

ISO/TS 17444-2:2017-09 (E)

Electronic fee collection - Charging performance - Part 2: Examination framework

| Contents | | Page |
|--------------------|--------------------------------------------------------------------------------------------------|-------------|
| Foreword | | vi |
| Introduction | | vii |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 2 |
| 4 | Symbols and abbreviated terms | 6 |
| 5 | Examination Framework | 7 |
| 5.1 | General | 7 |
| 5.2 | Method for defining a Specific Examination Framework | 8 |
| 5.2.1 | General | 8 |
| 5.2.2 | Selection of metrics to be evaluated | 9 |
| 5.2.3 | Definition of environmental conditions and associated performance requirements | 9 |
| 5.2.4 | Determination of Required Sample Sizes | 9 |
| 5.2.5 | Selection of methods for generating Charging Input and Reference Data | 10 |
| 5.2.6 | Determination of Test Routes/Subset of Charged Network for generating representative trips | 10 |
| 5.2.7 | Documentation of the Specific Examination Framework | 10 |
| 5.3 | Sources of data | 10 |
| 5.4 | Methods of generating charging input | 13 |
| 5.4.1 | General | 13 |
| 5.4.2 | Predefined routes (identifier: "PVP") | 14 |
| 5.4.3 | Reference System (used in combination with identifiers: "PVR" and "UVR") | 15 |
| 5.4.4 | Simulated OBE/FE (identifier: "SO") | 16 |
| 5.4.5 | Dedicated OBE Testing (identifier: "DO") | 17 |
| 5.5 | Applicability of metrics scheme types | 17 |
| 5.6 | Charging Metric Selection Tables | 22 |
| 5.6.1 | General | 22 |
| 5.6.2 | DSRC Discrete | 22 |
| 5.6.3 | Autonomous Discrete | 23 |
| 5.6.4 | Autonomous Continuous | 24 |
| 6 | Examination Tests | 26 |
| 6.1 | Common (and DSRC Discrete) Examination Tests | 26 |
| 6.1.1 | General | 26 |
| 6.1.2 | ET-CM-E2E-1 E2E -- Correct Charging Rate | 26 |
| 6.1.3 | ET-CM-E2E-2 E2E -- Overcharging Rate | 27 |
| 6.1.4 | ET-CM-E2E-3 E2E -- Undercharging Rate | 27 |
| 6.1.5 | ET-CM-E2E-4 E2E -- Late Charging Rate | 28 |
| 6.1.6 | ET-CM-UA-1 UA -- Correct Charging Rate | 29 |
| 6.1.7 | ET-CM-UA-2 UA -- Overcharging Rate | 29 |
| 6.1.8 | ET-CM-UA-3 UA -- Undercharging Rate | 30 |
| 6.1.9 | ET-CM-UA-4 UA -- Accurate application of Payments and Refunds | 31 |
| 6.1.10 | ET-CM-UA-5 UA -- Accurate Personalisation of OBUs | 31 |
| 6.1.11 | ET-CM-PC-1 PC -- Correct Charging Rate | 32 |
| 6.1.12 | ET-CM-PC-2 PC -- Overcharging Rate | 32 |
| 6.1.13 | ET-CM-PC-3 PC -- Undercharging Rate | 33 |

