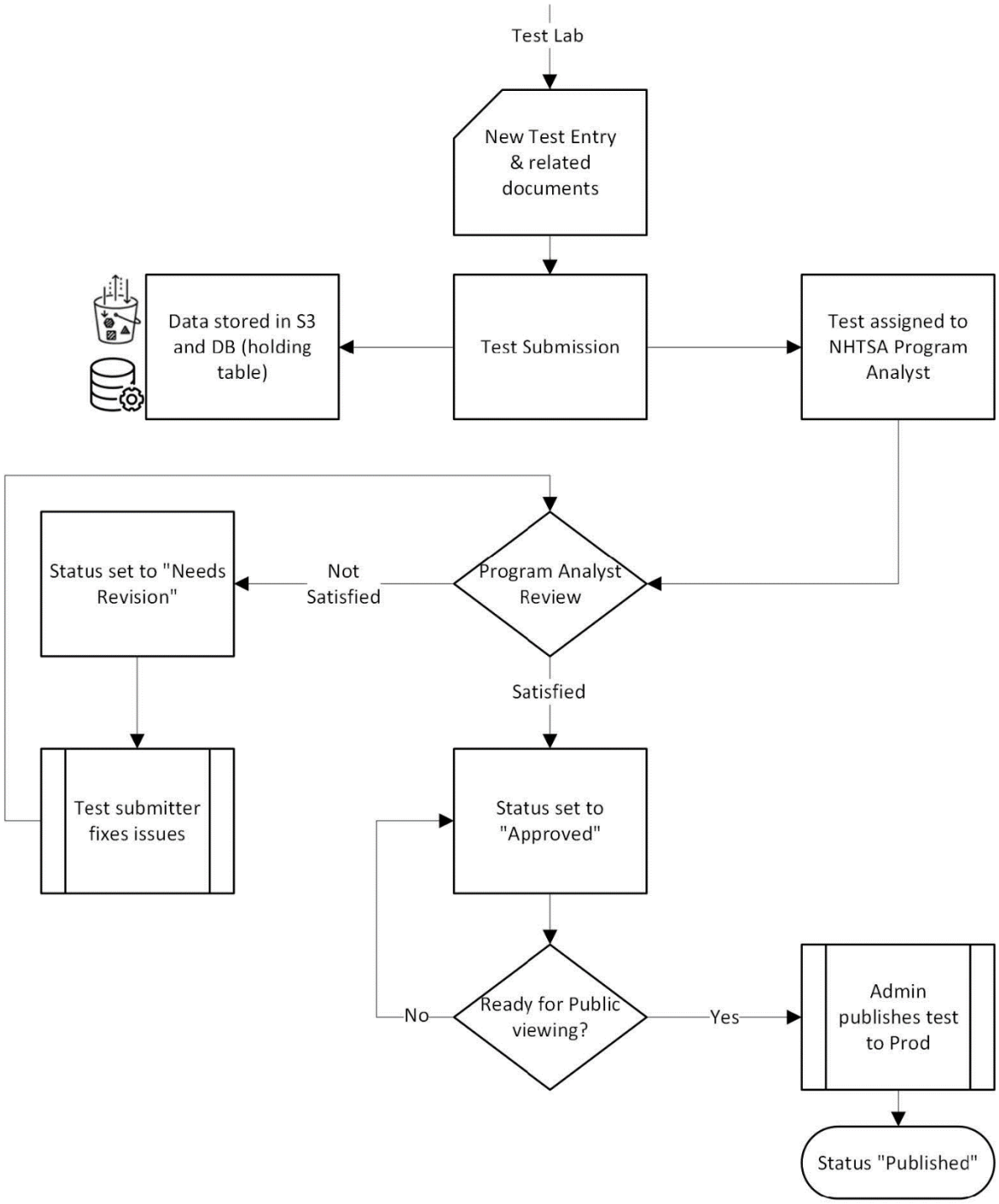

Figure 8 - Flowchart of Data Submission and Approval Process

Appendix A:

External users submitting data to CTD are given the user account "test lab." Internal NHTSA users reviewing and approving data submissions are given the user account "NHTSA program analyst." Administrator accounts can publish approved test submissions to the public facing website.

