

# METER DATA FILE FORMAT SPECIFICATION NEM12 & NEM13

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| 0.8     | September 2009 | Updated document to AEMO format.  |
| 1.0     | July 2013      | Updated to incorporate SGSD change of NSRD becoming an information field only<br>Put into new AEMO formatting. Updated to correct errors, clarify sections and remove and create new reason codes.<br>Updated with feedback from internal and the MSWG.   |
| 1.01    | Sept 2013      | Updated with feedback from initial consultation. Incorporated (where the input of these did not require any system changes) issues raised in the clarifications document. Feedback at the Sept MSWG.  |
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## CONTENTS

|             |   |           |
|-------------|---|-----------|
| 1.          | INTRODUCTION  | <b>5</b>  |
| 1.1.        | Purpose and Scope   | 5         |
| 1.2.        | Definitions and Interpretation  | 5         |
| 1.3.        | Related AEMO Documents  | 5         |
| 2.          | GENERAL RULES AND INFORMATION   | <b>5</b>  |
| 3.          | TECHNICAL INFORMATION   | <b>6</b>  |
| 3.1.        | Version details   | 6         |
| 3.2.        | File delivery   | 6         |
| 3.3.        | File construction   | 7         |
| 4.          | INTERVAL METER READING FILE SPECIFICATION AND VALIDATION (NEM12)        | <b>9</b>  |
| 4.1.        | Blocking cycle  | 9         |
| 4.2.        | Header record (100)   | 9         |
| 4.3.        | NMI data details record (200)   | 10        |
| 4.4.        | Interval data record (300)  | 11        |
| 4.5.        | Interval event record (400)   | 13        |
| 4.6.        | B2B details record (500)  | 14        |
| 4.7.        | End of data (900)   | 14        |
| 5.          | ACCUMULATION METER READING FILE SPECIFICATION AND VALIDATION (NEM13)    | <b>15</b> |
| 5.1.        | Blocking cycle  | 15        |
| 5.2.        | Header record (100)   | 15        |
| 5.3.        | Accumulation meter data record (250)                                    | 16        |
| 5.4.        | B2B details record (550)  | 19        |
| 5.5.        | End of data (900)   | 20        |
| APPENDIX A. | TRANSACTION CODE FLAGS  | <b>21</b> |
| APPENDIX B. | FORMAT & UNIT OF MEASURE FIELD DETAILS                                  | <b>22</b> |
| APPENDIX C. | QUALITY FLAGS   | <b>23</b> |
| APPENDIX D. | METHOD FLAGS  | <b>24</b> |
| APPENDIX E. | REASON CODES  | <b>25</b> |
| APPENDIX F. | OBSOLETE REASON CODES (ONLY TO BE USED WHEN PROVIDING HISTORICAL DATA)  | <b>29</b> |
| APPENDIX G. | SUMMARY OF FILE FORMAT AND BLOCKING                                     | <b>30</b> |
| APPENDIX H. | EXAMPLE INTERVAL DATA FILE (NEM12)                                      | <b>31</b> |
| H.1         | Interval Metering Data - Metering Installations with Remote Acquisition | 31        |

|     |  |           |
|-----|--|-----------|
| H.2 | Substituted Interval Metering Data - Metering Installations with Remote Acquisition of Metering Data   | 31        |
| H.3 | Interval Metering Data – Manually Read Interval Metering Installation Estimate   | 32        |
| H.4 | Multiple NMIs and Datastreams, Metering Installations with Remote Acquisition– (all Actual Metering Data)  | 34        |
| H.5 | Interval Metering Data - Remote Read Metering Installations with Remote Acquisition of Metering Data – Multiple QualityMethod/ReasonCode combination | 35        |
| H.6 | Metering Data for Meter Change with Configuration Change – Manually Read Interval Metering Installation  | 36        |
| H.7 | Transfer occurs on the NSRD for Manually Read Interval Metering Installation   | 37        |
| H.8 | Meter Change: Metering Installation with Accumulated Metering Data to Manually Read Interval Metering Installation                                   | 38        |
| H.9 | 5-Minute Interval Metering Data - Metering Installations with Remote Acquisition   | 39        |
|     | <b>APPENDIX I. EXAMPLE ACCUMULATION DATA FILE (NEM13)</b>  | <b>40</b> |
| I.1 | Actual Meter Readings  | 40        |
| I.2 | Normal Meter Reading with Estimate   | 40        |
| I.3 | Meter Reading and Meter Change   | 40        |
| I.4 | Historical Data values   | 40        |
| I.5 | Transfer read  | 41        |
|     | <b>APPENDIX J. EXAMPLE OF USE OF THE REGISTER READ FIELDS</b>  | <b>43</b> |

## 1. INTRODUCTION

### 1.1. Purpose and Scope

- (a) This document specifies the Meter Data File Format (MDFF) to be used by MDPs for the provision of *metering data* to MDPs, ENMs, and *Registered Participants*.
- (b) The MDFF can be used for the provisioning of *metering data* held in “standalone” files and for *metering data* held as CSV data blocks in other defined formats (e.g. aseXML *B2B transactions*).
- (c) This document has effect only for the purposes set out in the NER. The NER and the *National Electricity Law* prevail over this MDFF to the extent of any inconsistency.

### 1.2. Definitions and Interpretation

The Retail Electricity Market Procedures – Glossary and Framework:

- (a) is incorporated into and forms part of this document; and
- (b) should be read with this document.

### 1.3. Related AEMO Documents

| Title   | Location  |
|---|---|
| Retail Electricity Market Procedures – Glossary and Framework | <a href="http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Glossary-and-Framework">http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Glossary-and-Framework</a>   |
| Metrology Procedure: Part B                                   | <a href="http://www.aemo.com.au/Electricity/Policies-and-Procedures/Metrology-Procedures-and-Unmetered-Loads">http://www.aemo.com.au/Electricity/Policies-and-Procedures/Metrology-Procedures-and-Unmetered-Loads</a>   |
| Service Level Procedure (MDP)                                 | <a href="http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Metering-procedures-guidelines-and-processes">http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Metering-procedures-guidelines-and-processes</a> |
| NMI Procedure   | <a href="http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Metering-procedures-guidelines-and-processes">http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Metering-procedures-guidelines-and-processes</a> |
| Standing Data for MSATS                                       | <a href="http://www.aemo.com.au/Electricity/Policies-and-Procedures/Market-Settlement-and-Transfer-Solutions/Standing-Data-for-MSATS">http://www.aemo.com.au/Electricity/Policies-and-Procedures/Market-Settlement-and-Transfer-Solutions/Standing-Data-for-MSATS</a>                 |
| B2B Procedure: Meter Data Process                             | <a href="http://www.aemo.com.au/Electricity/Policies-and-Procedures/B2B/BB-Procedures">http://www.aemo.com.au/Electricity/Policies-and-Procedures/B2B/BB-Procedures</a>   |
| B2B Procedure: Technical Delivery Specification               | <a href="http://www.aemo.com.au/Electricity/Policies-and-Procedures/B2B/BB-Procedures">http://www.aemo.com.au/Electricity/Policies-and-Procedures/B2B/BB-Procedures</a>   |

## 2. GENERAL RULES AND INFORMATION

- (a) The MDFF must:
  - (i) be constructed in a CSV format;
  - (ii) contain only a single Header (100) record;
  - (iii) contain a single End (900) record; and
  - (iv) contain NEM12 or NEM13 formatted data, but not both.
- (b) Due to delays with the updating of MSATS, recipients of an MDFF file should be aware that the information provided in the MDFF file might not align with MSATS at the time of receipt.

- (c) The MDP must ensure that all NMI suffixes associated with a *NMI* for any *IntervalDate* are included in the same 100-900 event block.

### 3. TECHNICAL INFORMATION

#### 3.1. Version details

- (a) The file format for *interval metering data* is "NEM12". The *VersionHeader* field in the 100 header record indicates this information.
- (b) The file format for *accumulated metering data* is "NEM13". The *VersionHeader* field in the 100 header record indicates this information.

#### 3.2. File delivery

##### 3.2.1. Delivery via B2B

If using *B2B e-Hub* as the delivery mechanism, refer to the relevant B2B Procedure: Technical Delivery Specification.

##### 3.2.2. Alternative Delivery Method

- (a) File naming standard:
- (i) The file name is not case sensitive.
  - (ii) The symbol # is to be used as a delimiter and must not be used within any of the file header fields.
  - (iii) Using the file as a standalone file the following file naming convention will be adopted:
    - VersionHeader#Unique ID#From#To.csv
    - Example = nem12#0123456789012345#mda1#retail1.csv

Where:

    - VersionHeader - 5 alphanumeric characters - "NEM12" or "NEM13".
    - VersionHeader must match the *VersionHeader* in the 100 Header Record(s).
    - Unique ID – Up to a maximum of 36 alphanumeric characters. This must be a unique identifier.
    - From – The Participant ID of the MDP that generates the file.
    - To - The Participant ID of the intended *Registered Participant*, MDP, ENM.
- (b) Compression:
- (i) Data files may be delivered as compressed files with a ".zip" extension, providing the 'zlib' standard is used to manage the compression.
  - (ii) Files must not be password protected.
  - (iii) Using the file as a standalone file the following file naming convention will be adopted:
    - VersionHeader#Unique ID#From#To.zip
    - Example = nem12#0123456789012345#mda1#retail1.zip

### 3.3. File construction

- (a) The values in a field are not case sensitive, except where allowed values are specified as an enumerated list in the record definition tables (refer sections 4 and 5).
- (b) All record lines must end in a carriage return and line feed (CRLF).

#### 3.3.1. Spaces, nulls and commas

- (a) Fields must not include leading or trailing spaces.
- (b) Where no Interval values exist, the *IntervalValue* field must contain a value of zero (0) and the *QualityFlag* field must have a value of "N". A null value is not allowed in the quantity field of the NEM13 file.
- (c) A comma is required between all fields, even if the field is null.
- (d) Commas are not permitted in any data field.

