

### Harmonization of qualification data

Instructions to generate standardized ISO-MME data sets Update – version 1.4



Updates

#### Updates (1)



- Version 1.4 (Jul 2025)
  - > THOR-50M (TH, T3)
    - All subtypes of the test, section 2.1.5: changed reference for channel sorting order from 'ISO/TS 13499 RED B : 2021 E' to the wording 'latest version of ISO/TS 13499 RED B'
    - All subtypes of the test, section 2.1.7: corrected sign of search level to minus and changed wording from 'signal exceeds' to 'signal falls below' the level
  - > WorldSID-50M
    - All subtypes of the test, section 2.1.5: changed reference for channel sorting order from 'ISO/TS 13499 RED B : 2021 E' to the wording 'latest version of ISO/TS 13499 RED B'
    - All subtypes of the test except HEDF, HEDL, HEDR, section 2.1.7: corrected sign of search level to minus and changed wording from 'signal exceeds' to 'signal falls below' the level

### Updates (2)



- Version 1.3.1 (Mar 2024)
  - > THOR-50M (TH, T3)
    - ISO code of pendulum updated
      - Only neck tests and only instructions affected
      - Examples ok but version number set to 1.3.1
  - > WorldSID-50M
    - ISO code of pendulum updated
      - Only neck tests and only instructions affected
      - Examples ok but version number set to 1.3.1
- Version 1.3 (Jan 2024)
  - > THOR-50M
    - Update to be compliant with "THOR-50M Qualification Procedures and Requirements, April 2023", NHTSA
  - > WorldSID-50M
    - Update to be compliant with ISO 15830:2022
  - › General
    - Examples
      - Raw and processed data to verify the process of t<sub>0</sub> definition and bias removal



Motivation

#### Motivation



#### General problem

- > Analysis (comparison of time-history curves) of qualification data coming from different sources is complicated
  - ISO TS 13499 (ISO-MME) describes the general format of the data only
  - Data sets may vary in detail (e.g., ISO codes, t<sub>0</sub>, bias removal)
- Time-consuming data processing necessary
  - Harmonizing of the relevant parameters (even if it is not required to calculate performance criteria)
    - Headers
    - Descriptors
    - ISO codes
    - Sign convention
    - Definition of t<sub>0</sub>
    - Biasing removal
    - etc.

#### Vision

 Harmonizing/standardizing of all important parameters to enable plug & play data analysis without time consuming data processing

# Motivation Pilot applications



- > THOR 50<sup>th</sup> Percentile Male (THOR-50M)
  - > Reference
    - THOR 50<sup>th</sup> Percentile Male (THOR-50M), Qualification Procedures and Requirements, April 2023, National Highway Traffic Safety Administration, U. S. Department of Transportation
    - EuroNCAP TB 026
       THOR Specification and Certification, Version 1.3, TB 026, 13<sup>th</sup> February 2023, B. Been & J. Ellway
  - > Improvement compared to other protocols because of some essential pre-definitions
    - Definition ISO codes of the measured signals
    - Bias removal procedures
    - Usage of a sign convention and its implementation in the post-processing routines
- WorldSID 50<sup>th</sup> Percentile Male Side Impact Dummy
  - > References
    - ISO 15830-2:2022(E), Road vehicles Design and performance specifications for the WorldSID 50<sup>th</sup> percentile male side impact dummy Part 2: Mechanical subsystems
    - THOR 50<sup>th</sup> Percentile Male (THOR-50M) Qualification Procedures Manual, September 2018, National Highway Traffic Safety Administration, U. S. Department of Transportation
  - Link to similar THOR procedures to get a dummy-wide harmonization

### Motivation Goal



- Definition of instructions to generate standardized ISO-MME data sets
  - > Boundary conditions
    - Based on and not in conflict with existing instructions (e.g., users manuals)
    - If new items needed, then use of existing procedures (if possible)
  - > Deliverables
    - Instructions for every qualification test (pdf document) harmonized for all qualification procedures
    - Sample data sets