After a user successfully logs into the portal, they will see a list of tests that they have created. The user can filter by database, submission status, etc.

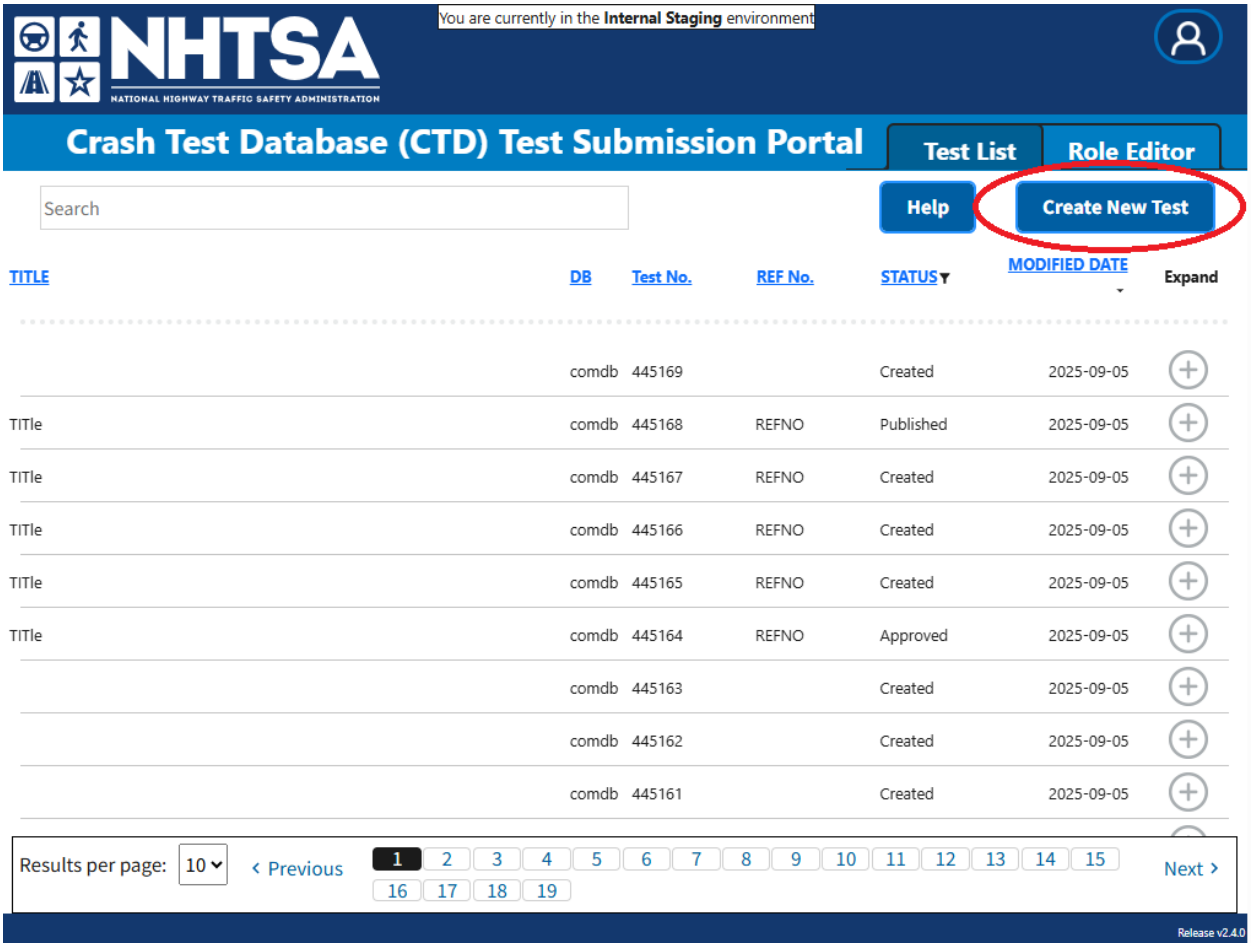

Figure 9 - CTD Submission Portal Landing Page

The first step in creating a new test is to click "create new test."

