PROCEDURE

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Market Manual 3: Metering

Part 3.2: Meter Point Registration and Maintenance

Issue 30.0

This document describes the procedures for registering *meter points* and changes to *metering installations* in the *IESO* marketplace.

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This *market manual* may contain a summary of a particular *market rule*. Where provided, the summary has been used because of the length of the *market rule* itself. The reader should be aware; however, that where a *market rule* is applicable, the obligation that needs to be met is as stated in the *market rules*. To the extent of any discrepancy or inconsistency between the provisions of a particular *market rule* and the summary, the provision of the *market rule* shall govern.

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Related Documents

Document ID	Document Title
MDP_PRO_0007	Market Manual 3: Metering, Part 3.1: Metering Service Provider (MSP) Registration, Revocation, and De-registration
PRO-408	Market Manual 1: Connecting to Ontario's Power System, Part 1.5: Market Registration Procedures
MDP_PRO_0017	Market Manual 2: Market Administration, Part 2.1 Dispute Resolution
MDP_STD_0004	Wholesale Revenue Metering Standard - Hardware

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Reference	Description of Change
Appendix B – Table B-3	Updated to include additional specific examples of which commissioning activities apply to various common field work.
Appendix C – Table C-1	Updated to lower injected load secondary current requirement for Engineering Unit Report.

Market Manuals

The *market manuals* consolidate market procedures and associated forms, standards, and policies that define certain elements relating to the operation of the *IESO-administered markets*. Market procedures provide more detailed descriptions of the requirements for various activities than is specified in the *market rules*. Where there is a discrepancy between the requirements in a document within a *market manual* and the *market rules*, the *market rules* must prevail. Standards and policies appended to, or referenced in, these procedures provide a supporting framework.

Market Procedures

The "Metering Manual*"* is Volume 3 of the *market manual*, and this document is "Part 3.2: Meter Point Registration and Maintenance".

A list of the other component parts of the "Metering Manual" is provided in "Part 3.0: Metering Overview", in Section 2, "About This Manual".

Structure of Market Procedures

Each market procedure is composed of the following sections:

1. ***"Introduction"***, which contains general information about the procedure, including an overview, a description of the purpose and scope of the procedure, and information about roles and responsibilities of the parties involved in the procedure.
2. ***"Procedural Work Flow"***, which contains a graphical representation of the steps and flow of information within the procedure.
3. ***"Procedural Steps"***, which contains a table that describes each step and provides other detail related to each step.
4. ***"Appendices"***, which may include such items as forms, standards, policies, and agreements.

Conventions

The *market manual* standard conventions are as defined in the "Market Manual Overview" document.

– End of Section –

1. Introduction

1.1 Purpose

This procedure describes the process of *meter point* registration, which is one part of the registration process for a *metering installation* in the *IESO-administered markets*. This procedure also describes the registration of changes that can occur to a *metering installation*.

1.2 Scope

This procedure covers the steps for *meter point* registration and changes to registration for a *metering installation*, but other procedures in "Market Manual 3" may need to be performed before, after, or in parallel with steps in this procedure, namely:

1. "Part 3.8: Creating and Maintaining Delivery Point Relationships" describes how the *IESO* creates *delivery points* for both *energy market* and *transmission tariff* customers. *Delivery points* must be set up by the *IESO* before *meter point* registration can begin. Additional details regarding the creation of *delivery points* for the *energy market* are given in *IESO's* "Market Manual 1: Connecting to Ontario's Power System, Part 1.5 Market Registration Procedures".
2. "Part 3.7: Totalization Table Registration", where totalization tables associated with a *delivery point* are registered with the *IESO* in order to allow *settlement* for the *energy market* and/or calculation of *transmission tariffs.*

Links to these two procedures appear, where relevant, in the workflow diagrams of this procedure.

1.3 Overview

The *market rules* require *market participants* to register their *metering installations* with the *IESO* in order to participate in the *energy market*. The process of registering a *meter point* can occur in parallel with other registration procedures, as described in Section 1.2. The process of *meter point* registration results in a *meter point* ID being assigned to the *metering installation*.

The *IESO* can refuse registration of *meter points* that it deems unsuitable for registration.

Table 1-1, below, describes which sub-procedures to follow for specific tasks. The sub-procedures are illustrated in the procedural workflows (PWF) presented in Section 2, and explained in more detail in Section 3.

Table 1-1: Which Sub-Procedure Should You Do?

To do this task….	Perform this Sub-Procedure…	Described in this Section and Work Flow…
Register a *meter point*.	Registration of a *meter point*	2.1 / B
Register a change due to an *emergency* or malfunction impacting *metering data* (new *meter*, new *instrument transformer* ratios, new channel destinations)	Registration of changes to MDAS Master File that affect *metering data*	2.2 / C
Change the *metering service provider* responsible for a *metering installation*.	Change of *metering service provider* for a *meter point* ID	2.5 / F
Permanently *disconnect* a *metering installation* at a specific *meter point* or de-register a *facility*.	De-registration of one or more *meter point* IDs	2.6 / G

1.4 Task Highlights

This section describes important tasks performed in some, or all, of the sub-procedures covered by this document. See Sections 2 and 3 of this document for a more detailed description of the tasks.

1.4.1 Preparing and Submitting the Single Line Diagram (SLD)

To document the location of the components of the *metering installation* in relation to the electrical transmission/distribution network, the *metering service provider* submits to the *IESO* a Single Line Diagram (SLD) of the *metering installation*. This SLD must be prepared in accordance with the provisions of Sections 1.5, 1.6 and Appendix B of "Part 3.6: Conceptual Drawing Review", and submitted in Online IESO (https://online.ieso.ca). If *transmission tariffs* exist at the *delivery point* associated with the *meter point*, the *metering service provider* must make a copy of the SLD and submit it to its *transmitter* for review, before submitting this copy to the *IESO*.

The *IESO* reviews the SLD that will become part of the official *meter point* documentation. The *IESO* must be satisfied with the SLD in order for registration to proceed.

1.4.2 Declaration of Metering Installation Compliance

Following the *IESO's* successful review of the SLD submitted, the *metering service provider* must assess whether the *metering installation* is compliant or not with Chapter 6 of the *market rules* and the standards and policies of the *IESO* regarding metering. If the *metering service provider* believes the *metering installation* is compliant, the *metering service provider* must inform the *IESO* accordingly, by sending a signed "Metering Service Provider Declaration of Metering Installation Compliance". Otherwise, the *metering service provider* must perform the Alternative Standard/*Exemption* procedure, as described in the next section.

1.4.3 Alternative Metering Installation Standards and General Exemptions

This sub-process is specific to the registration of *meter point* associated with *metering installations* that do not fully comply with Chapter 6 of the *market rules* and the standards and policies of the *IESO* regarding metering. The process is described in detail in Appendix E.

1.4.4 Preparing and Submitting Site-Specific Loss Adjustments and Measurement Error Correction Factors

The *metering service provider* must have a registered Professional Engineer, recognized as such by the Professional Engineers Ontario, prepare, sign and stamp a Site-Specific Loss Adjustments Register and a Measurement Error Correction Register (collectively, the "Registers") for the *metering installation* submitted for registration. These Registers are then submitted to the *IESO*. *Metering service providers* must refer to "Part 3.4: Measurement Error Correction" and "Part 3.5: Site-Specific Loss Adjustments" for further information about how to perform these calculations and to complete the Registers, as well as to the "Site-Specific Loss Adjustments Standard".

1.4.5 Total Loss Factors (TLF)

Total Loss Factors (TLF) take into account distribution losses up to the *defined meter point*. TLFs, as approved by the *Ontario Energy Board* and communicated by the relevant LDC, must also be submitted by the *metering service provider*, when appropriate.

1.4.6 Emergency Instrument Transformer Restoration Plan (EITRP)

The "Emergency Instrument Transformer Restoration Plan" (EITRP) is a document that describes the actions that the *metering service provider* must take in case of failure of the *instrument transformers* (ITs) and *meters* that are part of a *metering installation*. The EITRP, which is described in Appendix D, must also be submitted by the *metering service provider*, whenever relevant to the specific process.

1.4.7 Statement of Metered Market Participant Identification

During the registration process for a *metering installation*, or at any time after a *metering installation* has been registered, the *metered market participant* must inform the *IESO* that more than one *metering service provider* is being registered for the *metering installation*. When this condition occurs, the *metered market participant* must complete "Assigning a Metering Service Provider to a Meter Point" (IMO-FORM-1390) and send it to the *IESO*. If IMO-FORM-1390 is not completed, the *IESO* deems the assigned *metering service provider* at the *delivery point* to be the *metering service provider* for the *metering installation*.

Note: Only the *metering service provider* assigned to the *delivery point* submits totalization table information to the *IESO*.

1.4.8 Submitting the MDAS Master File(s) to the IESO

As part of the registration process for a *meter point* ID, the *metering service provider* must communicate to the *IESO* specific configuration information for the *meter* at that *meter point* ID.

This information must be submitted in the form of a MDAS Master File. The *metering service provider* must create the file and upload it to Online IESO.

The *IESO* reviews the submitted MDAS Master File for completeness. Where the MDAS Master File submitted by the *metering service provider* is either incomplete or incorrect, the *IESO* notifies the *metering service provider* accordingly and asks for the MDAS Master file to be resubmitted. The registration process will not proceed until a satisfactory MDAS Master File is received by the *IESO*.

In the case of registering a *meter point* ID for which the *metering installation* is currently interrogated by the *IESO*, the *IESO* will also compare the new MDAS Master File with the one currently residing in the MDAS Production module. See Section 1.4.12 for more details.