#### 3.3.2. Date and time

- (a) All components of the *DateTime* fields are two digits.
- (b) *Date*(8) format means a reverse notation date field (i.e. CCYYMMDD) with no separators between its components (century, years, months and days). The "8" indicates that the total field length is always 8 character - e.g. "20030501" is the 1st May 2003.
- (c) *DateTime*(12) format means a reverse notation date-time field (i.e. CCYYMMDDhhmm) with no separators between its components (century, years, months, days, hours and minutes). The "12" indicates that the total field length is always 12 characters - e.g. 200301011534 is 15:34 on 1st January 2003.
- (d) *DateTime*(14) format means a reverse notation date-time field (i.e. CCYYMMDDhhmmss) with no separators between its components (century, years, months, days, hours, minutes and seconds). The "14" indicates that the total field length is always 14 characters - e.g. 20030101153445 is 15:34.45 on 1st January 2003.
- (e) The time standard for the end of the *day* is 00:00 of the following *day*.

#### 3.3.3. Interval Metering Data

- (a) *Interval metering data* is presented in time sequence order, with the first Interval for a *day* being the first Interval after midnight for the interval length that is programmed into the *meter*. Refer to the *IntervalLength* field in 4.3.
- (b) For 5-minute data:
  - (i) The first Interval (1) for a *meter* programmed to record 5-minute *interval metering data* would relate to the period ending 00:05 of the *IntervalDate*.
  - (ii) The last Interval (288) for a *meter* programmed to record 5-minute *interval metering data* would relate to the period ending 00:00 of the *IntervalDate*+1.
- (c) For 15-minute data:
  - (i) The first Interval (1) for a *meter* programmed to record 15-minute *interval metering data* would relate to the period ending 00:15 of the *IntervalDate*.
  - (ii) The last Interval (96) for a *meter* programmed to record 15-minute *interval metering data* would relate to the period ending 00:00 of the *IntervalDate*+1.

- (d) For 30-minute data:
- (i) The first Interval (1) for a *meter* programmed to record 30-minute *interval metering data* would relate to the period ending 00:30 of the IntervalDate.
  - (ii) The last Interval (48) for a *meter* programmed to record 30-minute *interval metering data* would relate to the period ending 00:00 of the IntervalDate+1.

### 3.3.4. Index Read for type 4A and type 5 Metering Installations

The rules around index reads for type 4A and type 5 *metering installations*.

- (a) The index read is the total *accumulated metering data* for a Datastream retrieved from a *meter's* register at the time of collection.
- (b) IndexRead must be provided for *active energy* Datastreams (Wh) when collected.
- (c) *Registered Participants* must not raise a Validation query with the MDP relating to any IndexRead value.
- (d) The IndexRead must be exclusive of *meter* multipliers. This value must be in the format displayed on the *meter* and, where available, include any leading or trailing zeros.
- (e) The provision of an IndexRead for any time other than the current Meter Reading must be agreed between the relevant *Registered Participant* and MDP.
- (f) The latest IndexRead only must be provided where more than one has been collected on the Meter Reading date.

### 3.3.5. Reason Code

The following rules apply to the use of reason codes:

- (a) The MDP must apply the ReasonCode that most accurately reflects the reason for supplying the code or based on the hierarchical structure agreed with the FRMP.
- (b) A ReasonCode must be provided for all Intervals and consumption values where the QualityFlag 'S' (*substituted metering data*) or 'F' (*final substituted metering data*).
- (c) A ReasonCode must be provided for Actual Meter Readings (QualityFlag 'A') for all Intervals where the *meter* has recorded a *power outage* (reason code 79), *time reset* (reason code 89), or *tamper* (reason code 61).
- (d) Other ReasonCodes may be provided where the QualityFlag value is 'A'.
- (e) Multiple Interval event records (400 record) are allowed for each *interval metering data* record (300 record) where more than one ReasonCode is applicable to the *day's* Meter Readings.
- (f) Only one QualityMethod and one ReasonCode can be applied to an Interval.
- (g) Where the QualityMethod is 'V' (*variable data*) a ReasonCode is not to be provided.
- (h) The complete list of available reason codes, with accompanying descriptions, and obsolete reason codes are detailed in Appendix E and Appendix F. Obsolete reason codes are provided to support the provision of Historical Data only.
- (i) Quality flag meanings and relationships with other fields are detailed in Appendix C.

### 3.3.6. Mandatory and required data

The key to the initials used in the Field Requirement column of all Record data tables in sections 4 and 5 is as follows:



- Key M = Mandatory (must be provided in all situations).
- R = Required (must be provided if this information is available).
- N = Not required (unless specified, can be provided but may be ignored by the recipient).

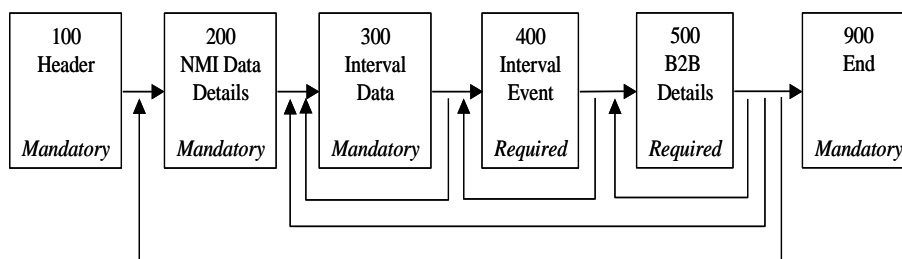
Where more than one initial is used in the 'Field Requirement' column, the 'Definitions' column provides clarification on the scenarios where each initial applies.

## 4. INTERVAL METER READING FILE SPECIFICATION AND VALIDATION (NEM12)

### 4.1. Blocking cycle

The blocking of the records must be in accordance with the following diagram; i.e. in the order of 100,200,300,400,500,900 records.

For example: If any data changes in the 200 record, a new 200 record must be provided for the subsequent 300 record (e.g. if the *UOM*, *IntervalLength* or *NMISuffix* changes).



The 400 & 500 records are required in certain circumstances.

Refer to Appendix G for details of the blocking cycle for this file.

### 4.2. Header record (100)

Example: *RecordIndicator,VersionHeader,DateTime,FromParticipant,ToParticipant*

100,NEM12,200301011534,MDP1,Retailer1

| Field                  | Format        | Field Requirement | Definition  |
|------------------------|---------------|-------------------|---|
| <i>RecordIndicator</i> | Numeric(3)    | M                 | Header record indicator. 1 per file (100-900 record set).<br>A 100 record must have a matching 900 record.<br>Allowed value: 100. |
| <i>VersionHeader</i>   | VarChar(5)    | M                 | Version identifier. Details the version of the data block and hence its format.<br>Allowed value: NEM12.                          |
| <i>DateTime</i>        | DateTime (12) | M                 | File creation date/time.  |
| <i>FromParticipant</i> | VarChar(10)   | M                 | The Participant ID of the MDP that generates the file.  |
| <i>ToParticipant</i>   | VarChar(10)   | M                 | The Participant ID of the intended <i>Registered Participant</i> , MDP or ENM.  |

### 4.3. NMI data details record (200)

Multiple 300-500 record blocks are allowed within a single 200 record.

Example: RecordIndicator,NMI,NMIConfiguration,RegisterID,NMISuffix,MDMDataStreamIdentifier,MeterSerialNumber,UOM,IntervalLength,NextScheduledReadDate

200,VABD000163,E1Q1,1,E1,N1,METSER123,kWh,30,20040120

| Field                          | Format       | Field Requirement | Definition   |
|--------------------------------|--------------|-------------------|--|
| <u>RecordIndicator</u>         | Numeric(3)   | M                 | <i>NMI</i> data details record indicator.<br>Allowed value: 200.   |
| <u>NMI</u>                     | Char(10)     | M                 | <i>NMI</i> for the <i>connection point</i> .<br>Does not include check-digit or <i>NMI</i> suffix.   |
| <u>NMIConfiguration</u>        | VarChar(240) | M                 | String of all <u>NMISuffixes</u> applicable to the <i>NMI</i> .<br>The <u>NMIConfiguration</u> must represent the actual configuration of the Site.<br>Where there is a <i>NMI</i> configuration change, all active channels on any part of the <i>day</i> must be provided.   |
| <u>RegisterID</u>              | VarChar(10)  | M/N               | Interval Meter register identifier. Defined the same as the <u>RegisterID</u> field in the CATS_Register_Identifier table.<br>The value should match the value in MSATS.<br>e.g. "1", "2", "E1", "B1".<br>The <u>RegisterID</u> is:<br>Mandatory for type 4, 4A and type 5 <i>metering data</i> when the sender of the MDFF file is the Current MDP.<br>Not required for types 1-3 and type 7 or when sending <i>metering data</i> to another MDP (eg Meter Churn data). |
| <u>NMISuffix</u>               | Char(2)      | M                 | As defined in the NMI Procedure e.g. "E1", "B1", "Q1", "K1".   |
| <u>MDMDataStreamIdentifier</u> | Char(2)      | M/N               | Defined as per the suffix field in the CATS_NMI_DataStream table,<br>e.g. "N1", "N2".<br>The value must match the value in MSATS.<br>The field must be provided if the <i>metering data</i> has or would be sent to MSATS by the sender.<br>The field is not required when sending the data to another MDP.  |
| <u>MeterSerialNumber</u>       | VarChar(12)  | M/N               | The Meter Serial ID of the <i>meter</i> installed at a Site.<br>If the <i>meter</i> is replaced, the Meter Serial ID of the new <i>meter</i> will apply on and from the IntervalDate when the <i>meter</i> is replaced.<br>Not required for type 7 <i>metering installations</i> , logical <i>meters</i> , Historical Data, or where multiple <i>meters</i> are summated to form a single <u>RegisterID</u> .  |

| Field                        | Format     | Field Requirement | Definition   |
|------------------------------|------------|-------------------|--|
| <u>UOM</u>                   | VarChar(5) | M                 | Unit of measure of data.<br>Refer Appendix B for the list of allowed values for this field.  |
| <u>IntervalLength</u>        | Numeric(2) | M                 | Time in minutes of each Interval period: 5, 15, or 30.   |
| <u>NextScheduledReadDate</u> | Date(8)    | M/N               | This date is the NSRD.<br>This field is not required for remotely read <i>meters</i> .<br>This field is not required where the <i>meter</i> will not be read again (eg <i>meter</i> removed, <i>NMI</i> abolished, MDP will no longer be the MDP).<br>The NSRD provided in this file is accurate at the time the file is generated (noting this may be subject to change e.g. if route change etc.).<br>MSATS is the database of record, therefore, should there be a discrepancy between the NSRD Date in this file, MSATS shall prevail. |

#### 4.4. Interval data record (300)

Example: RecordIndicator,IntervalDate,IntervalValue1 . . . IntervalValueN,  
QualityMethod,ReasonCode,ReasonDescription,UpdateDateTime,MSATSLoadDateTime

300,20030501,50.1, . . . ,21.5,V,,,20030101153445,20030102023012

300 records must be presented in date sequential order. For example, with a series of Meter Readings for a period, the current record is the next incremental IntervalDate after the previous record. Or, where data for individual, non-consecutive *days* is sent, the IntervalDate for each 300 record is later than the previous one.