A page will load allowing the user to enter the test information. Users can manually enter information in each field on this page. Required fields are marked with a red asterisk. Users can navigate between tables in the left hand column of the page by clicking on the table name.

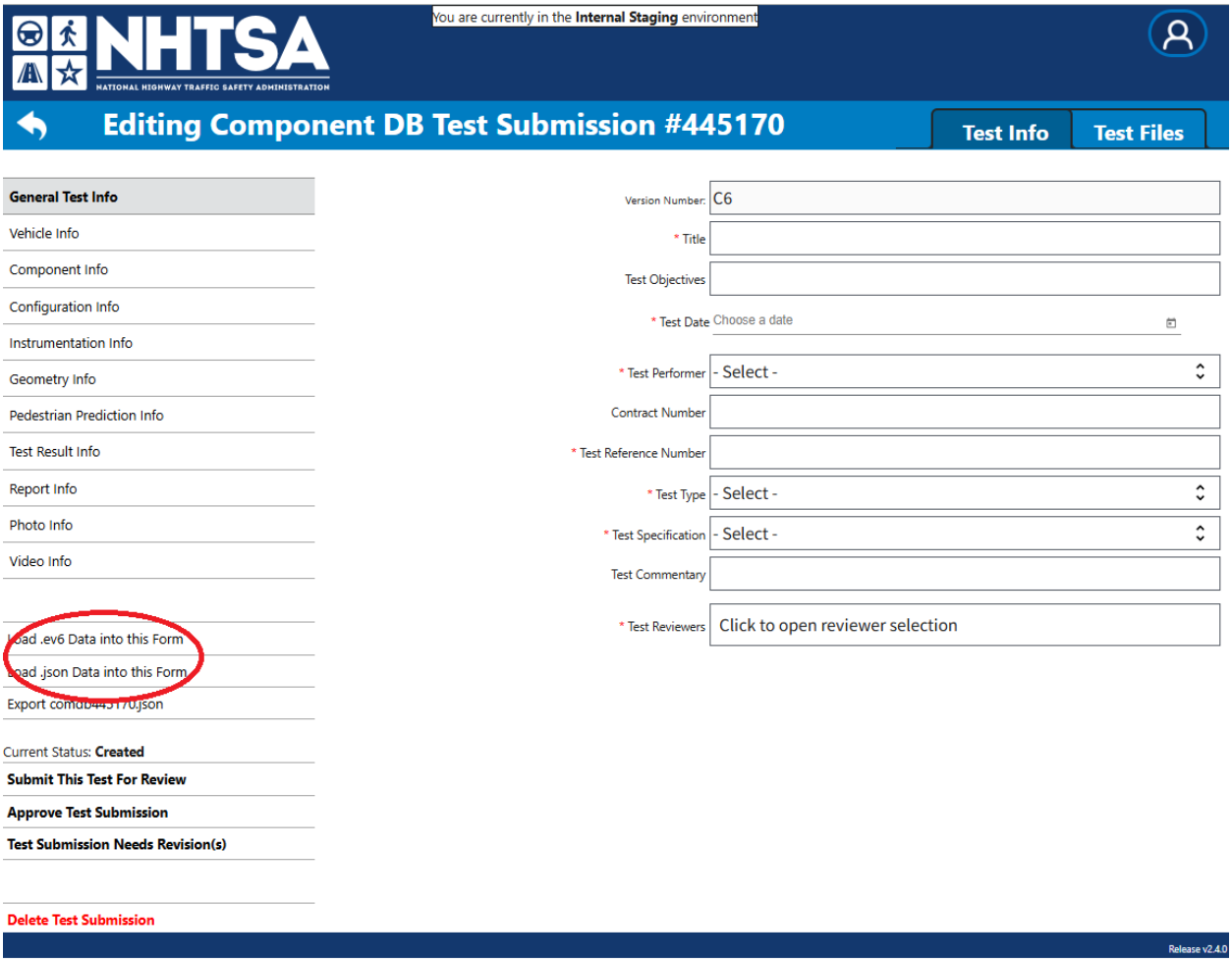

Figure 10 - Test Information Entry

If a user wishes, they may upload a properly formatted JSON or EV6 file to auto populate the test information on all the tables at once.

