



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 1 of 6

### Rieker® CARS™ Service Specification

This document describes the specifications for Rieker's Curve Advisory Reporting Service (CARS™), as it exists as of January 1, 2018. The service is made public for licensing of qualified operators and Department of Transportations.

CARS™ is used to facilitate the determination of a horizontal curve advisory speeds according to the 2009 Manual for Uniform Traffic Control Devices (MUTCD)

When used by properly trained personnel, the service combines Rieker's proven Ball Bank inclinometer with GPS and proprietary software to generate a comprehensive Curve Advisory Report for a horizontal curve. Additional information, as described herein, is also provided by the service. The service is accessed through the Rieker internet customer portal.

### 1 GENERAL SPECIFICATION

- 1.01 Delivery Date - Upon receipt of a properly authorized Purchase Order (PO), Rieker will furnish all the necessary hardware to the customer within four weeks.
- 1.02 Nonfunctioning units - Any hardware, not functioning at the time of receipt will be replaced at Rieker's expense within two weeks
- 1.03 Ownership - Rieker retains ownership of the units and will warrant the units from any manufacturer defect during the lease period
- 1.04 The hardware units are provided in a portable, easily transportable case, herein referred to as a "kit". All of the hardware needed for an assessment will be contained in the kit.
- 1.05 The units can be placed easily in any vehicle and can be moved between vehicles at the recipient's discretion.
- 1.06 The kit allows for single operator use during all data collection operations.
- 1.07 The kit allows for the data collection to be conducted at any speed, including at or below the speed limit
- 1.08 All of the data and telemetry is captured automatically and continuously with no user interaction.
- 1.09 The kit includes a suitable computer tablet. The tablet is preconfigured with software that provides for the capture of optional data, which includes posted speed limit and sign location/attributes to be captured by a non-driving, and qualified, passenger
- 1.10 The hardware captures data independently of the collection vehicle.
- 1.11 All the data necessary for curve analysis can be gathered with a single pass of a curve, in either direction
- 1.12 Multiple passes over the same roadway can be conducted and will be combined for comparison onto the analysis report. The manufacturer recommends two passes in each direction.

### 2 HARDWARE SPECIFICATIONS

- 2.01 The GPS provides lateral accuracy of +/- 2 meters, 80% of the time
- 2.02 The GPS coordinates are recorded to a resolution of 0.00001
- 2.03 The GPS signal strength is continuously displayed and automatically recorded with each data record
- 2.04 The integrated ball bank inclinometer provides and overall accuracy of 0.5 degrees
- 2.05 The integrated ball bank inclinometer is compensated for temperature

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 2 of 6

- 2.06 The integrated ball bank inclinometer is manufactured according to the FWHA, Chapter 3, "Methods for Establishing Advisory Speed - Procedures for Setting Advisory Speeds on Curves"
- 2.07 The ball bank will operate accurately between -4 to +158 degrees Fahrenheit.
- 2.08 An LCD display provides the driver a visual display of bank angle in degrees to a resolution of 0.1 degree.
- 2.09 The unit is powered from a 12 Volt DC supply utilizing the vehicles cigarette lighter adapter. A cigarette lighter power supply is provided with the kit.
- 2.10 The ball bank unit provides for Calibration verification, at any time, which is recorded as part of the data records.
- 2.11 The ball bank can be leveled on any surface in the vehicle to a relative zero angle.
- 2.12 The ball bank unit is housed in a case rated at NEMA 4.
- 2.13 The hardware can be stored indefinitely at temperatures between -40 to +185 degrees Fahrenheit.
- 2.14 Data will continue to be recorded in the event of GPS signal loss and the driver is alerted with an audible alarm
- 2.15 All the necessary cables are included in each kit. These include:
  - (a) GPS antenna extension cables with magnetic base for roof mount.
  - (b) 12 Volt DC lighter power adaptor.
  - (c) USB computer communication cable.
- 2.16 The hardware is contained in a carrying case with the following features:
  - (a) Padlock ready for security.
  - (b) Impact resistant.
  - (c) Water tight.
  - (d) Dustproof.
  - (e) Temperature rated to +140 degrees Fahrenheit.
  - (f) Easily carried by one person.