1.4.9 Commissioning

The *metering service provider* must perform commissioning of the *metering installation* during *meter point* registration. Following successful completion of commissioning, the *metering service provider* must submit a commissioning reporting package to the *IESO*. Refer to Appendix B for the requirements for commissioning a *metering installation*.

1.4.10 Communication Test

The communication test of a *metering installation* is performed during changes to an MDAS Master File that do not affect the *metering data*. This test ensures that the communication channel is still functional, once the change to the MDAS Master File has been implemented.

1.4.11 End-to-End Test

The end-to-end test of a *metering installation* is another mandatory step in registering a *meter point*. The test ensures that the correct MDAS Master File(s) for the *metering installation* is being used by the *IESO*; the *metering installation* can be successfully interrogated; and the *metering data* thus obtained is accurate; and ensures that the *IESO* can synchronize the time clock within the *meter*. A "Confirmation of Engineering Units Report" is produced by the *IESO* and sent to the *metering service provider* for confirmation. The *metering service provider* reviews and approves the relevant report verifying that the information is correct within 2 *business days*. Guidelines for conducting the end-to-end test and Confirmation of Engineering Report of a *metering installation* appear in Appendix C.

1.4.12 The Metering Registration (MR) Hotline

Metering service providers require authorization from the *IESO* on every occasion when they need to perform work that may:

a. Affect the quality of *metering data* from a *metering installation*, or
b. Introduce changes to current *meter point* registration information about these *metering installations*.

The Metering Installation Department of the *IESO* operates the Metering Registration (MR) Hotline as part of the *meter point* registration process. The MR Hotline offers weekday service (normally 7:30 a.m. to 4 p.m.) to *metering service providers* who need to schedule various types of work with the *IESO*, or report *emergency* repairs made in response to a Meter Trouble Report for *metering installations*. Registration requests are submitted in Online IESO (https://online.ieso.ca). The various scopes of work for the MR Hotline are as follows:

- 'New Connections' of *metering installations* to be registered for the market.

- Scheduled maintenance on an existing *metering installation* to replace a *meter* with a similar or identical *meter* that has the same programming configuration ('Scheduled Maintenance - Like for Like').
- Scheduled maintenance on an existing *metering installation* to replace a *meter* with a non-similar or non-identical *meter*, that does not have the same programming configuration, de-register the existing *meter* and re-register the *metering installation* ('Scheduled Maintenance - Critical Change').
- Report *emergency* work already performed on an existing *metering installation* in the past 24 hours, to replace an existing *meter* with a similar or identical *meter* that has the same programming configuration, de-register the defective *meter*, and re-register the *metering installation* ('Emergency - Like for Like').
- Report *emergency* work already performed on an existing *metering installation* in the past 24 hours, to replace a *meter* with a non-similar or non-identical *meter* that does not have the same programming configuration, de-register the existing defective *meter*, and re-register the *metering installation* ('Emergency - Critical Change').
- Changes to a *meter's* MDAS Master File, including de-registration of individual channels of non-compliant *meters* that do not require the re-registration of the *metering installation* ('MIRT Update only').
- Updates to an existing Totalization Table for a *metering installation (*'Totalization Table').

The MR Hotline telephone number is (905) 855-6490 and the FAX number is (905) 855-8688.

1.4.13 Registration of Small or Minor Embedded Generation Facilities

Revenue *metering installations* for small or minor embedded *generation facilities* of less than 2 MVA nameplate rating and injecting less than 17 gigaWatt-hours per annum into the *IESO-controlled grid*, shall comply with the registration processes as detailed in this *market manual* but with the following modifications and clarifications: (i) An Emergency Instrument Transformer Restoration Plan (EITRP) shall not be required. Where this manual requires the submission of an EITRP, it shall not apply. The *IESO* will register the *metering installation* without an EITRP. (ii) Correction factors will be applied on the failure of an*instrument transformer*, according to Appendix D, Section 5 of this *market manual,* provided the *IESO* can continue to communicate with the *meter*. However, *metering service provider* - or *metered market participant*-supplied estimated data will not be used under any circumstances.

- Embedded generation may or may not attract *transmission service* as per the Ontario Energy Board Transmission Rate Schedule. Where the embedded *generation facility* does not attract network, line or transformation connection service charges and does not have transmission *delivery points*, the registration of the *facility* does not need the notification of, or the approval of, the *transmitter*.
- Channels 3 and 4 (received channels) shall be adjusted using a default load factor (LF) of 1.0 unless all the parties agree to a different value. The *metering service provider* shall ensure that the parties are in agreement with the proposed LF prior to submission to the *IESO*. See "Market Manual 3: Metering, Part 3.7: Totalization Table Registration", Appendix D for additional information on *settlement* of *embedded generators*.

1.4.14 Temporary Withdrawal of Electricity without a Registered Wholesale Meter

Subject to Section 2.1.5 of Chapter 6 of the *market rules* the *IESO* may permit a *metered market participant* to connect equipment to the *IESO-controlled grid* without a *registered wholesale meter* under certain conditions. The request shall come from the *metered market participant* when an unforeseeable or unavoidable situation prevents them from registering the *registered wholesale meters* prior to the connection date. This process does not qualify for poor planning or changing a commissioning sequence. The conditions for granting connection without a *registered wholesale meter* include, but are not limited to:

- The temporary withdrawal of electricity from the *IESO-controlled grid* will be strictly for connecting equipment for commissioning purposes and not for load (e.g. soaking a power transformer for the purpose of commissioning);
- The *metered market participant* will submit factory test cards of the power transformer they wish to connect;
- Wholesale *revenue meters* will be in service and registered within 48 hours of connecting; and
- Once connected, if the *metered market participant* cannot fulfill the conditions outlined above (e.g. the *registered wholesale meters* are not registered within 48 hours and/or draws load without *registered wholesale meters*), the *metered market participant* and the *IESO* will refer the matter to the *Market Assessment and Compliance Division*.

The approval for such a request is at the sole discretion of the *IESO*.

1.5 Changes to a Metering Installation

This document also describes processes for changes that can be applied to, or in relation to, a *metering installation* up to, and including, de-registration. The processes associated with such changes are as follows:

- Registration of changes to MDAS Master File that affect *metering data*;
- Registration of changes to MDAS Master File that do not affect *metering data*;
- Registration of changes that do not affect MDAS Master File;
- Change of *metering service provider* for a *meter point* ID; and
- De-registration of one or more *meter points* IDs.

A list of all these processes, together with the associated workflows and triggers, is presented in Table 1-1 in Section 1.3.

1.6 Additional Registration Requirements

1.6.1 Requirements for Alternative Meter Use

Metered market participants who intend to use *IESO*-registered *meters* for purposes in addition to *IESO* transactions must ensure that the selected *meter* has been accepted by the *IESO* for simultaneous communication functions. *Meters* that meet *IESO* requirements for this functionality are identified on the "Conforming Meter List". Only these *meters* can be used by *market participants* for alternative *meter* use in the *IESO-administered markets*.

1.6.2 Requirements for Passwords

Metered market participants must ensure that security controls for passwords in *meters* registered, or being registered, with the *IESO* meet the requirements set out in Chapter 6, Section 9.2 of the *market rules*. However, only the *metering service provider* and the *IESO* shall have the "read plus synchronize time" and "read plus write" passwords. If password requirements are not met, access to *metering data* will be allowed only from the *metering database* and only by the *metered market participant*; *metering service provider*; connected *transmitter* or *distributor*; authorized agents of the *metered market participants*; and the *IESO*.

1.7 Retaining Registration under the Alternative Metering Installation Standard

Metering installations registered under the alternative metering installation standard can remain registered until such time as a substantial upgrade or refurbishment is performed. At this time, the registration expires and the *metering installation* has to be upgraded to be fully compliant with Section 4.1 of Chapter 6 of the *market rules*.

There are some *metering installations* however, where an upgrade to full compliance requires rebuilding of major components of a *facility* or power system and is impractical. Under these circumstances the *metered market participant* may apply to retain registration under Section 4.4.8 of Chapter 6 of the *market rules*. The right to retain registration granted by the *IESO* under these conditions would permit qualifying *metered market participants* to retain registration of certain components of the *metering installation* under the alternative metering installation standard.

Refer to Appendix E for a detailed description, conditions, cases and the application process for retaining registration under the alternative metering installation standard.

1.8 Contact Information

If the *market participant* wishes to contact the *IESO*, the *market participant* can contact the *IESO* Customer Relations via email at customer.relations@ieso.ca or via telephone, mail or courier to the numbers and addresses given on the *IESO's* Web site (www.ieso.ca). If the *IESO* Customer Relations is closed, telephone messages or emails may be left in relevant voice or electronic *IESO* mail boxes, which will be answered as soon as possible by Customer Relations staff.

Standard forms that *market participants* must complete for this procedure are listed in Appendix A. These forms are generally available for downloading on the *IESO* Web site.

Metering installations must be registered via Online IESO (https://online.ieso.ca).

1.9 IT Applications that Support this Procedure

The process of registration of a *metering installation* is supported by a number of applications as described below:

1.9.1 Metering Installation Registration Tool (MIRT)

This tool enables the *metering service provider* to provide the *IESO*, via Online IESO, with an MDAS Master File. *Metering service providers* can create the MDAS Master File in MIRT, or import the Master File into MIRT from MDAS, complete it, and then upload it to Online IESO.

1.9.2 MDAS

MDAS is used during the registration process of a *meter point* ID. MDAS imports the MIRT Master File provided by the *metering service provider.* MDAS performs the end-to-end test during the registration process, by interrogating the *meters* pertaining to the *metering installation* being registered.