The next image shows a JSON loaded and populating most information fields. However, the required field Test Reviewer is not populated, and an error message is displayed to the user.

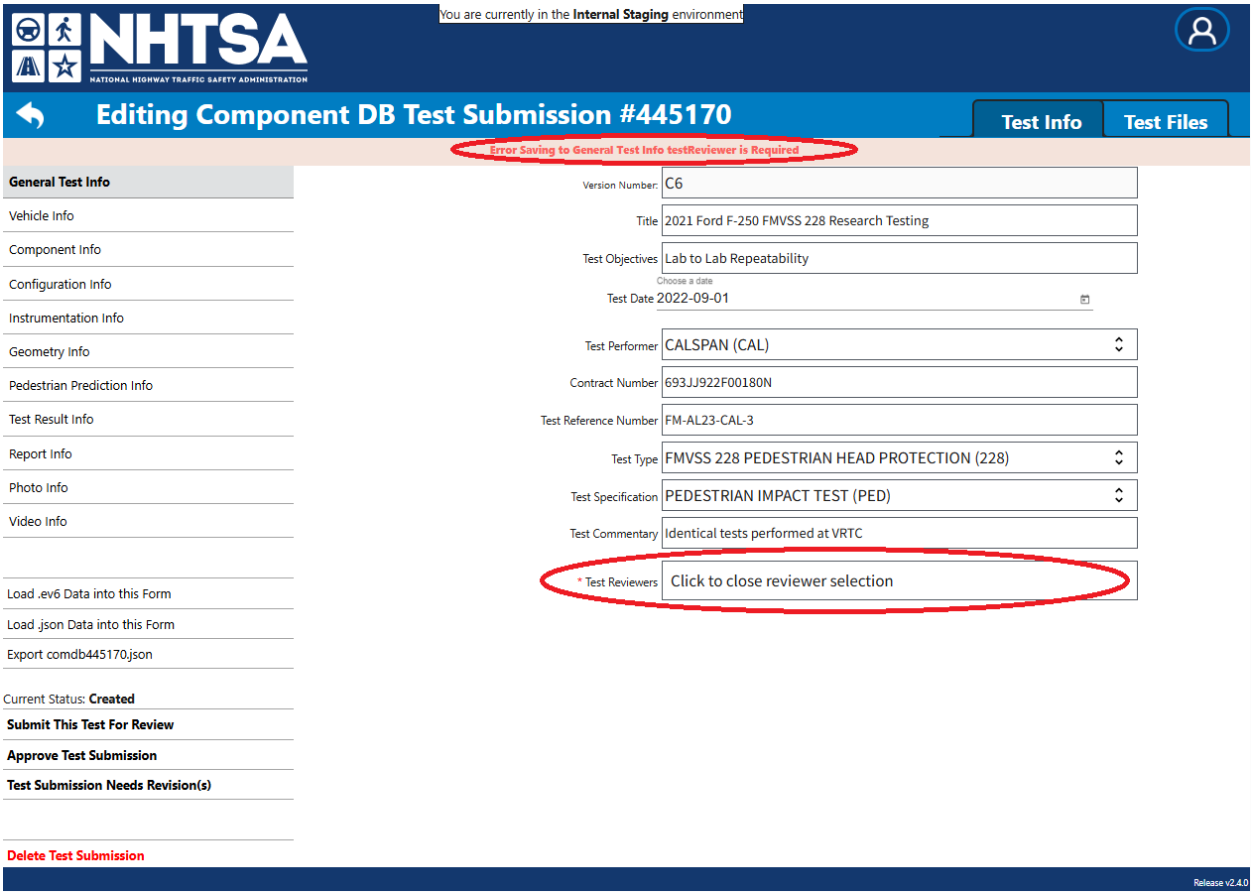

Figure 11 - Test Submission with Errors

Clicking on the Test Reviewer field will provide the user of a drop-down box of valid choices. After the user chooses a test reviewer, no more errors are displayed.