| | | |
|--------|------------------------------------------------------------------------------------------------|----|
| 6.1.14 | ET-CM-PC-4 PC -- Latency -- TC | 34 |
| 6.1.15 | ET-CM-PC-5 PC -- Late Payment Claims Rate | 34 |
| 6.1.16 | ET-CM-PC-6 PC -- Rejected Payment Claim Rate | 35 |
| 6.1.17 | ET-CM-BD-1 BD -- Correct Charging Rate | 35 |
| 6.1.18 | ET-CM-BD-2 BD -- Overcharging Rate | 36 |
| 6.1.19 | ET-CM-BD-3 BD -- Undercharging Rate | 37 |
| 6.1.20 | ET-CM-BD-4 BD -- Incorrect Charging Rate | 37 |
| 6.1.21 | ET-CM-BD-5 BD -- Latency -- TC | 38 |
| 6.1.22 | ET-CM-BD-6 BD -- Late Billing Details Rate | 38 |
| 6.1.23 | ET-CM-BD-7 BD -- Rejected Billing Details Rate | 39 |
| 6.1.24 | ET-CM-BD-8 BD -- Incorrectly rejected Billing Details Rate | 39 |
| 6.1.25 | ET-CM-BD-9 BD -- Inferred Billing Details Rate | 40 |
| 6.2 | DSRC Discrete -- Optional DSRC Toll Declaration Metrics | 40 |
| 6.2.1 | General | 40 |
| 6.2.2 | ET-CM-TD-1 TD -- Correct Toll Declaration Generation Rate | 40 |
| 6.2.3 | ET-CM-TD-2 TD -- Incorrect Toll Declaration Generation Rate | 41 |
| 6.2.4 | ET-CM-TD-3 TD -- Late Toll Declarations Rate | 41 |
| 6.2.5 | ET-CM-TD-4 TD -- TSP Charge Parameter Change Rate | 42 |
| 6.2.6 | ET-CM-TD-5 TD -- TSP False Positive Rate | 42 |
| 6.3 | Autonomous Discrete Specific Examination Tests | 43 |
| 6.3.1 | General | 43 |
| 6.3.2 | ET-CM-TD-1 TD -- Correct Toll Declaration Generation Rate | 43 |
| 6.3.3 | ET-CM-TD-2 TD -- Incorrect Toll Declaration Generation Rate | 43 |
| 6.3.4 | ET-CM-TD-3 TD -- Late Toll Declarations Rate | 44 |
| 6.3.5 | ET-CM-TD-4 TD -- TSP Charge Parameter Change Rate | 44 |
| 6.3.6 | ET-CM-TD-5 TD -- TSP False Positive Rate | 45 |
| 6.3.7 | ET-CM-DTD-1 DTD -- Correct Charging Rate (charge object detections) | 45 |
| 6.3.8 | ET-CM-DTD-2 DTD -- Incorrect Charge Event Recognition Rate | 46 |
| 6.3.9 | ET-CM-DTD-3 DTD -- Missed Charge Object Detection Rate | 46 |
| 6.3.10 | ET-CM-DTD-4 DTD Overcharging Rate | 47 |
| 6.3.11 | ET-CM-CR-1 CR -- Correct Charge Report Generation Rate | 47 |
| 6.3.12 | ET-CM-CR-2 CR -- Incorrect Charge Report Generation Rate | 48 |
| 6.3.13 | ET-CM-CR-3 CR -- Charge Report Latency | 48 |
| 6.3.14 | ET-CM-CR-4 CR -- TSP Front End Charge Parameter Change Rate | 49 |
| 6.3.15 | ET-CM-CR-5 CR -- TSP Front End False Positive Rate | 49 |
| 6.3.16 | ET-CM-DCR-1 DCR -- Correct Charging Rate (charge object detections) | 50 |
| 6.3.17 | ET-CM-DCR-2 DCR -- Incorrect Charge Event Recognition Rate | 50 |
| 6.3.18 | ET-CM-DCR-3 DCR -- Missed Charge Object Detection Rate | 51 |
| 6.3.19 | ET-CM-DCR-4 DCR -- Overcharging rate (Incorrect false positive Charge Event Recognition) | 51 |
| 6.4 | Autonomous Continuous Specific Examination Tests | 52 |
| 6.4.1 | General | 52 |
| 6.4.2 | ET-CM-TD-1 TD -- Correct Toll Declaration Generation Rate | 52 |
| 6.4.3 | ET-CM-TD-2 TD -- Incorrect Toll Declaration Generation Rate | 52 |
| 6.4.4 | ET-CM-TD-3 TD -- Late Toll Declarations Rate | 53 |
| 6.4.5 | ET-CM-TD-4 TD -- TSP Charge Parameter Change Rate | 53 |
| 6.4.6 | ET-CM-TD-5 TD -- TSP False Positive Rate | 54 |
| 6.4.7 | ET-CM-CTD-1 CTD Correct Charging Rate | 54 |
| 6.4.8 | ET-CM-CTD-2 CTD Overcharging Rate | 55 |
| 6.4.9 | ET-CM-CTD-3 CTD Accuracy of Distance/Time Measurement | 55 |
| 6.4.10 | ET-CM-CR-1 CR -- Correct Charge Report Generation Rate | 56 |
| 6.4.11 | ET-CM-CR-2 CR -- Incorrect Charge Report Generation Rate | 56 |
| 6.4.12 | ET-CM-CR-3 CR -- Charge Report Latency | 57 |
| 6.4.13 | ET-CM-CR-4 CR -- TSP Front End Charge Parameter Change Rate | 57 |
| 6.4.14 | ET-CM-CR-5 CR -- TSP Front End False Positive Rate | 58 |
| 6.4.15 | ET-CM-CCR-1 CCR -- Correct Charging Rate | 58 |
| 6.4.16 | ET-CM-CCR-2 CCR -- Overcharging Rate | 59 |
| 6.4.17 | ET-CM-CCR-3 CCR -- Accuracy of Distance/Time Measurement | 59 |
| | Annex A (informative) Examination Test documentation template | 61 |

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Annex B (informative) Examination Framework considerations | 62 |
| Annex C (informative) Statistical considerations | 66 |
| Annex D (informative) Methods for reducing sample sizes for very high/low probability metrics during the Evaluation Phase | 72 |
| Annex E (informative)Example-specificExaminationFrameworks | 76 |
| Bibliography | 93 |