MDAS is employed by *IESO* in order to collect daily *metering interval* data that is then transmitted to MDMS. In addition, MDAS will provide the information required to produce communication meter trouble reports.

1.9.3 MDMS and MDM Meter Data Reports

MDMS receives *metering data* collected by MDAS and generates totalization tables. MDM Meter Data Reports is the tool *market participants* can use to view and download market transactions.

1.9.4 CDMS

The Customer Data Management System (CDMS) is designed to meet the business requirements for the following business groups: System Capability, Market Entry and Metering Installation. The CDMS system is used by the three groups for the creation and maintenance of facility technical data:

- Registration of *market participants* and other organization types
- Registration of *facilities* and resources
- Registration of *metering installations*

The CDMS system maintains relationships between *metered market participants* (MMP), *metering service providers* (MSP), *transmitters* and/or *distributors*, and a *delivery point* (resource).

Also, the CDMS system maintains profiles, permissions, privileges and accounts for MSP's, and MMP's. Once created and validated in CDMS, *metering*-relevant information, such as the *delivery point* relationships, is replicated to other *IESO* systems, such as Online IESO, MDMS and MTR system.

1.10 Roles and Responsibilities

The following section describes the roles and responsibilities of the *IESO*, *metering service provider*, and *metered market participants* during the *meter point* registration sub-procedure (Sections 2.1 and 3.1). Some of these responsibilities may not exist for other sub-procedures in this document.

The IESO is responsible for:

- Reviewing the SLD submitted by the *metering service provider*;
- Assigning *meter point* ID(s) and other IDs, as applicable, for the *metering installation*;
- Conducting the end-to-end test and preparing the "Engineering Units Report";
- Sending the Engineering Units Report to the *metering service provider* for verification and approval; and
- Informing the relevant *metered market participant* / *metering service provider* of the successful or unsuccessful registration.

Metering service providers are responsible for:

- Submitting the SLD to the *IESO* for review;
- Submitting a copy of the SLD to the *transmitter* for review where *transmission tariffs* exist at the associated *delivery point*;
- Submitting the *transmitter*-reviewed SLD to the *IESO*;
- Formally notifying the *IESO* that the *metering installation* is compliant, as described above, or, alternately, applying for an *exemption*;
- Submitting Site-Specific Loss Adjustments (SSLA), Measurement Error Correction (MEC) factors, "Emergency Restoration Plan" and, if required, Total Loss Factors (TLF) to the *IESO*. The SSLA Register and the MEC Register must be certified by a registered professional engineer;
- Completing the "Assigning a Metering Service Provider to a Meter Point" (IMO-Form-1390), as applicable;
- Using one of the three methods described in Section 1.9.2 to create the MDAS Master File for the relevant *meter point* ID and submitting the information to the *IESO*;
- Initiating the end-to-end test, by calling the *IESO* and providing the information required, and participating in the completion of the test;
- Performing the commissioning activities and recording the results;
- Approving the *IESO*-completed "Engineering Units Report" for each *meter point* ID upon verifying that the information in the Report is correct and accurate;
- Following the procedure for changes to MDAS Master File that do not affect *metering data* for a *meter point* ID when *metered market participant* or *metering service provider* changes occurred at *delivery point* level; and
- Providing, upon request from its *metered market participant*, any relevant information regarding the *metering installation*; and
- Providing the *transmitter* with the *meter point* documentation on completion of the registration procedure or changes to registration procedure.
-

Metered market participants are responsible for:

- Providing the *Delivery Point* Name and ID to their *metering service provider*, as received from the *IESO* during *facility* registration;
- Ensuring that their contracts relating to each *metering installation* in respect of which it is the *metered market participant* contain such terms and conditions related to the *metering installation* as may be required for compliance with the *market rules*;
- Initiating the procedure of changing a *metering service provider* for a *meter point*; and
- Ensuring a proper transfer of documentation between an outgoing and a newly-appointed *metering service provider* for a *meter point* in respect of which it is the *metered market participant*.

– End of Section –

2. Procedural Work Flow

The following diagrams represent the flow of work and information related to *meter point* registration among the *IESO*, the *metering service provider*, and any other parties.

Table 2–1: Legend for Work Flow Diagrams

Legend	Description
Oval	An event that triggers task or that completes task. Trigger events and completion events are numbered sequentially within procedure (01 to 99)
Task Box	Shows reference number, party responsible for performing task (if "other party"), and task name or brief summary of task. Reference number (e.g., 1A.02) indicates procedure number within this *market manual* (1), sub-procedure identifier (if applicable) (A), and task number (02)
Solid horizontal line	Shows information flow between the *IESO* and external parties
Solid vertical line	Shows linkage between tasks
Broken line	Links trigger events and completion events to preceding or succeeding task

Links labelled MIR-xx represent letters that the *IESO* sends to the participants at various steps.