Now that there are no more errors, the user can proceed to upload test files, such as photos, videos, reports, and time-history data.

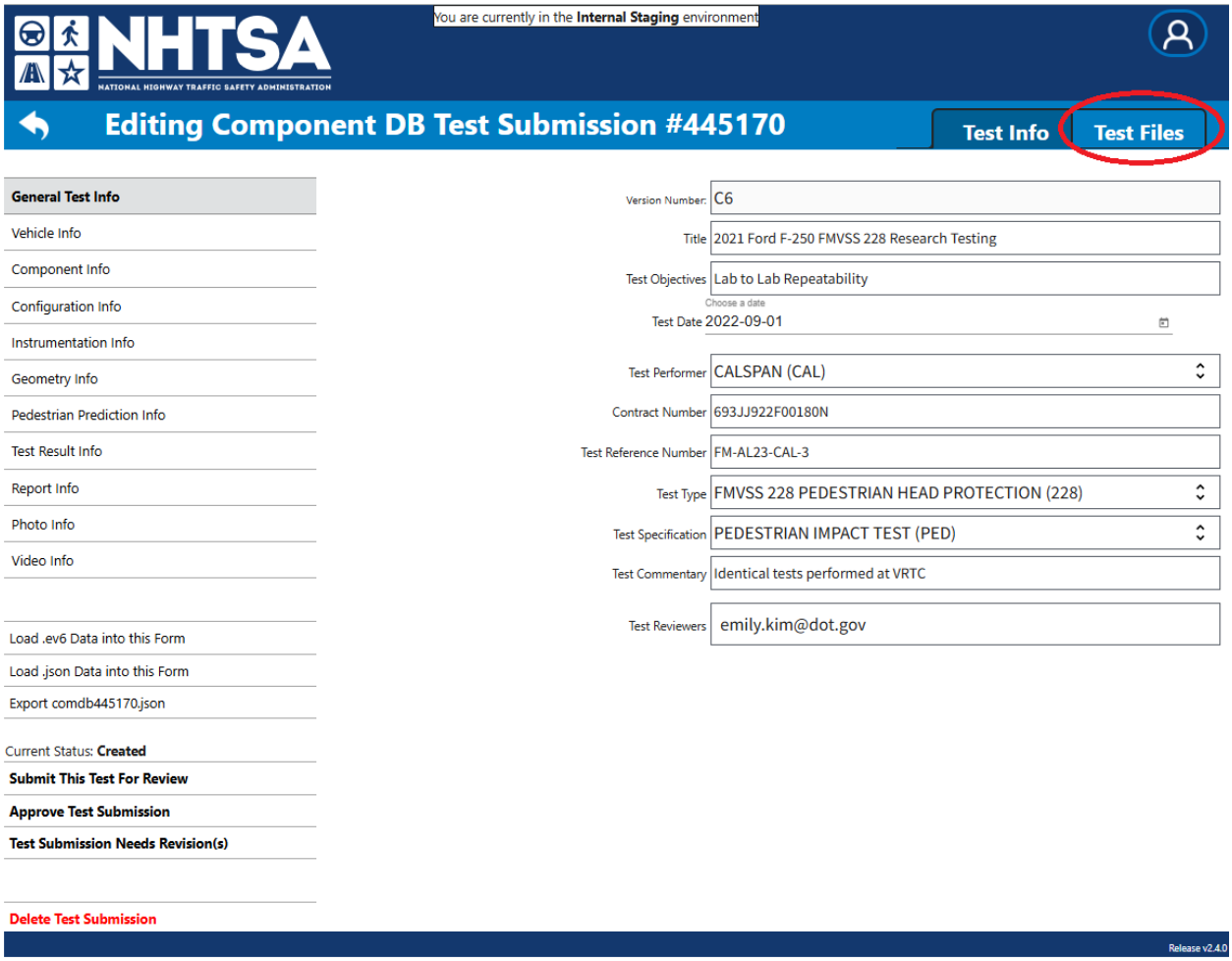

Figure 12 - Data Submission Portal Test Files

After clicking Test Files, the user will have the ability to upload a properly formatted zip file.