### 3 TABLET SPECIFICATIONS

- 3.01 The kit comes with a Windows™ Tablet, nominally the Aspire Switch 10 E SW3, or equivalent, with not less than the following minimum system requirements:
  - (a) 1.33 GHz, quad core
  - (b) 2 GB of RAM memory
  - (c) 10.1" screen
  - (d) detachable keyboard
  - (e) touch screen
  - (f) wi-fi capable
  - (g) USB serial interface ready
- 3.02 The tablet contains all the necessary software, including proprietary Rieker software, for use in the Ball Bank data collection.
- 3.02 The tablet is supplied with a wall charging cord
- 3.03 The tablet is supplied with a car charging cable capable of using the vehicle's cigarette lighter

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 3 of 6

3.04 A tablet mount is included, nominally a Griffen™ cup-holder mount, capable of non-permanent installation

#### 4 REPORTING CAPABILITIES

4.01 Rieker licenses unlimited use of the CARS portal to the authorized user, according to the end user license agreement, for use in creating curve reports for the licensed territory, during the license period.

4.02 The licensed territory will be defined by a description of Route and system at the time of purchase.

4.03 The portal license is granted for 36 months from the time of purchase.

4.04 The portal provides for the bulk export of all user data including all collected data and all processed data. The data is provided in an organized format

4.05 The portal will be upgraded from time to time at no additional charge during the license period

4.06 The portal provides the user with the following reporting detail:

- (a) A list of all user data files, displaying file name, number of data points, collected by, collected on, uploaded on and corridor name
- (b) Filtering and sorting functionality to manage data lists
- (c) Data visualization using Google™ maps showing all streets and displaying which routes have been evaluated. All Google pan and zoom features are available

4.07 The following details are provided for horizontal curves:

- (d) A list of all analyzed and saved horizontal curves, displaying curve name, corridor, created by, last saved on, and number of passes
- (e) Editable posted speed limit
- (f) Editable side frictions limits
- (g) For each saved horizontal curve pass analyzed, a display of:
  - i. Pass number
  - ii. Curve direction
  - iii. Travel direction
  - iv. Point of curvature expressed in latitude and longitude
  - v. Point of tangency express in latitude and longitude
  - vi. Percentage fit of model to curve
  - vii. Average Test speed
  - viii. Curve radius
  - ix. Curve length
  - x. Deflection angle
  - xi. Curve class
  - xii. Elevation at apex
  - xiii. Curve grade
  - xiv. Minimum calculated advisory speed
  - xv. Recommended advisory speed

The information and material presented may not be published, broadcast, rewritten, or redistributed without the express written consent of Rieker® Inc.  
The content presented is provided for informational purposes only and subject to change.  
©2002-2016 Rieker® Inc. All Rights Reserved.  
FORM NUMBER: RK0013\_01/07 UPDATED: 2/28/18

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 4 of 6

- (h) Advisory signing requirements for each pass according to the FWHA, Chapter 3, “Methods for Establishing Advisory Speed - Procedures for Setting Advisory Speeds on Curves”, and as further defined by the 2009 MUTCD Table 2C-5.
  - i. Pass number
  - ii. Speed differential
  - iii. Curve sign
  - iv. Curve sign requirements
  - v. Advisory speed sign
  - vi. Advisory speed sign requirements
  - vii. Chevron sign
  - viii. Chevron spacing
  - ix. Chevron requirements
- (i) Graphical Data for each horizontal curve pass:
  - i. Plot of the actual data and modeled curve data points.
  - ii. Plot of the curve radius data points.
  - iii. Plot of the test speed data points
  - iv. Plot of the vertical data points
  - v. Plot of the measured and modeled lateral acceleration forces
  - vi. Plot of the calculated curve advisory speed data points
- (j) Calibration records containing, pass number, collected on, collected by, corridor name, prior calibration and subsequent calibration.
- (k) Ball Bank measurement detail
- (l) Cross slope elevation detail

#### 4.08 The following details are provided for collected and created signs:

- (m) Sign information and attributes
  - i. Inventory number
  - ii. Sign type
  - iii. Corridor
  - iv. Mile marker
  - v. Curve name associated
  - vi. Curve direction
  - vii. Driving direction
  - viii. Road side
  - ix. Facing direction
  - x. Existing/Proposed
  - xi. Damage
  - xii. Latitude
  - xiii. Longitude
  - xiv. Distance from point of curvature
  - xv. Created by