2.1 Registration of a Meter Point

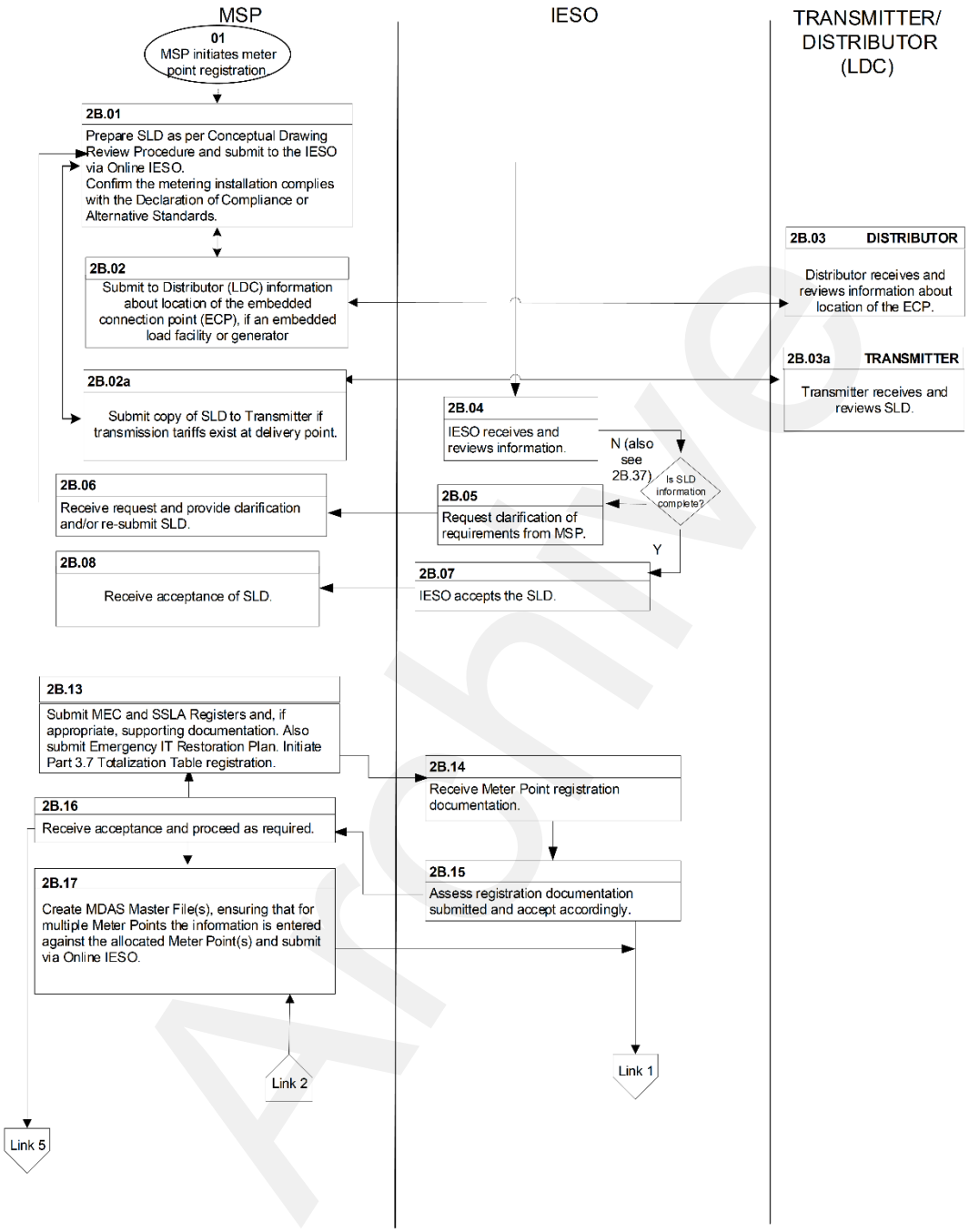

Figure 2–1: Work flow for Registration of a Meter Point

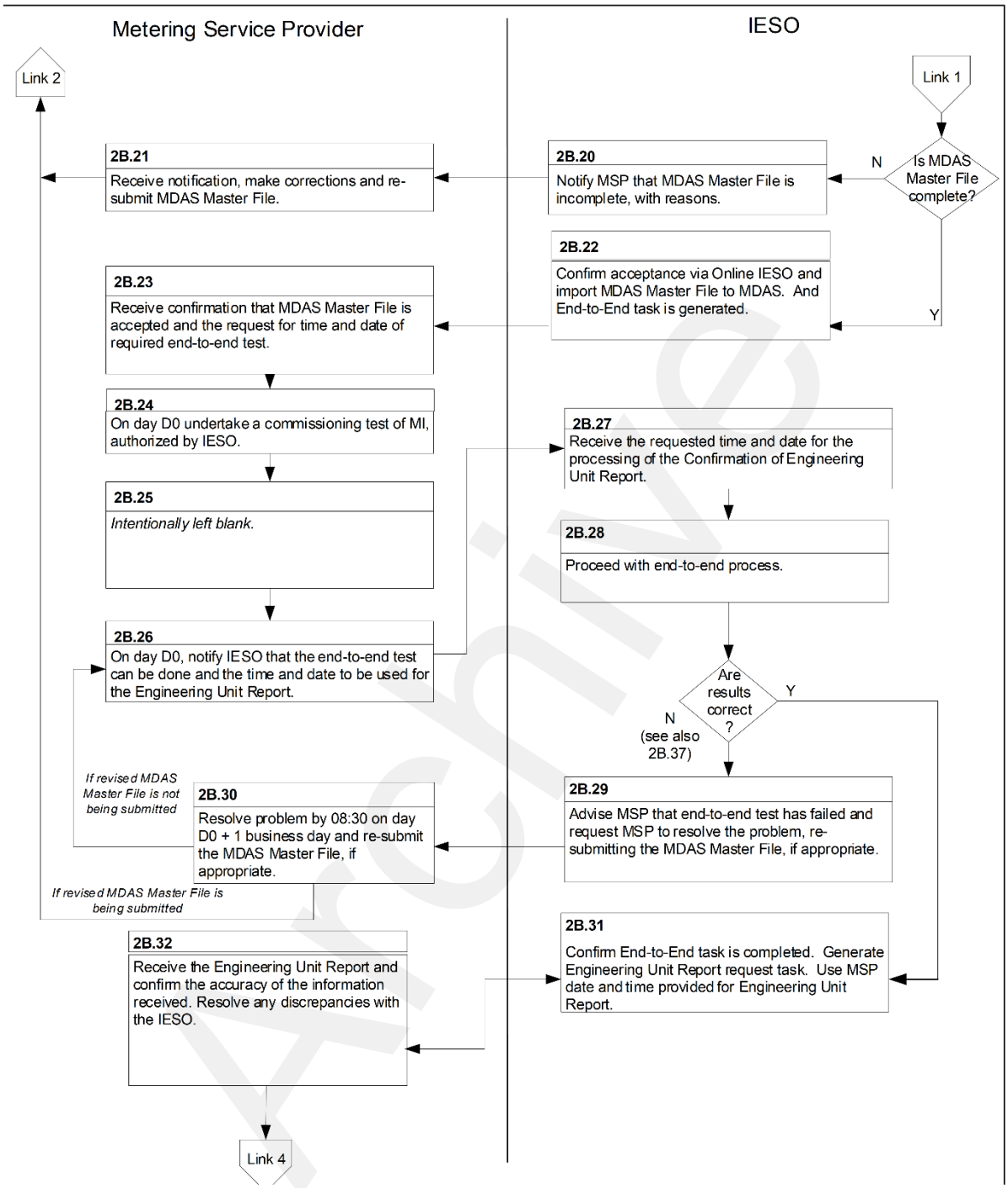

Figure 2-1: Work flow for Registration of a Meter Point (continued)

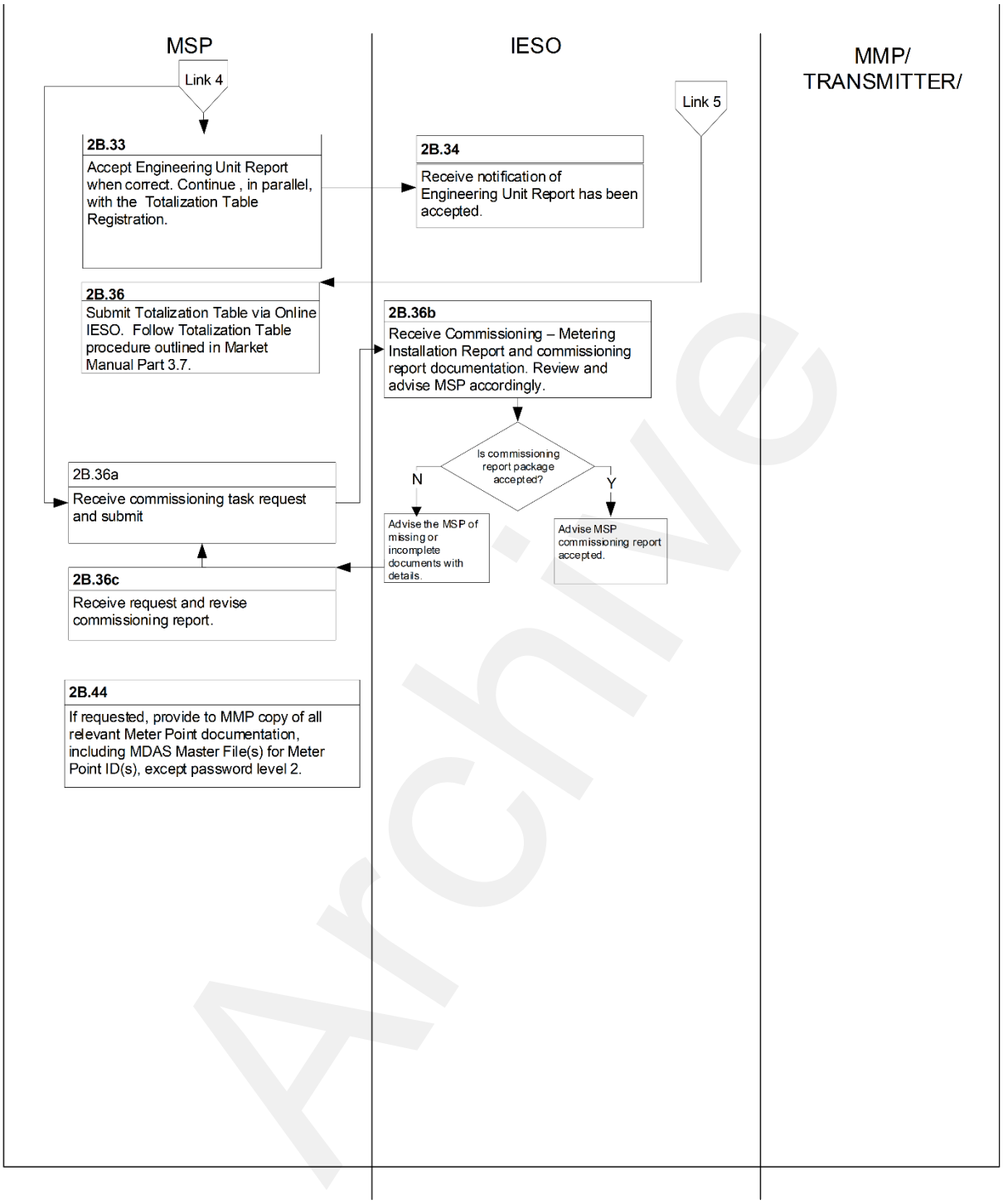

Figure 2-1: Work flow for Registration of a Meter Point (continued)

2.2 Registration of Changes to MDAS Master File

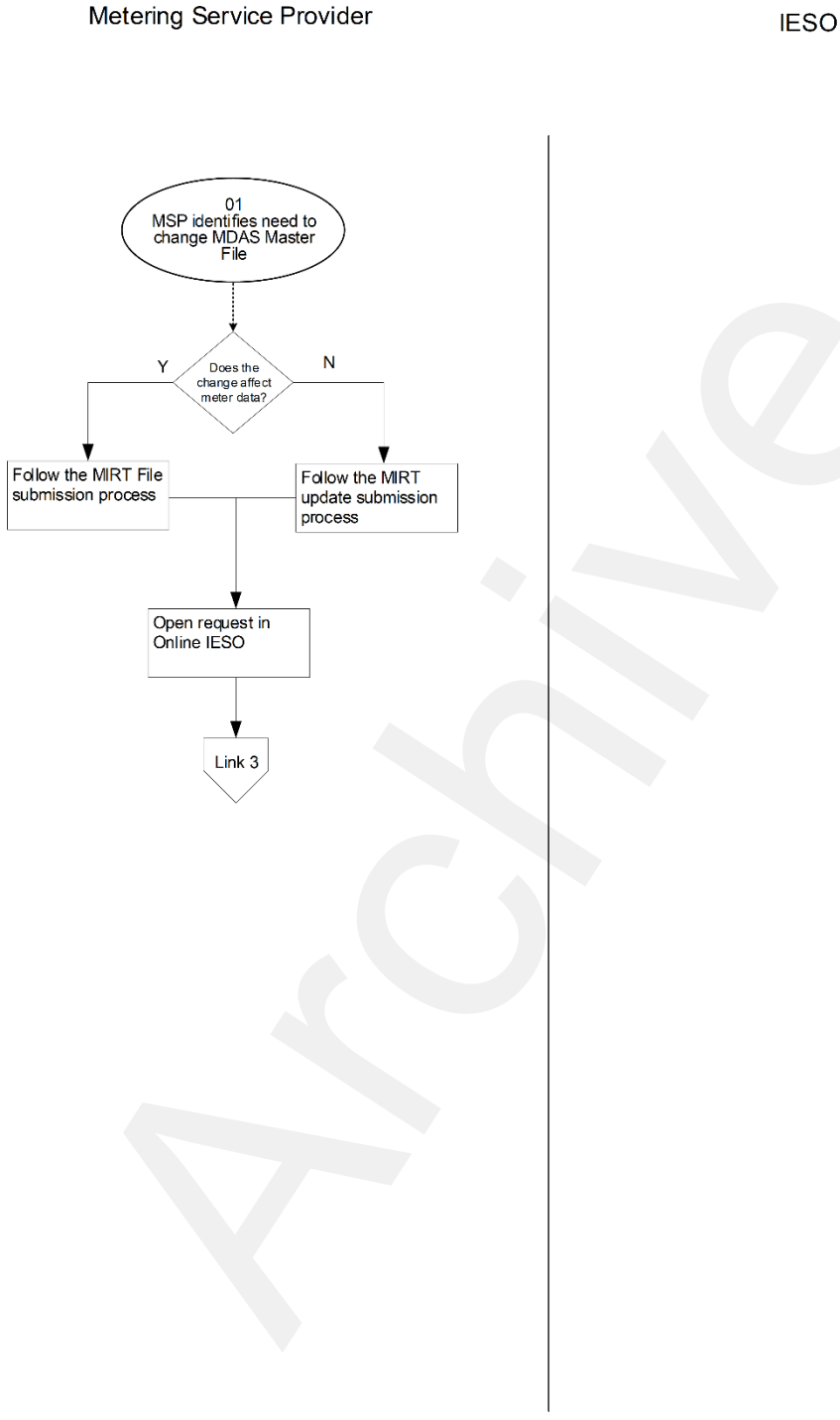

Figure 2–2: Work flow for Registration of Changes to MDAS Master File that Affect Metering Data