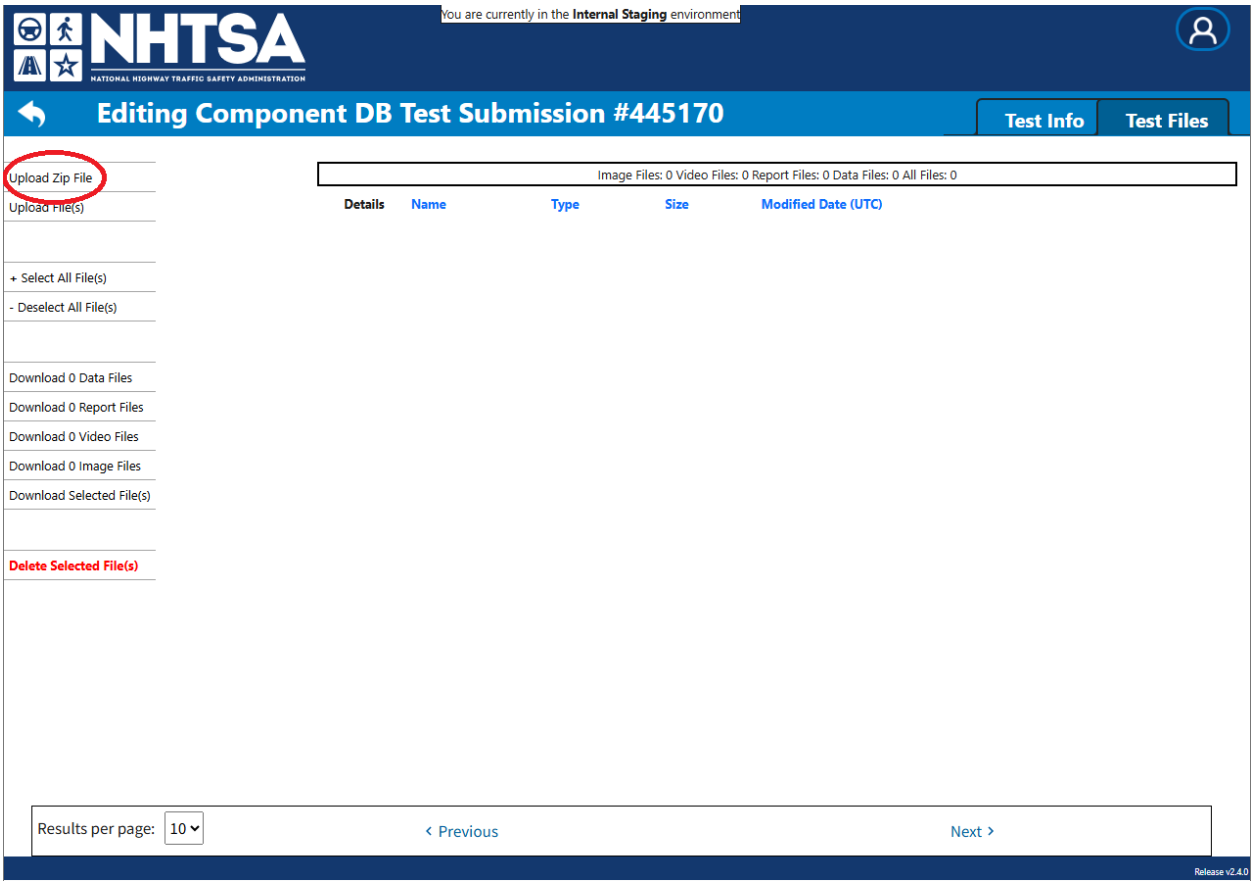

Figure 13 - Data Submission Portal Zip File Upload

After a zip file is chosen, the upload process will begin. Depending on network speed and file size, this may take some time, so the user is prompted to check back later. At this stage, users can navigate back to "Test Info" and continue populating fields, or leave the program to run unattended, uploaded data is automatically saved.