Where the same QualityMethod and ReasonCode apply to all IntervalValues in the 300 record, the QualityMethod, ReasonCode and ReasonDescription in the 300 Record must be used. If either of these fields contains multiple values for the IntervalValues, the QualityMethod in the 300 record must be set to "V" and the 400 record must be provided.

The use of 'V' as the quality method in this example indicates the QualityMethod, ReasonCode or ReasonDescription vary across the *day* and will be provided, for each Interval, in the 400 records that would immediately follow this record. Refer 4.5 for details on the use of the 400 records.

| Field                  | Format     | Field Requirement | Definition   |
|------------------------|------------|-------------------|--|
| <u>RecordIndicator</u> | Numeric(3) | M                 | <i>Interval metering data</i> record indicator.<br>Allowed value: 300. |
| <u>IntervalDate</u>    | Date(8)    | M                 | Interval date.   |

| Field   | Format  | Field Requirement | Definition   |
|---|---|-------------------|--|
| <u>IntervalValue1</u><br>...<br><u>IntervalValueN</u> | Numeric(sx.y)<br>Refer Appendices –<br>Appendix B for<br>details on the format<br>of this number. | M                 | <p><i>Interval metering data.</i></p> <p>The total amount of <i>energy</i> or other measured value for the Interval inclusive of any multiplier or scaling factor.</p> <p>The number of values provided must equal 1440 divided by the <u>IntervalLength</u>. This is a repeating field with individual field values separated by comma delimiters.</p> <p><u>Allowed value rules:</u></p> <p>If no data – i.e. null, then set the relevant <u>IntervalValue</u> field to zero “0” and set the respective quality flag in the <u>QualityMethod</u> field to “N”.</p> <p>A negative value is not allowed.</p> <p>The value may contain decimal places.</p> <p>Exponential values are not allowed.</p> |
| <u>QualityMethod</u>                                  | VarChar(3)  | M                 | <p>Summary of the data quality and Substitution/Estimation flags for all <u>IntervalValues</u> contained in this record.</p> <p>The <u>QualityMethod</u> applies to all <u>IntervalValues</u> in this record. Where multiple <u>QualityMethods</u> or <u>ReasonCodes</u> apply to these <u>IntervalValues</u>, a quality flag ‘V’ must be used.</p> <p>Format: In the form QMM, where quality flag (‘Q’) = 1 character and method flag (MM) = 2 character.</p> <p><u>Allowed values:</u></p> <p>See quality and method tables (Appendix C &amp; D).</p> <p>If quality flag = ‘A’, ‘N’ or ‘V’ no method flag is required.</p>   |
| <u>ReasonCode</u>                                     | Numeric(3)  | M/N               | <p>Summary of the reasons for Substitute/Estimate or information for all <u>IntervalValues</u> contained in this record.</p> <p>The <u>ReasonCode</u> applies to all <u>IntervalValues</u> in this record.</p> <p>Not required if quality flag = ‘A’, ‘N’, or ‘E’, but can be provided for information.</p> <p>The field must not be populated if quality flag = ‘V’.</p> <p><u>Allowed values:</u> Refer Appendix E.</p>  |
| <u>ReasonDescription</u>                              | VarChar(240)  | N/M               | <p>Description of <u>ReasonCode</u>.</p> <p>Mandatory where the <u>ReasonCode</u> is ‘0’.</p>  |
| <u>UpdateDateTime</u>                                 | DateTime(14)  | M/N               | <p>The latest date/time that any updated <u>IntervalValue</u> or <u>QualityMethod</u> for the <u>IntervalDate</u>. This is the MDP’s version date/time that the <i>metering data</i> was created or changed.</p> <p>This date and time applies to data in this 300 record.</p> <p>This field is not required if the <u>QualityMethod</u> is ‘N’.</p>   |

| Field                               | Format       | Field Requirement | Definition  |
|-------------------------------------|--------------|-------------------|---|
| <u>MSATSLoadDateTim</u><br><u>e</u> | DateTime(14) | R                 | This is the date/time stamp MSATS records when <i>metering data</i> was loaded into MSATS. This date is in the acknowledgement notification sent to the MDP by MSATS. |

#### 4.5. Interval event record (400)

Example: RecordIndicator,StartInterval,EndInterval,QualityMethod,ReasonCode,ReasonDescription

400,1,28,S14,32,

This record is mandatory where the QualityFlag is 'V' in the 300 record or where the quality flag is 'A' and reason codes 79, 89, and 61 are used.

The StartInterval/EndInterval pairs must be presented in ascending record order. The StartInterval/EndInterval period must cover an entire *day* without gaps or overlaps. For example, (based on a 30-minute Interval):

400,1,26,A,,

400,27,31,S53,9,

400,32,48,E52,,

Refer section 2 (c) for further rules regarding the use of this record.

| Field                  | Format     | Field Requirement | Definition   |
|------------------------|------------|-------------------|--|
| <u>RecordIndicator</u> | Numeric(3) | M                 | Interval event record indicator.<br>Allowed value: 400.  |
| <u>StartInterval</u>   | Numeric(4) | M                 | The first Interval number that the <u>ReasonCode/QualityMethod</u> combination applies to.<br>The <u>StartInterval</u> must be less than or equal to the <u>EndInterval</u> .  |
| <u>EndInterval</u>     | Numeric(4) | M                 | The last Interval number that the <u>ReasonCode/QualityMethod</u> combination applies to.  |
| <u>QualityMethod</u>   | VarChar(3) | M                 | Data quality & Substitution/Estimation flag for <i>metering data</i> .<br>The <u>QualityMethod</u> applies to all <u>IntervalValues</u> in the inclusive range defined by the <u>StartInterval</u> and <u>EndInterval</u> .<br>Format: In the form QMM, where quality flag (Q) = 1 character and method flag (MM) = 2 character<br><u>Allowed values:</u><br>See quality and method tables (refer Appendices C & D).<br>If quality flag = "A" or "N" no method required.<br>The quality flag of "V" cannot be used in this record. |
| <u>ReasonCode</u>      | Numeric(3) | M/N               | Reason for Substitute/Estimate or information.<br>The <u>ReasonCode</u> applies to all <u>IntervalValues</u> in the inclusive range defined by the <u>StartInterval</u> and <u>EndInterval</u> .<br>Not required if quality flag = "N" or "E" but can be provided for information.<br><u>Allowed values:</u> Refer Appendix E.   |

| Field                    | Format       | Field Requirement | Definition   |
|--------------------------|--------------|-------------------|--|
| <u>ReasonDescription</u> | VarChar(240) | N/M               | Description of <u>ReasonCode</u> .<br>Mandatory where the <u>ReasonCode</u> is "0".<br>The <u>ReasonDescription</u> applies to all <u>IntervalValues</u> in the inclusive range defined by the <u>StartInterval</u> and <u>EndInterval</u> . |

#### 4.6. B2B details record (500)

Example: RecordIndicator,TransCode,RetServiceOrder,ReadDateTime,IndexRead

500,S,RETNSRVCEORD1,20031220154500,001123.5

This record is mandatory where a manual Meter Reading has been performed or attempted.

Only valid 500 records associated with the current Meter Reading period must be provided. For example, a 500 record associated with a Substitute will become invalid if Actual Metering Data subsequently replace the Substitutes.

This record must be repeated where multiple TransCodes or RetServiceOrders apply to the *day*.

| Field                       | Format       | Field Requirement | Definition  |
|-----------------------------|--------------|-------------------|---|
| <u>RecordIndicator</u><br>L | Numeric(3)   | M                 | B2B details record indicator.<br>Allowed value: 500.  |
| <u>TransCode</u>            | Char(1)      | M                 | Indicates why the recipient is receiving this <i>metering data</i> . Refer Appendix A for a list of allowed values for this field. A value of 'O' (i.e. capital letter O) must be used when providing Historical Data and where this information is unavailable.  |
| <u>RetServiceOrder</u><br>L | Varchar(15)  | R                 | The Service Order number associated with the Meter Reading.   |
| <u>ReadDateTime</u>         | DateTime(14) | M/R/N             | Actual date/time of the Meter Reading.<br>The date/time the transaction occurred or, for a Substitution (quality flag = 'S' or 'F'), when the Meter Reading should have occurred.<br>The time component of the <u>ReadDateTime</u> should be the actual time of the attempted Meter Reading. If this is not available the value of the time component must be 00:00:01.<br>The <u>ReadDateTime</u> is required when providing Historical Data and not required for Estimates. |
| <u>IndexRead</u>            | Varchar(15)  | R/N               | The total recorded <i>accumulated energy</i> for a Datastream retrieved from a <i>meter's</i> register at the time of collection. For type 4A and type 5 <i>metering installations</i> the MDP must provide the <u>IndexRead</u> when collected. Refer section 3.3.4.   |

#### 4.7. End of data (900)

Example: RecordIndicator

900

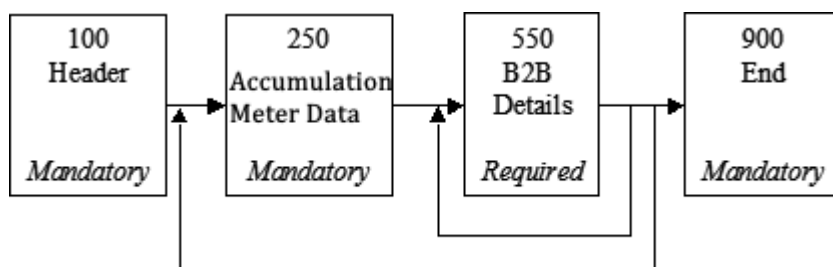
| Field                  | Format     | Field Requirement | Definition   |
|------------------------|------------|-------------------|--|
| <u>RecordIndicator</u> | Numeric(3) | M                 | This is the end of record indicator for the record set commencing with the previous 100 record.<br>Allowed Value: 900. |

## 5. ACCUMULATION METER READING FILE SPECIFICATION AND VALIDATION (NEM13)

### 5.1. Blocking cycle

The blocking must be in accordance with the following diagram i.e. in the order of 100, 250, 550, 900 records.