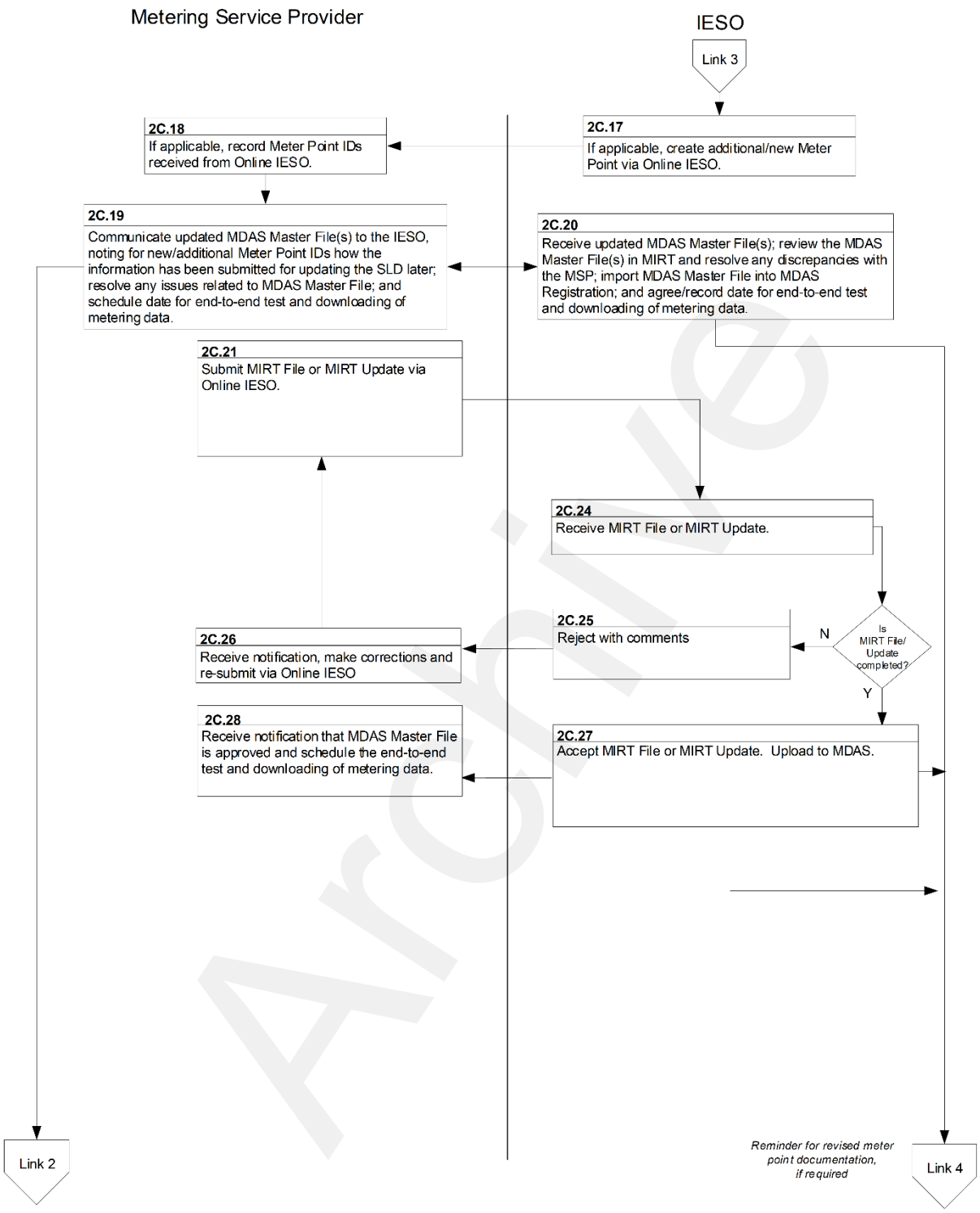

Figure 2–2: Work flow for Registration of Changes to MDAS Master File that Affect Metering Data (continued)

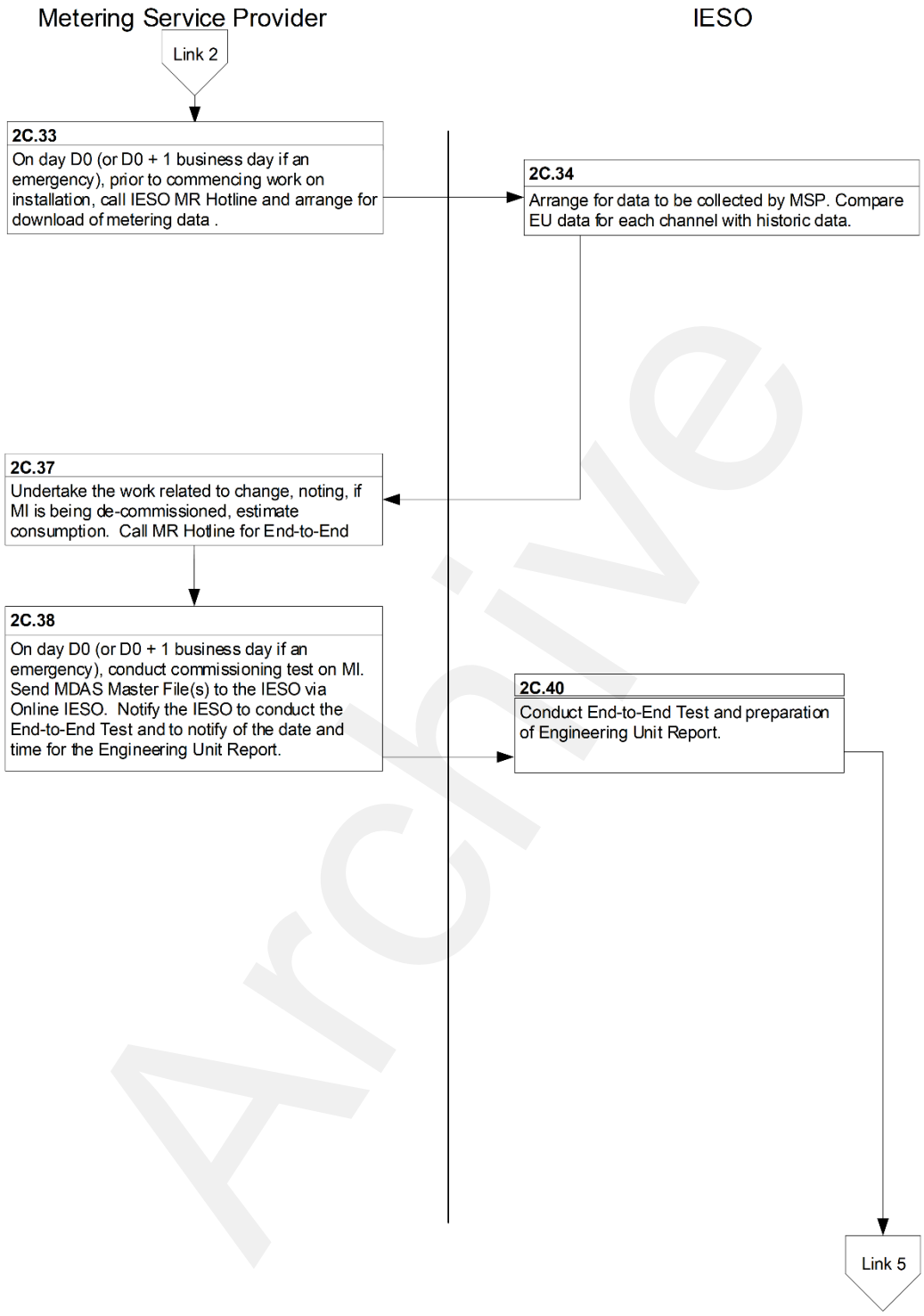

Figure 2–2: Work flow for Registration of Changes to MDAS Master File that Affect Metering Data (continued)