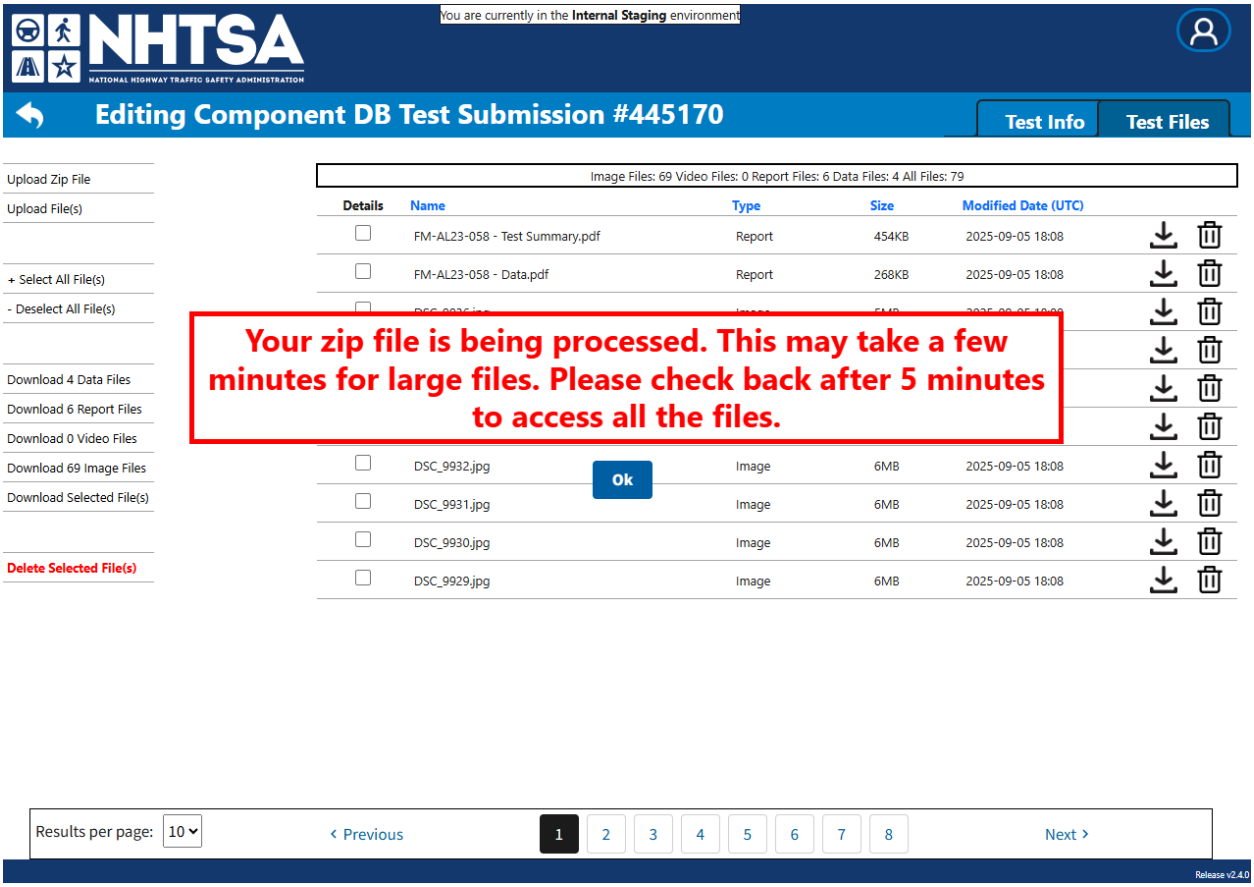

Figure 14 - Upload Data Processing

After all files are uploaded, the user should ensure no errors are provided on the interface before continuing. Total file counts are provided for each type of media.