Instructions

# Instructions Availability and terms of use

- Information is available on PDB's website
  - https://pdb-org.com/en/information/36-qualification-procedures-en.html
- > Terms of use
  - > Download without registration
    - Blocking of some countries because of restrictions of the German government
  - Usage free of charge and without any registration
  - License agreement
    - Is included in the downloaded packages
    - Is accepted automatically by using the instructions
    - Agreement limits the liability of PDB
    - Requests to use the instructions not against general laws (e.g., human rights etc.)
  - > The user is responsible to check PDB's website for updates
- Packages
  - > General information
  - WorldSID 50% instructions incl. examples (ISO-MME data)
  - > THOR-50M instructions incl. examples (ISO-MME data)

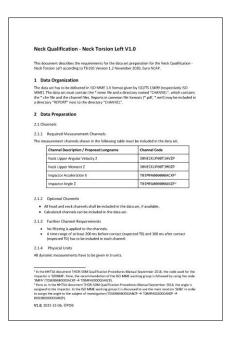


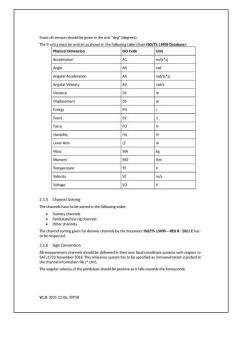


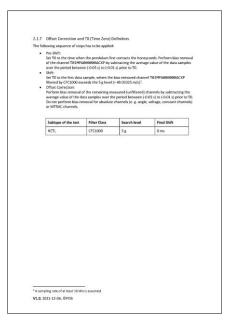
### Instructions General layout

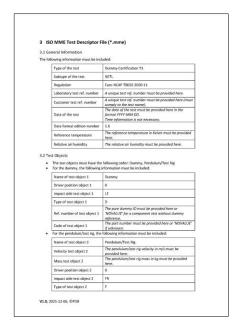


- Document of 4 pages
- Same structure for all qualification tests
- Instructions for
  - > Data organization (ISO MME version, storage of additional information etc.)
  - > Data preparation (channel codes, channel sorting, physical units, sign convention, t<sub>0</sub>, bias removal etc.)
  - ISO MME test descriptor file (general information, test objects etc.)









## Instructions General information



- General requirements
  - > Filtering
    - Pre-filtered signals only
  - Recording time
    - At least 200 ms before the expected t<sub>0</sub> to make use of the algorithms of finding t<sub>0</sub>, required for bias removal
    - At least 300 ms after the expected t<sub>0</sub> to a allow the t<sub>0</sub> finding algorithms a time shift
- Definitions
  - Acronym for every sub type of test
    - E.g., Head impact HEIP, Neck torsion left NETL
  - Naming of the channels
    - According to an expert group of DIN NA 052-00-36-03 AK
- Data processing
  - Definition of t<sub>0</sub>
  - > Bias removal

# Instructions Supporting information and general workflow



- Naming convention of the qualification tests
  - > THOR-50M: THOR\_Abbreviations.pdf
  - > WorldSID-50M: WorldSID\_Abbreviations.pdf
- $\rightarrow$  Summary of information required to define  $t_0$  and to remove bias
  - > THOR-50M: THOR\_Subtypes.pdf
  - > WorldSID-50M: WorldSID Subtype.pdf
- General workflow (see test-specific instructions for all details or THOR Subtypes.pdf/WorldSID Subtypes.pdf for a brief overview)
  - 1. Identify the reference channel
  - 2. Filter the reference channel
  - 3. Identify the time of the first contact (t<sub>0 preliminary</sub>)
  - 4. Apply a bias removal of the reference channel
  - 5. Time zero t<sub>0</sub> is defined as the time when the first data sample of the **reference channel** exceeds the search level
  - 6. Apply a test specific final time shift to **all** measured **channels**
  - 7. Apply a test specific bias removal of all signals except the reference channel



### Examples

### **Examples**



- Examples for every qualification test provided
- > Raw data
  - Correct naming of the channels (ISO code)
  - Correct signs of the channels
  - > t<sub>0</sub> not corrected
  - > No bias removal
- Processed data (=final data according to described instructions)
  - > Raw data but fully processed (definition of t<sub>0</sub> and bias removal)
- The data shall help to verify the user's routines to process qualification data



End