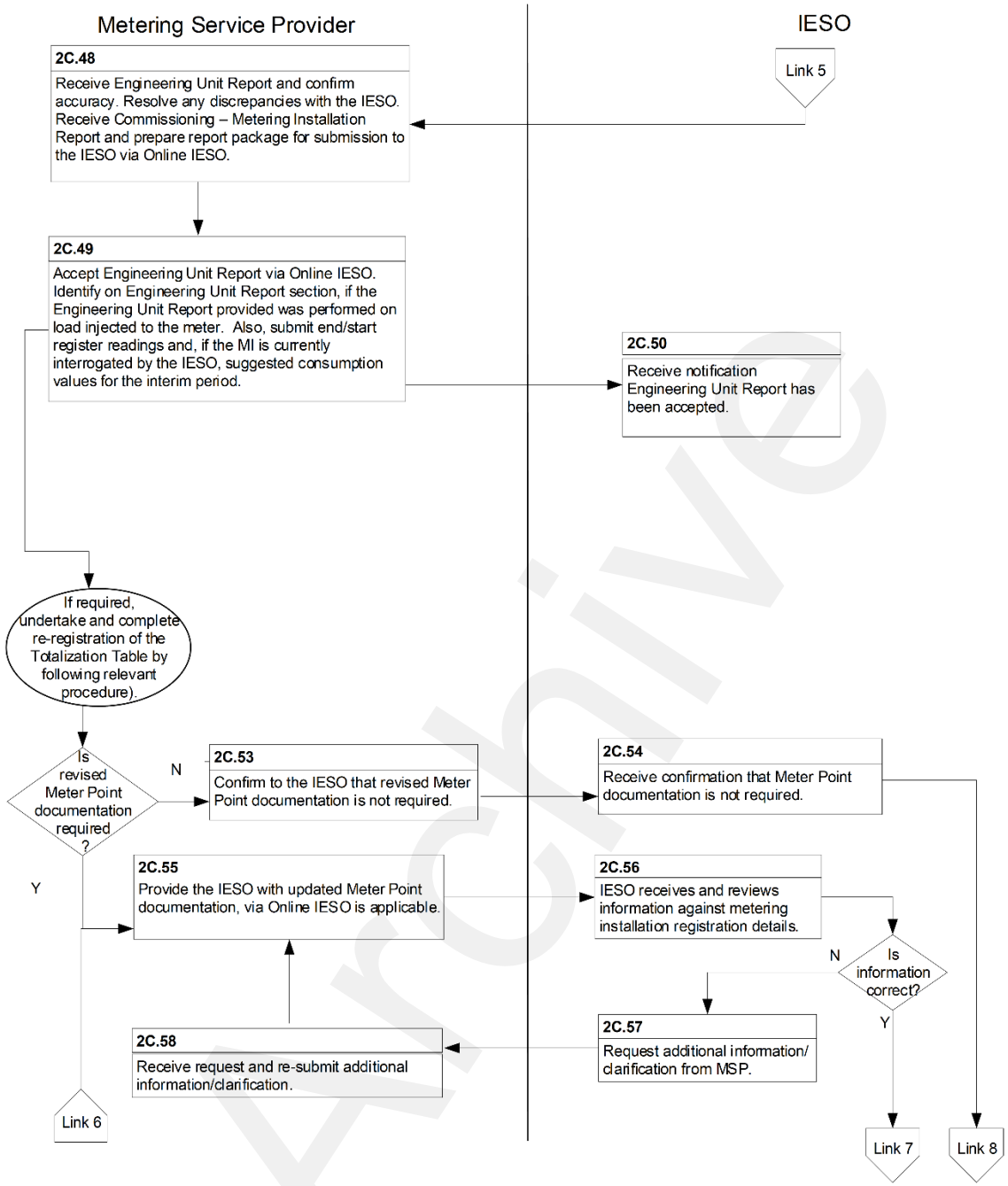

Figure 2–2: Work flow for Registration of Changes to MDAS Master File that Affect Metering Data (continued)

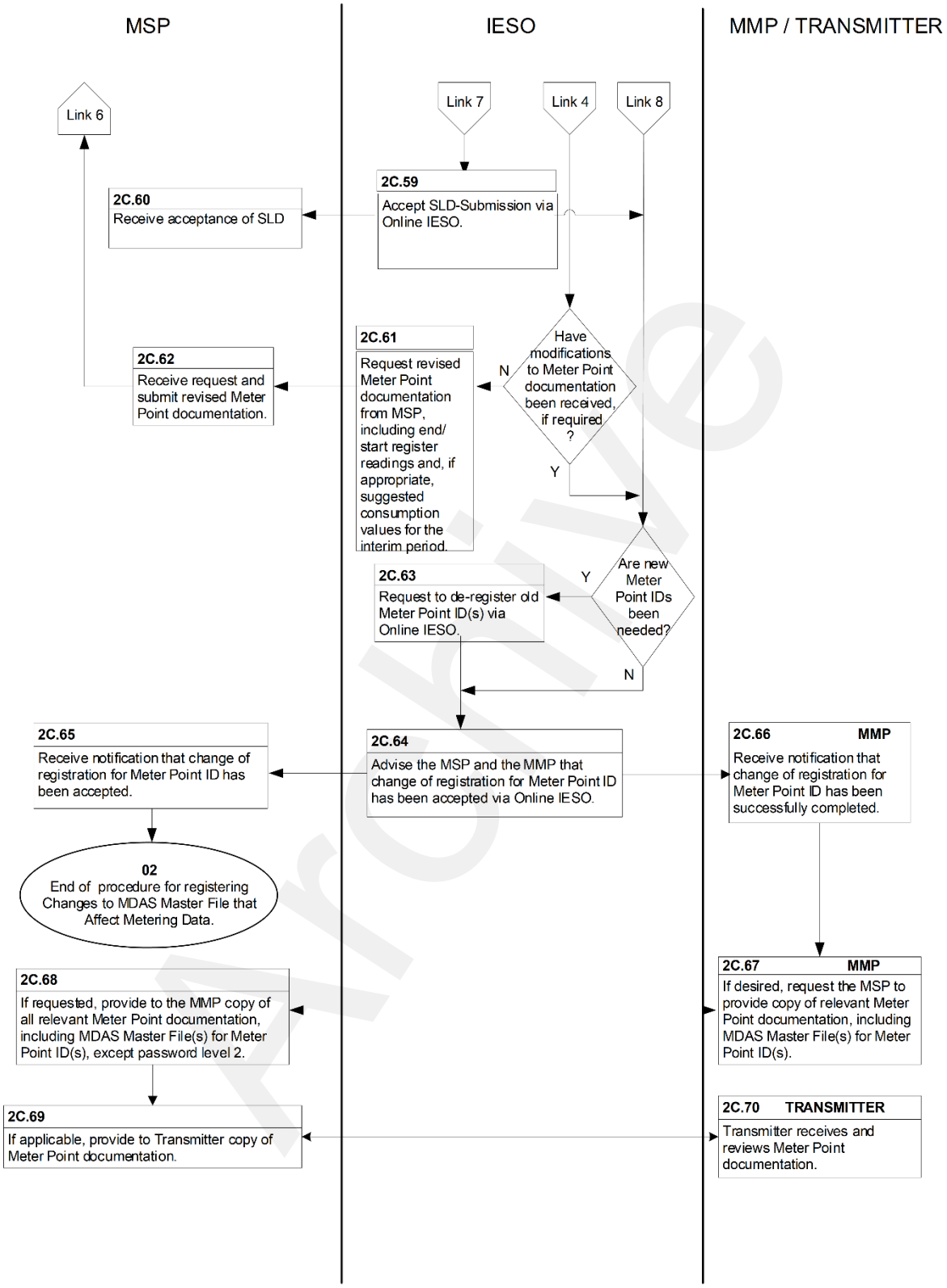

Figure 2–2: Work flow for Registration of Changes to MDAS Master File that Affect Metering Data (continued)