Assuming all data successfully uploads and the test information is not providing any errors, users are now able to submit the test for NHTSA's review. From here, a NHTSA staff member will review data and either approve it for publication, or notify the lab that changes are needed.

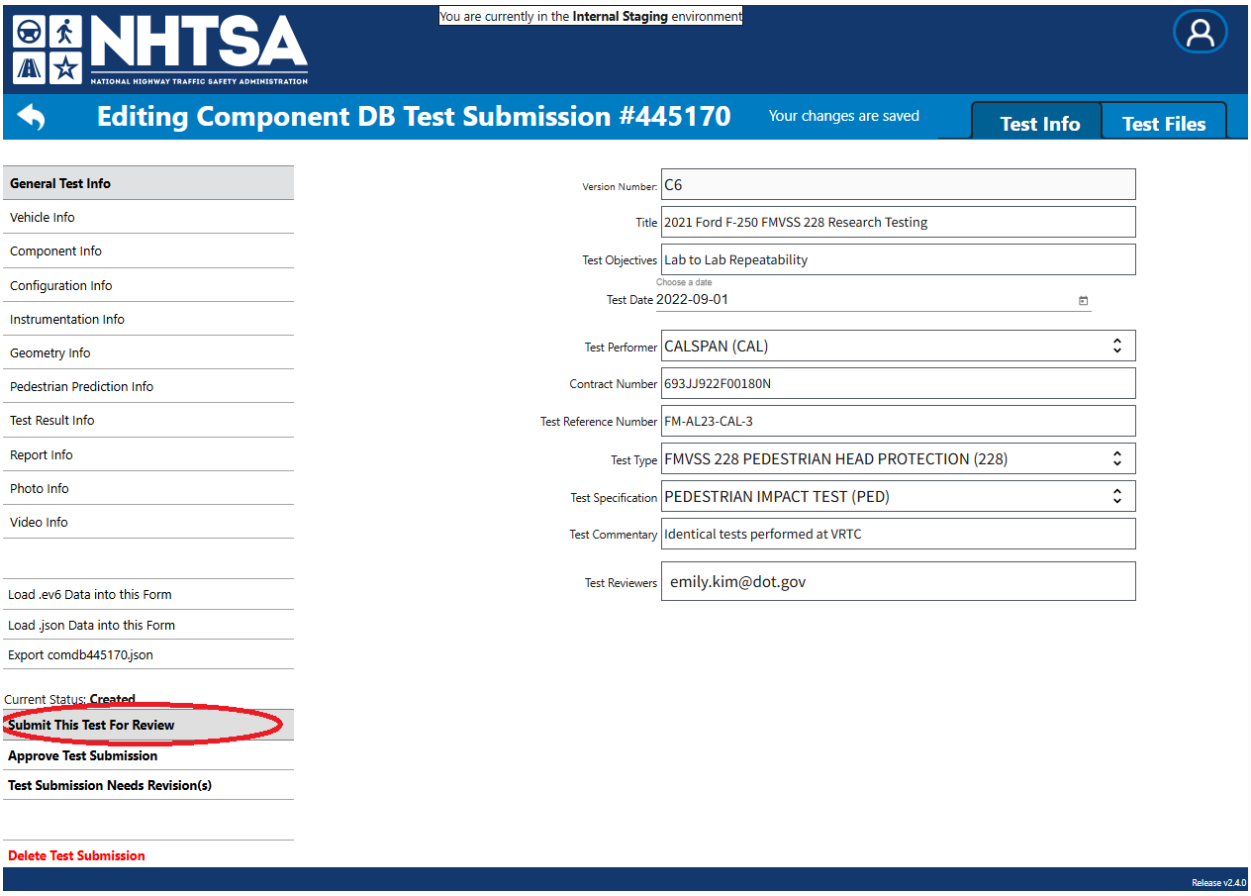

Figure 15 - Test Submission Ready for Review