The 550 record is required in certain circumstances.



Refer to Appendix G for details of the blocking cycle for this file.

### 5.2. Header record (100)

Example:

RecordIndicator,VersionHeader,DateTime,FromParticipant,ToParticipant

100,NEM13,200301011534,MDP1,Retailer1

| Field                  | Format        | Field Requirement | Definition   |
|------------------------|---------------|-------------------|--|
| <u>RecordIndicator</u> | Numeric(3)    | M                 | Header record indicator. 1 per file (100-900 record set). A 100 record must have a matching 900 record.<br>Allowed value: 100. |
| <u>VersionHeader</u>   | VarChar(5)    | M                 | Version identifier. Details the version of the data block and hence its format.<br>Allowed value: NEM13.                       |
| <u>DateTime</u>        | DateTime (12) | M                 | File creation date/time.   |
| <u>FromParticipant</u> | VarChar(10)   | M                 | The Participant ID of the MDP that generates the file.   |
| <u>ToParticipant</u>   | VarChar(10)   | M                 | The Participant ID of the intended <i>Registered Participant</i> , MDP or ENM .  |

### 5.3. Accumulation meter data record (250)

Example:

RecordIndicator,NMI,NMIConfiguration,RegisterID,NMISuffix,MDMDataStreamIdentifier,MeterSerialNumber,DirectionIndicator,PreviousRegisterRead,PreviousRegisterReadDateTime,PreviousQualityMethod,PreviousReasonCode,PreviousReasonDescription,CurrentRegisterRead,CurrentRegisterReadDateTime,CurrentQualityMethod,CurrentReasonCode,CurrentReasonDescription,Quantity,UOM,NextScheduledReadDate,UpdateDateTime,MSATSLoadDateTime

250,1234567890,1141,01,11,11,METSER66,E,000021.2,20031001103230,A,,,000534.5,20040201100030,E64,77,,343.5,kWh,20040509,20040202125010,20040203000130

| Field                          | Format       | Field Requirement | Definition   |
|--------------------------------|--------------|-------------------|--|
| <u>RecordIndicator</u>         | Numeric(3)   | M                 | Accumulation Meter record indicator.<br>Allowed value: 250.  |
| <u>NMI</u>                     | Char(10)     | M                 | <i>NMI</i> for the <i>connection point</i> . Does not include check-digit or <i>NMI</i> suffix.  |
| <u>NMIConfiguration</u>        | VarChar(240) | M                 | String of all applicable <u>NMISuffixes</u> for the <i>NMI</i> . The <u>NMIConfiguration</u> must represent the actual configuration of the Site.  |
| <u>RegisterID</u>              | VarChar(10)  | M                 | Accumulation meter register identifier. Defined the same as the <u>RegisterID</u> field in the CATS_Register_Identifier table.<br>The value should match the value in MSATS.<br>e.g. "1", "2".   |
| <u>NMISuffix</u>               | Char(2)      | M                 | As defined in the NMI Procedure - e.g. "11", "41".   |
| <u>MDMDataStreamIdentifier</u> | Char(2)      | M/N               | Defined as per the suffix field in the CATS_NMI_DataStream table, e.g. "11", "41".<br>The value must match the value in MSATS. The field must be provided if the <i>metering data</i> has or would be sent to MDM.   |
| <u>MeterSerialNumber</u>       | VarChar(12)  | M                 | Meter Serial ID as per Standing Data for MSATS.  |
| <u>DirectionIndicator</u>      | Char(1)      | M                 | A code to indicate whether this register records "Import" or "Export".<br><u>Allowed values</u> : 'I' = Import to grid, 'E' = Export from grid<br>"Import" means that <i>energy</i> normally flows from the <i>connection point</i> to the grid.<br>"Export" means <i>energy</i> normally flows from the grid to the <i>connection point</i> . |



| Field  | Format           | Field Requirement | Definition  |
|--|------------------|-------------------|---|
| <u>PreviousRegisterRead</u>                    | Varchar(15)      | M                 | <p><u>Previous RegisterRead</u>.</p> <p>Example of values: 1234567.123 or 0012456.123.</p> <p>Values must include any leading zeros and trailing zeros as per the physical dial format.</p> <p>Values must be exclusive of <i>meter</i> multipliers.</p> <p>The 'previous' Meter Reading is the earlier of the two Meter Readings provided. An Estimate cannot be provided in the <u>PreviousRegisterRead</u> field.</p> <p>Refer Appendix I for examples of the use of this field.</p> |
| <u>PreviousRegisterReadDateTim</u><br><u>e</u> | DateTime<br>(14) | M                 | <p>Actual date/time of the Meter Reading.</p> <p>The date/time the transaction occurred or, for a substitution (quality flag = 'S' or 'F'), when the Meter Reading should have occurred.</p> <p>The time component of the <u>PreviousRegisterReadDateTime</u> should be the actual time of the attempted Meter Reading. If this is not available the value of the time component must be 00:00:01.</p>  |
| <u>PreviousQualityMethod</u>                   | VarChar(3)       | M                 | <p>Data quality &amp; Substitution/Estimation flag for <u>PreviousRegisterRead</u>.</p> <p>Format :In the form QMM, where quality flag (Q) = 1 character and method flag (MM) = 2 character.</p> <p>Allowed values:</p> <p>See quality and method tables (refer Appendix C &amp; D)</p> <p>If quality flag = "A" then no method flag is required.</p>   |
| <u>PreviousReasonCode</u>                      | Numeric(3)       | M/N               | <p>Reason for Substitute/Estimate or information for <u>PreviousRegisterRead</u>. Refer to section 3.3.5 for more details.</p> <p>Allowed values:</p> <p>Refer Appendix E.</p> <p>Not Required where the quality flag = "A" or "E" but can be provided for information.</p>   |
| <u>PreviousReasonDescription</u>               | VarChar(240)     | N/M               | <p>Description of <u>ReasonCode</u> for <u>PreviousRegisterRead</u>.</p> <p>Mandatory where the <u>PreviousReasonCode</u> is "0".</p>   |
| <u>CurrentRegisterRead</u>                     | Varchar(15)      | M                 | <p>Register read.</p> <p>Example of values: 1234567.123 or 0012456.123.</p> <p>Values must include any leading zeros and trailing zeros as per the physical dial format.</p> <p>Values must be exclusive of <i>meter</i> multipliers.</p> <p>The 'current' Meter Reading is the later of the two Meter Readings provided. It has no specific relationship to the present; for example, it may be in the future if the Meter Reading is an Estimate.</p>                                 |

| Field                              | Format   | Field Requirement | Definition   |
|------------------------------------|--|-------------------|--|
| <u>CurrentRegisterReadDateTime</u> | DateTime<br>(14)   | M                 | <p>Actual date/time of the Meter Reading.</p> <p>For Estimates, the date should be equal to or greater than the <u>NextScheduledReadDate</u>, with a time component of 00:00:00 (ie, date(8) + 000000).</p> <p>The date/time the transaction occurred or, for a Substitution (quality flag = 'S' or 'F'), when Meter Reading should have occurred.</p> <p>The time component of the <u>CurrentRegisterReadDateTime</u> should be the actual time of the attempted Meter Reading. If this is not available the value of the time component must be 00:00:01.</p> <p>Refer Appendix I for examples of the use of this field.</p> |
| <u>CurrentQualityMethod</u>        | VarChar(3)   | M                 | <p>Data quality &amp; Substitution/Estimation flag for <u>CurrentRegisterRead</u>.</p> <p>Format: In the form QMM, where quality flag (Q) = 1 character and method flag (MM) = 2 character.</p> <p>Allowed values:<br/>See quality and method tables (refer Appendix C &amp; D).</p> <p>If quality flag = "A", no method flag is required.</p>   |
| <u>CurrentReasonCode</u>           | Numeric(3)   | M/N               | <p>Reason for Substitute/Estimate or information for <u>CurrentRegisterRead</u>. Refer to section 3.3.5 for more details.</p> <p>Allowed values:<br/>Refer Appendix E.</p> <p>Not Required where the quality flag = 'A' or 'E' but can be provided for information.</p>  |
| <u>CurrentReasonDescription</u>    | VarChar(240)   | N/M               | <p>Description of <u>ReasonCode</u> for <u>CurrentRegisterRead</u>.</p> <p>Mandatory where the <u>CurrentReasonCode</u> is '0'.</p>  |
| <u>Quantity</u>                    | Numeric<br>(sx.y)<br>Refer to Appendix B for details on the format of this number. | M                 | <p>The computed quantity, after the application of any multiplier value and taking account of any <i>meter</i> rollover. For <i>energy</i> values (e.g. watt hours or var hours) this is measured between the <u>CurrentRegisterRead</u> and <u>PreviousRegisterRead</u> (<u>CurrentRegisterRead</u> value less <u>PreviousRegisterRead</u> value corrected for the register multiplier). For non-<i>energy</i> (demand) values, it is the <u>CurrentRegisterRead</u> corrected for the register multiplier.</p> <p>A negative value must not be provided.</p>   |
| <u>UOM</u>                         | VarChar(5)   | M                 | <p>Unit of Measure for the <u>Quantity</u> value.</p> <p>Refer Appendix B for the list of allowed values for this field.</p>   |

| Field                        | Format        | Field Requirement | Definition   |
|------------------------------|---------------|-------------------|--|
| <u>NextScheduledReadDate</u> | Date(8)       | M/N               | This date is the NSRD.<br>This field is not required where the <i>meter</i> will not be read again (e.g. <i>meter</i> removed, <i>NMI</i> abolished, MDP will no longer be the MDP).<br>The NSRD provided in this file is accurate at the time the file is generated (noting this may be subject to change e.g. if route change etc.). MSATS is the database of record, therefore, should there be a discrepancy between the NSRD in this file, MSATS shall prevail. |
| <u>UpdateDateTime</u>        | DateTime (14) | M                 | The latest date/time for the updated <u>CurrentRegisterRead</u> or <u>CurrentQualityMethod</u> .<br>This is the MDP's version date/time that the <i>metering data</i> was created or changed. This date and time applies to data in this 250 record.   |
| <u>MSATSLoadDateTime</u>     | DateTime (14) | R                 | This is the date/time stamp MSATS records when <i>metering data</i> was loaded into MSATS. This date is in the acknowledgement notification sent to the MDP by MSATS   |

#### 5.4. B2B details record (550)

Example:

RecordIndicator,PreviousTransCode,PreviousRetServiceOrder,CurrentTransCode,  
CurrentRetServiceOrder

550,N,,A,

This record is not required if both the PreviousTransCode and CurrentTransCode are "N" and there are no service orders corresponding to the PreviousRegisterRead or CurrentRegisterRead readings.