2.3 Change of Metering Service Provider (for a Meter Point) Not Assigned to a Delivery Point

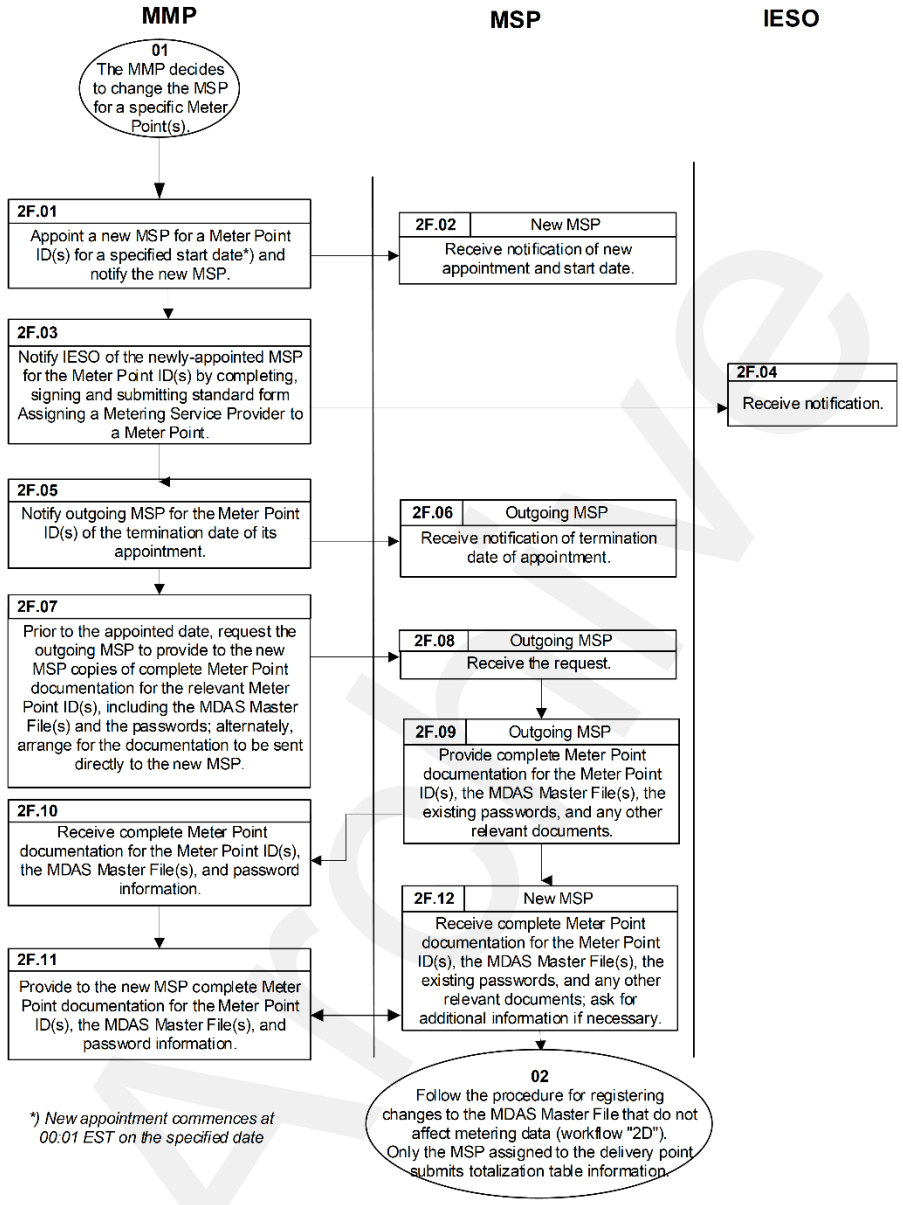

Figure 2–3: Work flow for Change of Metering Service Provider (for a Meter Point) Not Assigned to a Delivery Point

2.4 De-registration of one or more Meter Points associated with a Delivery Point

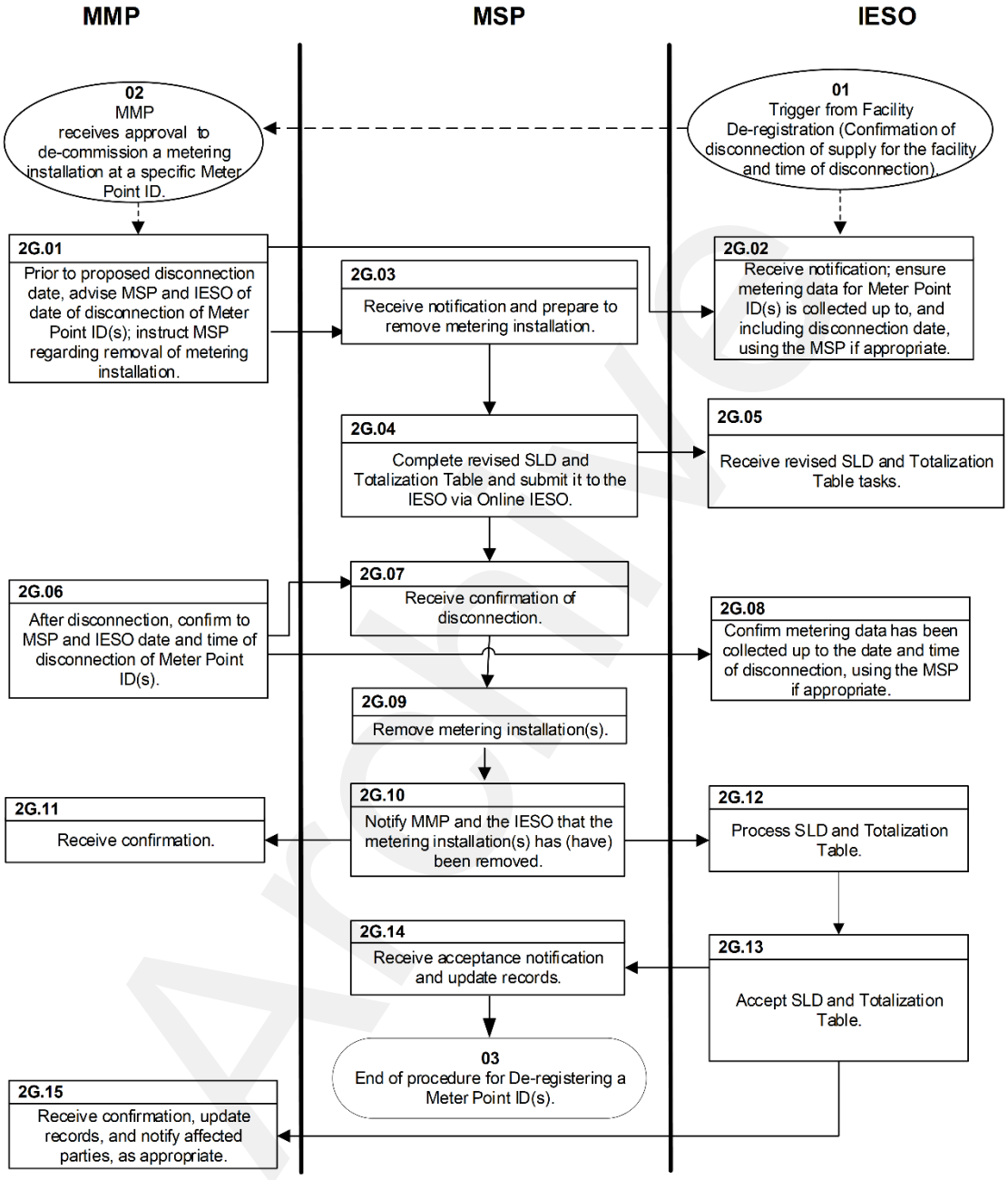

Figure 2–4: Work flow for De-registration of one or more Meter Points associated with a Delivery Point

– End of Section –

Appendix A: Forms

This appendix contains a list of forms associated with the procedure for the initial registration of *metering installations*, which are available on the *IESO* Web site (http://www.ieso.ca). The forms included are as follows:

Form Name	FORM No.
Totalization Table Form	IMO_FORM_1310
Application to Retain Registration under the Alternative Metering Installation Standard	IESO_FORM_1663
MIRT Update Form	IMO_FORM_1488

– End of Section –

Appendix B: Requirements for Commissioning a Metering Installation

This Appendix provides the requirements for carrying out the commissioning of a *metering installation*. Each *metering service provider* is responsible for commissioning its *metering installations* in accordance with the *market rules* and all applicable standards and policies of the *IESO*. The *metering service provider* shall have in place testing and commissioning procedures to ensure that these requirements are met.

The matter of safety is paramount and each *metering service provider* must adhere to all applicable occupational health and safety requirements. All personnel shall be equipped with the necessary safety equipment and training for the job.

The following section outlines the commissioning requirements. The recorded results form the commissioning reporting package for a *metering installation* and is subject to approval by *IESO*.

Commissioning Activities

Dependent on the scope of work associated with a *metering installation* registration request, the following activities may apply (for more information see Table B-3: Commissioning Requirements for Meter Registration Requests of Varying Scope).

Activities 1 through 4 from the following list shall be performed, when applicable, by a *metering service provider* prior to conducting end-to-end testing & completion of Engineering Unit Report (refer to Appendix C of this *market manual*).

1. Conduct Visual Check

Accuracy of the *IESO* approved single line diagram (SLD) for the *facility* shall be confirmed. Record *instrument transformer* nameplate data (e.g. phase association, manufacturer, model, MC approval number, MC accuracy class, & available ratios). Using the *metering installation* wiring diagram, a visual check of all equipment which forms part of the *metering installation* shall be conducted. Checks include tracing of the secondary cabling from the *instrument transformers* to the *meters*, inspecting all connections. Confirm that the *instrument transformers* are installed with polarity orientation consistent with *IESO*'s Wholesale Revenue Metering Hardware Standard. Confirm that the applied tap connections correspond to the ratio registered with *IESO*. Ensure seal log identifies all circuit access points to which seals are to be applied.

2. Test Secondary Wiring

Conduct continuity and insulation resistance testing on all new or disturbed secondary wiring.

3. Verify *Meter* Configuration

Record all required information and verify programming of the main (and/or alternate) *meter(s)* are consistent with the associated IESO Conforming Meter Framework. Ensure that each *meter's* clock is synchronized within +/- 60 seconds of EST. The *metering service provider* shall confirm that the communication equipment at the *metering installation* is functioning properly by performing remote download of all *metering data*.

4. Conduct Ratio and Polarity Tests

Review *instrument transformer* factory test results, ensuring that ratio and polarity testing has been performed for all available taps. If test results are not available, the *metering service provider* must perform (or witness) ratio and polarity testing and retain the results.

For the following activities 5 & 6, the *facility* load or generation is to be used as test current and voltage. These activities shall be conducted within 5 *business days* of the first valid testing timeframe. The first valid testing timeframe is considered to be the initial presence of 0.25A secondary current per phase for a minimum of 4 consecutive hours. *IESO* may accept results associated with measurements below 0.25A, provided that they are found to be within the defined tolerance limits.

5. Conduct *Instrument Transformer* Checks

Confirm the connected current transformer (CT) ratio by comparing the primary current reading obtained from an independent source. This could include reading the primary currents by means of a clip-on ammeter, or using secondary measurements from a separate set of CTs (operational panel ammeters, protection relays, or SCADA readings). If the primary current readings are within +/- 5%, the connected current transformer ratio is considered correct.

Where the voltage transformer (VT) secondary voltage is within +/- 5% of the nominal secondary voltage, the connected VT ratio is considered correct. Results outside of these limits shall be verified against an independent source.