The information and material presented may not be published, broadcast, rewritten, or redistributed without the express written consent of Rieker® Inc.  
The content presented is provided for informational purposes only and subject to change.  
©2002-2016 Rieker® Inc. All Rights Reserved.  
FORM NUMBER: RK0013\_01/07 UPDATED: 2/28/18

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 5 of 6

- xvi. Created on
- xvii. Installed on
- xviii. Retroreflectivity
- xix. Last inspected on
- xx. Times inspected

4.09 The following information is provided for flags which are used as engineering notes taken in the field:

- (n) A list of all flag files, displaying flag ID, captured on, comment, latitude, longitude, created by, corridor and milepost

4.10 The following details are provided for collected and analyzed vertical curves:

- (o) A list of all analyzed and saved vertical curves, displaying curve name, corridor, created by, last saved on, and number of passes
- (p) For each saved vertical curve pass analyzed, a display of:
  - i. Pass number
  - ii. Travel direction
  - iii. Point of curvature expressed in latitude and longitude
  - iv. Point of tangency express in latitude and longitude
  - v. Curve length
  - vi. Curve grade
- (q) Calibration records containing, pass number, collected on, collected by, corridor name, prior calibration and subsequent calibration.
- (r) Ball Bank measurement detail
- (s) Cross slope elevation detail

4.11 The portal offers singular and bulk export options for all collected and analyzed data files

- (t) Formatted PDF reports of all collected and processed curve data
- (u) .csv files for all collected and processed data files
- (v) Files exported include:
  - i. Collected data session file data
  - ii. Processed curve data
  - iii. Signs (also in XML format)
  - iv. Flags
  - v. Calibration verification history

## 5 SOFTWARE

- 5.01 Rieker licenses the use of the CARS proprietary software, according to the End User License Agreement (EULA) for 36 calendar months from the time of purchase
- 5.02 Rieker will, at its own expense pre-load State provided reference data associating route name and distances to the collected GPS coordinates, commonly referred to as “Mile Marker” data.
- 5.03 The curve report is generated according to the FHWA and 2009 MUTCD criteria. The tablet and portal software may be upgraded as revisions are published by the MUTCD.

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)



# Curve Advisory Reporting Service (CARS™)

## Service Specifications

Valid as of January 1, 2018

Page 6 of 6

- 5.04 All data gathered is automatically uploaded to the Rieker portal using a secure, password protected, connection.
- 5.05 All of the collected data and processed data is available to the end user for download
- 5.06 The data download organizes all the data and all the reports in an organized format
- 5.07 All software updates and maintenance are provided at no additional charge

### 6 TRAINING

- 6.01 Rieker or its authorized agent will provide training for the end user. The training will consist of an initial class, provided by Rieker, through either on-site or webinar conference
- 6.02 The training class includes aspects of unit set up, calibration, operation, reporting, and troubleshooting.

### 7 WARRANTY

- 7.01 Rieker provides a manufactures warrantee on all shipped parts.
- 7.02 Lost or damaged components will be replaced at the customer's expense
- 7.03 Any inoperative or damaged equipment can be returned to Rieker for repair or replacement. Rieker will replace defective parts within four weeks of receipt.

### 8 CUSTOMER SUPPORT

- 8.01 Rieker Customer support is available via email or phone Monday - Friday, 8:00 am EST to 5:00 pm EST, excluding major holidays.

### 9 TERMS AND CONDITIONS

- 9.01 The Terms and Conditions are published at: <http://www.riekerinc.com/Terms-Conditions.htm>

The information and material presented may not be published, broadcast, rewritten, or redistributed without the express written consent of Rieker® Inc. The content presented is provided for informational purposes only and subject to change.  
©2002-2016 Rieker® Inc. All Rights Reserved.  
FORM NUMBER: RK0013\_01/07 UPDATED: 2/28/18

**Rieker Rugged. Rieker Reliable.™**

RIEKER INC • 34 MOUNT PLEASANT ROAD • ASTON • PA • 19014 • USA

610-500-2000

fax: 610-500-2002

[inquiry@riekerinc.com](mailto:inquiry@riekerinc.com)

[www.riekerinc.com](http://www.riekerinc.com)