This record must be repeated where multiple TransCodes or RetServiceOrders apply to the PreviousRegisterRead or CurrentRegisterRead.

| Field                          | Format      | Field Requirement | Definition  |
|--------------------------------|-------------|-------------------|---|
| <u>RecordIndicator</u>         | Numeric(3)  | M                 | B2B details record indicator.<br>Allowed value: 550.  |
| <u>PreviousTransCode</u>       | Char(1)     | M                 | Indicates why the <u>PreviousRegisterRead</u> was collected.<br>Refer Appendix A for a list of allowed values for this field.<br>A value of "O" must be used when providing Historical Data and where this information is unavailable.  |
| <u>PreviousRetServiceOrder</u> | Varchar(15) | R                 | The <i>retailer's ServiceOrderRequest</i> number associated with the <u>PreviousRegisterRead</u> reading (where the <i>metering data</i> is directly associated with a <u>ServiceOrderRequest</u> ).<br><i>This information must only be provided to the requesting retailer.</i> |

| Field                         | Format      | Field Requirement | Definition   |
|-------------------------------|-------------|-------------------|--|
| <u>CurrentTransCode</u>       | Char(1)     | M                 | Indicates why the <u>CurrentRegisterRead</u> was collected.<br>Refer Appendix A for a list of allowed values for this field.<br>A value of "O" must be used when providing Historical Data and where this information is unavailable.  |
| <u>CurrentRetServiceOrder</u> | Varchar(15) | R                 | The <i>retailer's</i> Service Order number associated with the <u>CurrentRegisterRead</u> reading (where the <i>metering data</i> is directly associated with a B2B <u>service order request</u> ).<br><i>This information must only be provided to the requesting retailer.</i> |

### 5.5. End of data (900)

Example: RecordIndicator

900

| Field                  | Format     | Field Requirement | Definition   |
|------------------------|------------|-------------------|--|
| <u>RecordIndicator</u> | Numeric(3) | M                 | This is the end of record indicator for the record set commencing with the previous 100 record.<br>Allowed Value: 900. |

## APPENDIX A. TRANSACTION CODE FLAGS

References to service orders in the table below refer to work done by an MP, MDP, ENM or LNSP as the result of a *retailer's* ServiceOrderRequest or at its own initiation.

| TransCode | Action                | Comments   |
|-----------|-----------------------|--|
| A         | Alteration            | Any action involving the alteration of the metering installation at a Site. This includes a removal of one meter and replacing it with another and all new connections and 'Add/Alts' Service Orders.  |
| C         | Meter Reconfiguration | 'Meter Reconfiguration' Service Order. This includes off-peak (Controlled Load) timing changes. This does not apply to the removal of the meter.   |
| G         | Re-energisation       | 'Re-energisation' Service Order.   |
| D         | De-energisation       | 'De-energisation', including 'De-energisation for Non-payment' Service Order.  |
| E         | Estimate              | For all Estimates.   |
| N         | Normal Read           | Scheduled collection of metering data. Also includes the associated Substitutions.   |
| O         | Other                 | Include 'Meter Investigation' & 'Miscellaneous' Service Orders. This value is used when providing Historical Data and where the <u>TransCode</u> information is unavailable.   |
| S         | Special Read          | 'Special Read' Service Order.  |
| R         | Removal of meter      | This is used for meter removal or supply abolishment where the meter has been removed and will not be replaced. This excludes situations involving a meter changeover or where a meter is added to an existing configuration (these are considered to be alterations). |

## APPENDIX B. FORMAT & UNIT OF MEASURE FIELD DETAILS

### Format of differing types of data

The following table specifies the format and maximum number of characters that apply to the data shown in the IntervalValue (300 record) and Quantity (250 record) fields.

Other data types do not have specific defined format.

| UOM Type                        | Format  | CHARACTER LENGTH |
|---------------------------------|---------|------------------|
| M... mega (Million)             | Numeric | 15.7             |
| k... kilo (Thousand)            | Numeric | 15.4             |
| pf Power Factor                 | Numeric | 15.3             |
| Wh, VARh, VAh, VAr, VA, V, A, W | Numeric | 15.1             |

### Allowed Values in the UOM field

The allowed values for UOM are not case sensitive.

| Allowed Values | Description                                  |
|----------------|--|
| MWh            | megawatt hour                                |
| kWh            | kilowatt hour                                |
| Wh             | watt hour                                    |
| MVARh          | megavolt ampere reactive hour (megavar hour) |
| kVARh          | kilovolt ampere reactive hour                |
| VARh           | volt ampere reactive hour                    |
| MVAR           | megavolt ampere reactive                     |
| kVAR           | kilovolt ampere reactive                     |
| VAR            | volt ampere reactive                         |
| MW             | megawatt                                     |
| kW             | kilowatt                                     |
| W              | watt   |
| MVAh           | megavolt ampere hour                         |
| kVAh           | kilovolt ampere hour                         |
| VAh            | volt ampere hour                             |
| MVA            | megavolt ampere                              |
| kVA            | kilovolt ampere                              |
| VA             | volt ampere                                  |
| kV             | kilovolt                                     |
| V              | volt   |
| kA             | kiloampere                                   |
| A              | ampere                                       |
| pf             | Power Factor                                 |

## APPENDIX C. QUALITY FLAGS

| Quality Flag | Meaning of Quality Flag   | Relationship with other fields   |
|--------------|---|--|
| A            | Actual Metering Data.<br>As defined in Metrology Procedure Part B   | No method flag is required if this quality flag is used.<br>A reason code is mandatory and must be provided for all Intervals where the meter has recorded a power outage (reason code 79), time reset (reason code 89), or tamper (reason code 61) if this quality flag is used.  |
| E            | Forward estimated data.<br>As defined in Metrology Procedure Part B   | A method flag is mandatory if this quality flag is used.<br>No reason code applies if this quality flag is used.   |
| F            | Final substituted data.<br>As defined in Metrology Procedure Part B   | A method flag is mandatory if this quality flag is used.<br>A reason code is mandatory if this quality flag is used.   |
| N            | Null data.<br>As defined in Metrology Procedure Part B  | This value is not permitted in NEM13 files.<br>The Interval values must be set to "0" if this quality flag is used.<br>No method flag applies if this quality flag is used.<br>No reason code applies if this quality flag is used.  |
| S            | Substituted data.<br>As defined in Metrology Procedure Part B   | A method flag is mandatory if this quality flag is used.<br>A reason code is mandatory if this quality flag is used.   |
| V            | Variable data.<br>This is not a formal quality flag held against individual data items.<br>This value may only be used as part of the <i>QualityMethod</i> field in the 300 record. | This value is not permitted in NEM13 files.<br>No method flag applies if this quality flag is used.<br>No reason code applies if this quality flag is used.<br>Variable data.<br>This is not a formal quality flag held against individual data items.<br>This value may only be used as part of the <i>QualityMethod</i> field in the 300 record. |

## **APPENDIX D. METHOD FLAGS**

Refer to Metrology Procedure: Part B. Method flags are the numeric values that relate directly to the numeric values in substitution types, as defined in table “2.6 Summary Table of Substitution and Estimation types” of Metrology Procedure Part B. For example method flag 17 equal to substitution type 17.



## APPENDIX E. REASON CODES

| Reason Code | Reason Code Description     | Detailed Description  |
|-------------|-----------------------------|---|
| 0           | Free text description       | For use in the case that other reason code descriptions cannot be reasonably utilised.  |
| 1           | Meter/equipment changed     | Where <i>metering installation</i> has changed.   |
| 2           | Extreme weather conditions  | Extreme weather conditions have prevented <i>metering data</i> collection.  |
| 3           | Quarantined premises        | Site under quarantine preventing access to <i>metering installation</i> .   |
| 4           | Dangerous dog               | Dog has been identified as posing an immediate hazard to <i>metering installation</i> access.   |
| 5           | Blank screen                | Electronic <i>meter</i> has blank display, could be powered off or faulty display but unable to determine.  |
| 6           | De-energised premises       | Blank screen on an electronic <i>meter</i> where the meter reader can determine that the Site is de-energised or an Interval Metered Site where the MDP is providing <i>substituted metering data</i> for a Site that is de-energised but Datastreams are left active.                |
| 7           | Unable to locate meter      | The Site was found, but unable to locate the <i>metering installation</i> .   |
| 8           | Vacant premises             | Meter reader believes the Site is vacant.   |
| 9           | Under investigation         | An issue with the <i>metering installation</i> has been identified and is under investigation.  |
| 10          | Lock damaged unable to open | Unable to open lock due to damage and the lock is preventing access to the <i>metering installation</i> .   |
| 11          | In wrong route              | Unable to obtain reading due to the <i>metering installation</i> being in the wrong route.  |
| 12          | Locked premises             | Unable to obtain access to <i>metering installation</i> due to Site being locked.   |
| 13          | Locked gate                 | Locked gate at Site is preventing access to <i>metering installation</i> .  |
| 14          | Locked meter box            | Locked <i>meter</i> box is preventing access to <i>metering installation</i> .  |
| 15          | Overgrown vegetation        | Overgrown vegetation at Site is preventing access to <i>metering installation</i> .   |
| 16          | Noxious weeds               | Noxious weeds at Site are preventing access to <i>metering installation</i> .   |
| 17          | Unsafe equipment/location   | The equipment or the location of the <i>metering installation</i> has been identified as unsafe (other than meter being high).  |
| 18          | Read less than previous     | Current Meter Reading obtained is less than previous Meter Reading, no evidence of tampering and no reverse <i>energy</i> observed.   |
| 20          | Damaged equipment/panel     | The equipment or the panel of the <i>metering installation</i> has been damaged but has not been identified as unsafe.  |
| 21          | Main switch off             | Blank screen on an electronic <i>meter</i> where the meter reader can determine that the main switch has been turned off or Interval Metered Site where the MDP is providing <i>substituted metering data</i> for a Site that the main switch is off but Datastreams are left active. |

| Reason Code | Reason Code Description                     | Detailed Description   |
|-------------|---|--|
| 22          | Meter/equipment seals missing               | One or more seals are missing from the <i>metering installation</i> , no tampering has been identified.  |
| 23          | Reader error                                | MDP identified that Meter Reading provided by the meter reader was incorrect.  |
| 24          | Substituted/replaced data (data correction) | Interval Meter Reading – MDP replaced erroneous data for specific Intervals.   |
| 25          | Unable to locate premises                   | Unable to locate Site.   |
| 26          | Negative consumption (generation)           | Accumulation Meter where the previous Meter Reading is higher than the current Meter Reading, generally Site will have <i>generation</i> .                                     |
| 27          | RoLR  | To be used when transferring End User as a result of a RoLR Event.   |
| 28          | CT/VT fault                                 | MDP has corrected data due to a known instrument transformer (CT/VT) fault.  |
| 29          | Relay faulty/damaged                        | Meter reader has identified the relay device within the <i>metering installation</i> is faulty.  |
| 31          | Not all meters read                         | Readings for all <i>meters</i> linked to the Site have not been received by the MDP (typically as a result of a non-Scheduled Meter Reading).                                  |
| 32          | Re-energised without readings               | Unable to obtain Meter Readings due to exceptional circumstances when the Site is re-energised outside of standard practice.   |
| 33          | De-energised without readings               | Unable to obtain Meter Readings at the time of de-energisation including <i>disconnection</i> for non-payment.   |
| 34          | Meter not in handheld                       | Unexpected <i>meter</i> found on Site (new <i>meter</i> or additional <i>meter</i> ).  |
| 35          | Timeswitch faulty/reset required            | Meter reader has identified the time switching device within the <i>metering installation</i> is faulty and required resetting.  |
| 36          | Meter high/ladder required                  | <i>Meter</i> in a high position requiring a ladder to obtain Meter Reading.  |
| 37          | Meter under churn                           | MDP has Substituted data based on <i>metering data</i> not being received from relevant MDP.   |
| 38          | Unmarried lock                              | Site has two or more locks, one of which is a power industry lock and they have not been interlocked together correctly to allow access to the Site.                           |
| 39          | Reverse energy observed                     | Reverse <i>energy</i> observed where Site isn't expected to have reverse <i>energy</i> .   |
| 40          | Unrestrained livestock                      | Meter reader observed that livestock is roaming free on Site and could potentially be hazardous, or access wasn't obtained due to potential for livestock to escape.           |
| 41          | Faulty Meter display/dials                  | Display or dials on the <i>meter</i> are faulty and Site is not de-energised nor is the display blank on an electronic <i>meter</i> .  |
| 42          | Channel added/removed                       | MDP obtained metering data for a channel that has been added or <i>substituted metering data</i> where a channel has been removed but the Datastream is still active in MSATS. |

| Reason Code | Reason Code Description                     | Detailed Description  |
|-------------|---|---|
| 43          | Power outage                                | Interval Meter – <i>Metering data</i> for Intervals have been Substituted due to power not being available at the <i>metering installation</i> .  |
| 44          | Meter testing                               | MDP identifies <i>meter</i> has been under testing regime and has provided <i>substituted metering data</i> to reflect <i>energy</i> consumption during testing period.   |
| 45          | Readings failed to validate                 | Meter Readings have been loaded into MDP's system, but have failed Validation and have been Substituted.  |
| 47          | Refused access                              | The End User refused to provide access when requested.  |
| 48          | Dog on premises                             | Meter reader has identified that there is a dog on the Site but has been unable to determine if the dog is dangerous.   |
| 51          | Installation demolished                     | <i>Metering installation</i> no longer exists at the Site.  |
| 52          | Access – blocked                            | Used when there are items blocking safe access to the <i>meter</i> or Site.   |
| 53          | Pests in meter box                          | Pests have been identified within the <i>meter</i> box that poses a risk to <i>metering data</i> accuracy, safety of the <i>metering installation</i> or a hazard to the meter reader.  |
| 54          | Meter box damaged/faulty                    | Meter reader identifies that the <i>meter</i> box is damaged or faulty and the mechanical protection or weather proofing of the <i>metering installation</i> is compromised as a result.  |
| 55          | Dials obscured                              | Meter reader unable to obtain Meter Reading due to <i>meter</i> dials being obscured, <i>meter</i> face painted over, viewing panel in locked <i>meter</i> box with pvc panel misted over/faded/mouldy etc. No evidence of tampering. |
| 60          | Illegal connection                          | Meter reader has identified that the Site has been illegally connected.   |
| 61          | Equipment tampered                          | Meter reader identified that the <i>metering installation</i> has been tampered with and the recording of <i>energy</i> consumption may have been affected as a result.   |
| 62          | NSRD window expired                         | Where the NSRD window has expired and the meter reader has been unable to deliver Actual Meter Readings.  |
| 64          | Key required                                | Meter reader typically has access to the key but was unable to obtain/locate the key at the time of Meter Reading.  |
| 65          | Wrong key provided                          | Meter reader has been provided with a key but the key no longer opens the lock.   |
| 68          | Zero consumption                            | Where a Site has known zero consumption and the Site is not de-energised in MSATS but no <i>energy</i> is flowing to the <i>meter</i> .   |
| 69          | Reading exceeds Substitute                  | Re-Substituted data that has been modified to improve the smoothing of <i>energy</i> to align with the next Actual Meter Reading.   |
| 71          | Probe read error                            | Data collector unable to collect the metering data due to the meter probe being unable to extract the <i>metering data</i> .  |
| 72          | Re-calculated based on Actual Metering Data | MDP received Actual Meter Readings and prior Substitutes have been amended.   |

| Reason Code | Reason Code Description | Detailed Description   |
|-------------|-------------------------|--|
| 73          | Low consumption         | Meter Reading failed Validation as being too low based on Historical Data and has been either left as an actual or replaced by a Substitute.   |
| 74          | High consumption        | Meter Reading failed Validation as being too high based on Historical Data and has been either left as an actual or replaced by a Substitute.  |
| 75          | Customer read           | Meter Reading provided to the MDP by the End User. (Only applicable in Jurisdictions where End User Meter Readings are allowed).   |
| 76          | Communications fault    | Meter reader attempted to read the <i>meter</i> but was unable due to not being able to remotely communicate with the <i>meter</i> .   |
| 77          | Estimation Forecast     | Optional reason code that can be applied to Estimations.   |
| 78          | Null Data               | For Interval Meters where no <i>metering data</i> was received and Substitutes created to cover this period.   |
| 79          | Power Outage Alarm      | For Interval Meters where a power outage has been detected by the <i>meter</i> .   |
| 80          | Short Interval Alarm    | For Interval Meters where the time in the <i>meter</i> is slow and has now been corrected, resulting in the <i>interval metering data</i> not being a full 15 or 30 minutes in length. |
| 81          | Long Interval Alarm     | For Interval Meters where the time in the <i>meter</i> is fast and has now been corrected, resulting in the <i>interval metering data</i> exceeding a full 15 or 30 minutes in length. |
| 87          | Reset occurred          | Resetting of the <i>meter</i> due to re-programming, change of configuration or firmware upgrade etc.  |
| 89          | Time reset occurred     | Where a time reset has occurred within the <i>metering installation</i> .  |

## APPENDIX F. OBSOLETE REASON CODES (ONLY TO BE USED WHEN PROVIDING HISTORICAL DATA)

| Reason Code | Reason Code Description              |
|-------------|--------------------------------------|
| 19          | Consumer wanted                      |
| 30          | Meter stop switch on                 |
| 46          | Extreme weather/hot                  |
| 49          | Wet paint                            |
| 50          | Wrong tariff                         |
| 58          | Meter ok – supply failure            |
| 70          | Probe reports tampering              |
| 82          | CRC error                            |
| 83          | RAM checksum error                   |
| 84          | ROM checksum error                   |
| 85          | Data missing alarm                   |
| 86          | Clock error alarm                    |
| 88          | Watchdog timeout alarm               |
| 90          | Test mode                            |
| 91          | Load control                         |
| 92          | Added interval (data correction)     |
| 93          | Replaced interval (data correction)  |
| 94          | Estimated interval (data correction) |
| 95          | Pulse overflow alarm                 |
| 96          | Data out of limits                   |
| 97          | Excluded data                        |
| 98          | Parity error                         |
| 99          | Energy type (register changed)       |

## APPENDIX G. SUMMARY OF FILE FORMAT AND BLOCKING

### NEM12 File Format

| Record | Fields  | Blocking |
|--------|---|----------|
| 100    | RecordIndicator<br>VersionHeader<br>DateTime<br>FromParticipant<br>ToParticipant  | ←        |
| 200    | RecordIndicator<br>NMI<br>NMIConfiguration<br>RegisterID<br>NMISuffix<br>MDMDataStreamIdentifier<br>MeterSerialNumber<br>UOM<br>IntervalLength<br>NextScheduledReadDate                 |          |
| 300    | RecordIndicator<br>IntervalDate<br>IntervalValue1<br>IntervalValue2<br>...<br>IntervalValueN<br>QualityMethod<br>ReasonCode<br>ReasonDescription<br>UpdateDateTime<br>MSATSLoadDateTime |          |
| 400    | RecordIndicator<br>StartInterval<br>EndInterval<br>QualityMethod<br>ReasonCode<br>ReasonDescription   |          |
| 500    | RecordIndicator<br>TransCode<br>RetServiceOrder<br>ReadDateTime<br>IndexRead  |          |
| 900    | RecordIndicator   |          |

### NEM13 File Format

| Record | Fields  | Blocking |
|--------|---|----------|
| 100    | RecordIndicator<br>VersionHeader<br>DateTime<br>FromParticipant<br>ToParticipant  | ←        |
| 250    | RecordIndicator<br>NMI<br>NMIConfiguration<br>RegisterID<br>NMISuffix<br>MDMDataStreamIdentifier<br>MeterSerialNumber<br>DirectionIndicator<br>PreviousRegisterRead<br>PreviousRegisterReadDateTime<br>PreviousQualityMethod<br>PreviousReasonCode<br>PreviousReasonDescription<br>CurrentRegisterRead<br>CurrentRegisterReadDateTime<br>CurrentQualityMethod<br>Current ReasonCode<br>Current ReasonDescription<br>Quantity<br>UOM<br>NextScheduledReadDate<br>UpdateDateTime<br>MSATSLoadDateTime |          |
| 550    | RecordIndicator<br>PreviousTransCode<br>PreviousRetServiceOrder<br>CurrentTransCode<br>CurrentRetServiceOrder   |          |
| 900    | RecordIndicator   |          |

**APPENDIX H. EXAMPLE INTERVAL DATA FILE (NEM12)**

**H.1 Interval Metering Data - Metering Installations with Remote Acquisition**

This file contains a single *NMI* (VABD000163) and one *meter*.

The *meter* (METSER123) has two registers that measure:

- Export kWh (E1)
- Export kVArh (Q1)

The kWh data is sent to MSATS on the N1 Datastream suffix.

The 'Quality Method', 'Reason Code' and 'Reason Description' is the same for all Intervals in the *day* so they can be indicated on the 300 record, without any need for 400 records.

**100**,NEM12,200405011135,MDA1,Ret1

**200**,VABD000163,E1Q1,1,E1,N1,METSER123,kWh,30,

**300**,20040201,1.1112,A,,,20040202120025,20040202142516

**200**,VABD000163,E1Q1,2,Q1,,METSER123,kVArh,30,

**300**,20040201,2.2221,A,,,20040202120025,

**900**

**H.2 Substituted Interval Metering Data - Metering Installations with Remote Acquisition of Metering Data**

This file contains a single *NMI* (VBCD000022) and one *meter*.

The *meter* (METSER223) has two registers that measure:

- Export kWh (E1)
- Export kVArh (Q1)

The kWh data is sent to MSATS on the N1 Datastream suffix.

The QualityFlag is 'F' because these are *substituted metering data* that will never be replaced by 'A' given the *meter* has been damaged.

The QualityMethod, ReasonCode and ReasonDescription is the same for all Intervals in the *day* so they can be indicated on the 300 record, without any need for 400 records.

**100**,NEM12,200309010132,MDA1,Ret1

**200**,VBCD000022,E1Q1,1,E1,N1,METSER223,kWh,30,

**300**,20030801,2.312,F14,32,,20030802125725,20030804025521

**200**,VBCD000022,E1Q1,2,Q1,,METSER223,kVArh,30,

**300**,20030801,34.567,22.123,





200312200000001,20031221003500

**300**,20031222,17.695,18.972,16.847,20.662,20.694,20.278,17.550,18.275,20.220,21.073,22.586,23.091,22.053,18.649,21.463,21.536,18.642,21.843,22.837,18.894,20.759,18.974,18.714,18.357,16.858,20.079,20.648,19.761,20.035,22.139,20.196,19.199,16.695,20.547,15.331,16.888,17.213,15.653,16.840,16.958,17.133,18.711,17.288,19.315,14.873,18.728,16.901,13.580,E52,,,  
200312200000001,20031221003500

**300**,20031223,17.695,18.972,16.847,20.662,20.694,20.278,17.550,18.275,20.220,21.073,22.586,23.091,22.053,18.649,21.463,21.536,18.642,21.843,22.837,18.894,20.759,18.974,18.714,18.357,16.858,20.079,20.648,19.761,20.035,22.139,20.196,19.199,16.695,20.547,15.331,16.888,17.213,15.653,16.840,16.958,17.133,18.711,17.288,19.315,14.873,18.728,16.901,13.580,E52,,,  
200312200000001,20031221003500

**300**,20031224,17.695,18.972,16.847,20.662,20.694,20.278,17.550,18.275,20.220,21.073,22.586,23.091,22.053,18.649,21.463,21.536,18.642,21.843,22.837,18.894,20.759,18.974,18.714,18.357,16.858,20.079,20.648,19.761,20.035,22.139,20.196,19.199,16.695,20.547,15.331,16.888,17.213,15.653,16.840,16.958,17.133,18.711,17.288,19.315,14.873,18.728,16.901,13.580,E52,,,  
200312200000001,20031221003500

**300**,20031225,17.695,18.972,16.847,20.662,20.694,20.278,17.550,18.275,20.220,21.073,22.586,23.091,22.053,18.649,21.463,21.536,18.642,21.843,22.837,18.894,20.759,18.974,18.714,18.357,16.858,20.079,20.648,19.761,20.035,22.139,20.196,19.199,16.695,20.547,15.331,16.888,17.213,15.653,16.840,16.958,17.133,18.711,17.288,19.315,14.873,18.728,16.901,13.580,E52,,,  
200312200000001,20031221003500

**200**,NNNN123456,E1Q1,002,Q1,,METSER123,kVArh,30,20031225

**300**,20031219,17.461,15.155,15.300,15.321,17.020,18.691,16.538,13.949,13.289,13.694,16.042,15.171,16.654,14.146,15.064,14.781,14.549,19.439,16.321,16.178,15.854,16.860,15.504,15.779,14.767,17.256,19.324,17.850,14.264,19.835,16.563,15.520,20.235,15.911,18.250,17.259,18.752,16.221,18.408,15.992,16.429,14.313,18.305,15.305,18.933,15.293,18.905,18.616,A,,,20031220203500,

**300**,20031220,15.919,15.843,16.357,16.098,18.796,20.468,16.087,13.070,14.247,14.205,18.302,15.664,15.039,14.909,14.564,15.832,14.717,18.474,13.728,16.217,16.401,19.270,15.112,15.407,14.566,18.966,18.927,16.996,16.484,16.796,18.751,17.390,19.635,16.498,17.434,20.203,18.581,16.188,18.056,17.229,16.914,15.165,19.389,15.905,19.451,14.848,18.240,17.117,V,,,20031220203500,

**400**,1,31,A,,

**400**,32,48,E52,,

**500**,N,,20031220154500,

**300**,20031221,15.919,15.843,16.357,16.098,18.796,20.468,16.087,13.070,14.247,14.205,18.302,15.664,15.039,14.909,14.564,15.832,14.717,18.474,13.728,16.217,16.401,19.270,15.112,15.407,14.566,18.966,18.927,16.996,16.484,16.796,18.751,17.390,19.635,16.498,17.434,20.203,18.581,16.188,18.056,17.229,16.914,15.165,19.389,15.905,19.451,14.848,18.240,17.117,E52,,,200312200000001,

**300**,20031222,15.919,15.843,16.357,16.098,18.796,20.468,16.087,13.070,14.247,14.205,18.302,15.664,15.039,14.909,14.564,15.832,14.717,18.474,13.728,16.217,16.401,19.270,15.112,15.407,14.566,18.966,18.927,16.996,16.484,16.796,18.751,17.390,19.635,16.498,17.434,20.203,18.581,16.188,18.056,17.229,16.914,15.165,19.389,15.905,19.451,14.848,18.240,17.117,E52,,, 200312200000001,

**300**,20031223,15.919,15.843,16.357,16.098,18.796,20.468,16.087,13.070,14.247,14.205,18.302,15.664,15.039,14.909,14.564,15.832,14.717,18.474,13.728,16.217,16.401,19.270,15.112,15.407,14.566,18.966,18.927,16.996,16.484,16.796,18.751,17.390,19.635,16.498,17.434,20.203,18.581,16.188,18.056,17.229,16.914,15.165,19.389,15.905,19.451,14.848,18.240,17.117,E52,,, 200312200000001,

**300**,20031224,15.919,15.843,16.357,16.098,18.796,20.468,16.087,13.070,14.247,14.205,18.302,15.664,15.039,14.909,14.564,15.832,14.717,18.474,13.728,16.217,16.401,19.270,15.112,15.407,14.566,18.966,18.927,16.996,16.484,16.796,18.751,17.390,19.635,16.498,17.434,20.203,18.581,16.188,18.056,17.229,16.914,15.165,19.389,15.905,19.451,14.848,18.240,17.117,E52,,, 200312200000001,





- Export kWh (E1)

The kWh data is sent to MSATS on the N1 Datastream suffix.

**100**,NEM12,200404201300,MDA1,Ret1

**200**,CCCC123456,E1,001,E1,N1,METSER123,kWh,30,

**300**,20040417,18.023,19.150,17.592,24.155,18.568,22.304,19.222,19.032,19.090,22.237,24.350,22.274,20.193,16.615,19.575,20.391,16.459,20.527,21.438,19.327,21.424,16.656,17.616,18.416,16.666,19.961,18.120,18.023,18.588,21.759,17.841,19.548,18.486,21.391,15.656,16.634,16.377,14.246,17.451,15.742,18.038,18.470,14.936,17.987,15.751,19.750,16.202,14.733,V,,,20040418203500,20040419003500

**400**,1,20,F14,76,

**400**,21,24,A,,

**400**,25,48,S14,1,

**900**

## H.6 Metering Data for Meter Change with Configuration Change – Manually Read Interval Metering Installation

Historical Data provided for a *Registered Participant* request relating to *NMI* NCDE007777 for a period where a *meter* change occurred at 12:25pm on 10/8/2004. The new *meter* installed had a changed configuration. This example data block relates to Historical Data, hence index reads are not needed.

The old meter (METSER123) has two registers that measure:

- Export Wh (E1)
- Export varh (Q1)

The net Wh data is sent to MSATS on the N1 Datastream suffix.

The new *meter* (METSER456) has two registers that measure:

- Export Wh (E1)
- Import Wh (B1)

The net Wh data is sent to MSATS on the N1 Datastream suffix.

**100**,NEM12,200408121327,MDA1,Ret1

**200**,NCDE007777,E1Q1,1,E1,N1,METSER123,kWh,30,

**300**,20040809,18.023,19.150,17.592,24.155,18.568,22.304,19.222,19.032,19.090,22.237,24.350,22.274,20.193,16.615,19.575,20.391,16.459,20.527,21.438,19.327,21.424,16.656,17.616,18.416,16.666,19.961,18.120,18.023,18.588,21.759,17.841,19.548,18.486,21.391,15.656,16.634,16.377,14.246,17.451,15.742,18.038,18.470,14.936,17.987,15.751,19.750,16.202,14.733,A,,,20040812013500,20040812100035

**200**,NCDE007777,E1Q1,2,Q1,,METSER123,kVArh,30,

**300**,20040809,17.461,15.155,15.300,15.321,17.020,18.691,16.538,13.949,13.289,13.694,16.042,15.171,16.654,14.146,15.064,14.781,14.549,19.439,16.321,16.178,15.854,16.860,15.504,15.779,14.767,17.256,19.324,17.850,14.264,19.835,16.563,15.520,20.235,15.911,18.250,17.259,18.752,16.221,18.408,15.992,16.429,14.313,18.305,15.305,18.933,15.293,18.905,18.616,A,,,20031220203500,

**200**,NCDE007777,E1B1,1,E1,N1,METSER456,kWh,30,20040902

**300**,20040810,18.023,19.150,17.592,24.155,18.568,22.304,19.222,19.032,19.090,22.237,24.350,22.274,20.193,16.615,19.575,20.391,16.459,20.527,21.438,19.327,21.424,16.656,17.616,18.416,16.666,19.961,18.120,18.023,18.588,21.759,17.841,19.548,18.486,21.391,15.656,16.634,16.377,14.246,17.451,15.742,18.038,18.470,14.936,17.987,15.751,19.750,16.202,14.733,V,,,20040812013500,20040811120035







## APPENDIX I. EXAMPLE ACCUMULATION DATA FILE (NEM13)

### I.1 Actual Meter Readings

100,NEM13,200401101030,MDA1,Ret1

250,VABC005890,11,1,11,11,METSER123,E,006342.8,20031005093055,A,,,007654.9,20040107100333,A,,,1312.1,kWh,20040407, 20040108100333,20040108091133

900

### I.2 Normal Meter Reading with Estimate

100,NEM13,200401101030,MDA1,Ret1

250,VDEF005890,1141,1,11,11,MET12345,E,000888,20040108103055,A,,,000999,20040408000000,E64,,,111,kWh,20040408, 20040409000000,20040109103023

550,N,,E,

250,VDEF005890,1141,2,41,41,MET5678,E,0000950,20040108103055,A,,,0010015,20040408000000,E64,,,65,kWh,20040408, 20040409000000,20040109103023

550,N,,E,

900

### I.3 Meter Reading and Meter Change

This example shows a Site with two *meters* (MET12333 and MET2555), one of which was replaced after being destroyed (MET12333).

The *meter* that was not destroyed has a demand register with a multiplier (ie. current read has no relationship to previous Meter Reading within the 250 record). Note that the RegisterID on the new *meter* (MET5678) does not match that of the *meter* it replaced.

100,NEM13,200309211030,MDA1,Ret1

250,NABC001492,7111,A1,11,11,MET12333,E,000777,20030820103030,A,,,001000,20030920000001,F64,28,,233,kWh,, 20030921000001,20030922093738

550,N,,A,

250,NABC001492,7111,A2,71,71,MET2555,E,000545,20030820103030,A,,,000877,20030920145427,A,,,8.77,kW,20031108, 20030921145427,20030922093738

550,N,,A,

250,NABC001492,7111,A2,71,71,MET2555,E,000877,20030920145427,A,,,000745,20031108000000,E64,,,7.45,kW,20031108, 20031109090500,20030922093738

550,A,,E,

250,NABC001492,7111,A3,11,11,MET5678,E,000000,20030920000001,A,,,000450,20031108000000,E64,,,450,kWh,20031108, 20031109090000,20030922093738

550,A,,E,

900

### I.4 Historical Data values

The first 250 record shows that Historical Data is being provided and the previous Meter Reading is known to have occurred on a date that was not part of the normal scheduled reading cycle, but the MDP



system does not know the actual TransCode to apply. In this case, the 550 record will indicate the Meter Reading is not a normal Meter Reading (ie. on the scheduled cycle) by the use of the 'O' TransCode.

The second 250 record shows that Historical Data is being provided and the previous Meter Reading was tagged by the MDP system at the time with a TransCode of 'T', even though this TransCode is obsolete it can still be provided for Historical Data.

**100**,NEM13,200401101030,MDA1,Ret1

**250**,NABC001492,11,A1,11,11,MET12333,E,000555,20030420153330,A,,,000777,20030620103030,A,,,222,kWh,20040315,20030621103030,20030622103030

**550**,O,,N,

**250**,NABC004444,11,2,11,11,MET5678,E,000000,20030920000000,A,,,000250,20031122145040,A,,,250,kWh,20040315,20031123145040,20031124132017

**550**,T,,N,

**900**

## 1.5 Transfer read

This example shows an "opening read" for a Site with single *meter* with two registers that was re-energised as a result of a Service Order from the *retailer*. This transaction is an example of what the new *retailer* will receive when they become the Current FRMP.

### Data provided to new retailer.

**100**,NEM13,200309011030,MDA1,Ret1

250,NABC001492,4111,1,11,11,MET12333,E,000777,20030829103030,A,,,000777,20030829103030,A,,,0,kWh,20031108,20030830100001,20030830113738

550,D,SO987654,G,

**250**,NABC001492,4111,1,11,11,MET12333,E,000777,20030829103030,A,,,001000,200311090000000,E64,,,223,kWh,20031108,20030830100001,20030830113738

**550**,G,SO134567,E,

250,NABC001492,4111,2,41,41,MET12333,E,000545,20030829103030,A,,,000545,20030829103030,A,,,0,kWh,20031108,20030830100001,20030830113738

550,D,SO987654,G,

**250**,NABC001492,4111,2,41,41,MET12333,E,000545,20030829103030,A,,,000877,200311090000000,E64,,,332,kWh,20031108,20030830100001,20030830113738

**550**,G,SO134567,E,

**900**

### **Data provided to old retailer.**

The old *retailer* would initially be provided with a forecast to the NSRD, given the transfer will not have completed at the time the re-energisation Meter Reading is sent. Note that the Service Order number being provided to the old *retailer* is the old *retailer's* number when it requested the de-energisation of the *NMI*. The re-energisation Service Order number is not sent to the old *retailer* as it is not the originator of the Service Order.

**100**,NEM13,200308311030,MDA1,Ret0

**250**,NABC001492,4111,1,11,11,MET12333,E,000677,20030720153445,A,,,000777,20030829103030,A,,,100,kWh,20031108,20030830100001,20030830113738

**550**,D,SO987654,G,

**250**,NABC001492,4111,1,11,11,MET12333,E,000777,20030829103030,A,,,001000,20031109000000,  
E64,,,223,kWh,20031108,20030830100001,20030830113738

**550**,G,,E,

**250**,NABC001492,4111,2,41,41,MET12333,E,000455,20030720153445,A,,,000545,20030829103030,  
A,,,90,kWh,20031108,20030830100001,20030830113738

**550**,D,SO987654,G,

**250**,NABC001492,4111,2,41,41,MET12333,E,000545,20030829103030,A,,,000877,20031109000000,  
E64,,,332,kWh,20031108,20030830100001,20030830113738

**550**,G,,E,

**900**

## APPENDIX J. EXAMPLE OF USE OF THE REGISTER READ FIELDS

The tables below show examples of how the 'Current' and 'Previous Register Read' fields are populated for an Accumulation Metered site. The scenario also includes a transfer of the Site to a new *retailer* on Date 3.

There are 4 steps to the scenario:

**Step 1:** The initial Meter Reading for the Site, with an Actual Meter Reading ( $A_1$ ) and Estimate ( $E_1$ ) associated with the Meter Reading on Date 1.

**Step 2:** Provision of Actual Meter Readings ( $A_1, A_2$ ) for the first period (Date 1-2) and the new Estimate readings ( $E_2$ ) for the next Meter Reading period (Date 2-3).

**Step 3:** A Substitute ( $S_2$ ) is provided for the Meter Reading on Date 2, (e.g. Meter Reading error). A new Actual Meter Reading ( $A_3$ ) is provided relating to Date 3 as well as Estimates ( $E_3$ ) for the next period (Date 3-4).

The Date 3 Meter Reading is also used to facilitate transfer to the new *retailer*.

**Step 4:** The 'Substitute' ( $F_1$ ) for Date 2 is changed to a 'Final'. The old *retailer* may receive this as Meter Readings ( $A_1, F_1$ ) relating to the first period (Date 1-2) or ( $F_1, A_3$ ) for the second period (Date 2-3).

|        | Date 1<br>Reading 1 | Date 2<br>Reading 2 | Date 3<br>Reading 3 | Date 4<br>Reading 4 |
|--------|---------------------|---------------------|---------------------|---------------------|
| Step 1 | $A_1$               | $E_1$               |                     |                     |
| Step 2 | $A_1$               | $A_2$               | $E_2$               |                     |
| Step 3 | $A_1$               | $S_2$               | $A_3$               | $E_3$               |
| Step 4 | $A_1$               | $F_1$               | $A_3$               | $E_3$               |

|        | Previous Register Read |         | Current Register Read |         | Files to Retailer 1 or 2 |
|--------|------------------------|---------|-----------------------|---------|--------------------------|
|        | Date                   | Reading | Date                  | Reading |                          |
| Step 1 | Date 1                 | $A_1$   | Date 2                | $E_1$   | 1                        |
| Step 2 | Date 1                 | $A_1$   | Date 2                | $A_2$   | 1                        |
|        | Date 2                 | $A_2$   | Date 3                | $E_2$   | 1                        |
| Step 3 | Date 2                 | $A_1$   | Date 2                | $S_2$   | 1                        |
|        | Date 2                 | $S_2$   | Date 3                | $A_3$   | 1                        |
| Step 4 | Date 3                 | $A_3$   | Date 4                | $E_3$   | 2                        |
|        | Date 2                 | $F_1$   | Date 3                | $A_3$   | 1                        |
|        | OR                     |         | OR                    |         |                          |
|        | Date 1                 | $A_1$   | Date 2                | $F_1$   | 1                        |