6. Conduct Cross-Phase Test

The Cross-Phase Test confirms the correct operation of the *metering installation*. This is accomplished by using circuit analyzer with a minimum 0.2% accuracy applicable to the operating range of the measured values and recording the following information (as available) from both the analyzer and the main (and/or alternate) *meter(s)* under test:

- Per phase instantaneous magnitude and phase angle of voltage inputs
- Per phase instantaneous magnitude and phase angle of current inputs
- Per phase and total instantaneous power quantities (W, VAR, & VA or Power Factor)
- Energy quantities (Wh/VARh) recorded during the clocked 5 minute test interval

The *metering service provider* shall confirm that the instantaneous values are representative of the operational active and reactive power flow at the *facility* (for example, consider whether the *facility* is operating as load or generator). The energy quantities recorded by the circuit analyzer shall be compared to the energy quantities recorded by the *meter*. The error between the compared active energy quantities cannot exceed +/- 1.0%. The error between the compared reactive energy quantities cannot exceed +/- 3.0%. Notwithstanding the foregoing, the *metering service provider* may accept errors outside these reactive energy limits if the results are qualified and documented.

Security Requirements While Commissioning

Upon completion of any commissioning activities requiring removal of existing security seals for a registered *metering installation*, application and logging of security seals is required by the *meter service provider*. For a *metering installation* undergoing registration, application and logging of security seals by the *metering service provider* is dictated as commissioning work progresses (i.e. apply security seals to an access point at the time when access is no longer required to facilitate commissioning).

Commissioning Reporting Package

The *metering installation* registration request is completed with the *metering service provider* submission and *IESO* acceptance of the commissioning reporting package.

The requirement to submit a commissioning reporting package will be notified to the *metering service provider* as part of the end-to-end testing and Engineering Unit (EUR) process. All submitted documentation must clearly identify the *metering installation* and *metering installation* registration request number to which it is associated.

The commissioning reporting package is submitted by the *metering service provider* via Online IESO in two distinct tasks: Submit Commissioning Verification Report, and Submit Commissioning Test Report. These are each described as follows:

1. **Submit Commissioning Verification Report Task**

   The commissioning verification report shall contain the supporting results and statements from the *metering service provider* that activities 1 through 4 from the list of commissioning activities (as applicable to the associated *metering installation* registration request) have been successfully performed.

   Table B-1 below identifies the acceptable supporting results comprising the commissioning verification report. This represents the criteria that is assessed for approval by *IESO* upon receipt of the commissioning verification report.

Table B-1: Acceptable Supporting Results for a Commissioning Verification Report

Commissioning Activity	Supporting Results to be Documented in the Commissioning Verification Report
1. Visual Check	✓ MSP to provide the SLD and wiring diagram numbers and revisions used to perform visual checks. ✓ MSP to provide record of installation (or digital photographs of *instrument transformer* nameplates, indicating phase association). ✓ MSP to declare that all new or modified *instrument transformers* are installed with polarity orientation consistent with *IESO*'s Wholesale Revenue Metering Hardware Standard. ✓ MSP to declare that the applied tap connections for all new or modified *instrument transformers* correspond to the ratio registered with *IESO*. ✓ MSP to provide the date that all visual checks were completed.
2. Test Secondary Wiring	✓ MSP to declare that continuity and insulation resistance testing was completed on all new or disturbed secondary wiring.
3. Verify Metering Configuration	✓ MSP to attach a dated copy of the main (and/or alternate) *meter* programming (i.e. configuration report).
4. Ratio and Polarity Tests	✓ MSP to declare that the installed ITs have been factory tested, or tested (or testing witnessed) by the MSP for all available ratios.

The commissioning verification report must be submitted within 90 days of the approval date of the Engineering Unit Report.

2. **Submit Commissioning Test Report Task**

   The commissioning test report shall contain the supporting results and statements from the *metering service provider* that activities 5 & 6 from the list of commissioning activities (as applicable to the *metering installation* registration request) have been successfully performed.

   Table B-2 below identifies the acceptable supporting results comprising the commissioning test report. This represents the criteria that is assessed for approval by *IESO* upon receipt of the commissioning test report.

Table B-2: Acceptable Supporting Results for a Commissioning Test Report

Commissioning Activity	Supporting Results to be Documented in the Commissioning Test Report
5. Instrument Transformer Checks	✓ MSP to identify the independent source (i.e. clamp-on ammeter, protection relay, etc.) and provide its measured values compared to those measured by the main (and/or alternate) *meter*. ✓ MSP to declare that the primary current readings from the independent source vs. the main (and/or alternate) *meter* are within +/- 5%. ✓ MSP to declare that the voltage transformer (VT) secondary voltage is within +/- 5% of nominal, or from an independent source. ✓ MSP to provide the date that IT checks were completed.
6. Cross-Phase Test	✓ MSP to provide the model and serial number of the analyzer ✓ MSP to provide from both the analyzer and the main (and/or alternate) *meter* under test (as available) and define in terms of either primary or secondary: • Per phase instantaneous voltage magnitude and phase angle • Per phase instantaneous current magnitude and phase angle • Per phase and total instantaneous power quantities • Energy quantities recorded during the clocked 5-minute test interval for channels 1 through 4 ✓ MSP to declare that the instantaneous values are representative of the facility operational active and reactive power flow. ✓ MSP to declare that error between the compared meter and analyzer Wh quantities is within +/- 1.0%. ✓ MSP to declare that the error between the compared meter and analyzer VARh quantities is within +/- 3.0%. (or include a qualifying statement for errors exceeding these values). ✓ MSP to provide the date and interval time of the cross-phase test.

The commissioning test report normally must be submitted within 90 days of the approval date of the Engineering Unit Report, however the *metering service provider* may request an extension via Online IESO noting reasonable justification (e.g. "insufficient operational current to satisfy commissioning test"). Extensions are subject to approval by *IESO*.

Commissioning Requirements

Table B-3 below illustrates the required commissioning activities applicable to *metering installation* registration requests of varying scope.

Register Meter Installation

When a *metering installation* is registered, all commissioning activities must be performed and submission of associated commissioning reporting is required. A list of applicable commissioning activities will be specified to the *metering service provider* by *IESO* via Online IESO.

Like for Like/Master File Update

When *meter* replacement is performed for a registered *metering installation*, commissioning activities 3 & 6 must be performed and documented by the *metering service provider*. Commissioning documentation is not required to be submitted by the *metering service provider* at the time of *meter* replacement, but shall be retained by the *metering service provider* and subject to auditing by *IESO*.

Update Meter Installation(s)

Where the *metering installation* undergoes maintenance that affect the secondary wiring, *instrument transformer* replacement or other changes that impact *metering data*, the *IESO* may require the *metering service provider* to perform commissioning and submit a commissioning reporting package. Dependent on thescope of *metering installation* registration request, a list of applicable commissioning activities will be specified to the *metering service provider* by *IESO* via Online IESO. In general, the assumption holds that the specified commissioning requirements apply only to those components of the *metering installation* that are disturbed as a result of the work associated with the *metering installation* registration request.

Table B-3: Commissioning Requirements for Meter Registration Requests of Varying Scope

Description of Field Work	EUR Required?	Commissioning Verification	Commissioning Test	Comments
Register Meter Installation	Yes	Conduct Visual Check, Test Secondary Wiring, Verify Meter Configuration, Conduct Ratio and Polarity Tests	Conduct Cross Phase Test, Conduct IT Checks	All tests are required
Meter Replacement (like-for-like or different model)	Yes	Verify Meter Configuration	Conduct Cross Phase Test	Specified commissioning is required to be performed and results retained by the MSP, but a commissioning report package is not required to be submitted in Online IESO
Phone number or TCP/IP change	No	None	None	End to End communication test only
IT replacement or IT ratio change	Yes	Conduct Visual Check, Test Secondary Wiring, Conduct Ratio and Polarity Tests	Conduct Cross Phase Test, Conduct IT Checks	
Replace or move secondary IT wires (e.g. move meter cabinet or replace damaged secondary wires)	Yes	Conduct Visual Check, Test Secondary Wiring	Conduct Cross Phase Test, Conduct IT Checks	
Maintenance or testing of IT without removing secondary wires (e.g. IT oil sample or IT insulation resistance test)	No	None	None	

– End of Section –

Appendix C: Conducting End-to-End Testing & Engineering Unit Report

This Appendix provides information on how the *IESO* and the *metering service provider* will conduct the end-to-end test and the signoff of relevant documentation by the *metering service providers*.

This process confirms that the *metering service provider* agrees and certifies that the *metering data* recorded in the *metering installation* and the *metering data* recorded in the *metering database* is accurate.

End-to-End Test

Once commissioning of the *metering installation* has been completed in accordance with Appendix B and notification by the *IESO* that the MDAS Master File is complete, the *metering service provider* will instruct the *IESO* to proceed with the end-to-end test.

1. The *IESO* will proceed with the end-to-end test. The test consists of:
   a. Status Check
      - Successful communication to the meter and status check using MDAS. As part of the status check, the *IESO* shall confirm the meter time is within +/- 60 seconds of EST.
   b. Time Set
      - Successful time synchronization of the *meter*.
   c. All Read
      - Successful download of *metering* data including interval *meter* data, encoder readings and events.

2. Where the *IESO* is unable to perform any of the following:
   a. Communicate with the *meter* and verify the *meter* time is within +/- 60 seconds EST;
   b. Set time in the *meter*; or
   c. Perform All Read of *metering data*,

   The IESO shall consider that the end-to-end test has failed. *The metering service provider* will be advised accordingly and shall resolve any problems.

3. Once the end-to-end test is successfully completed, the *IESO* will inform the *metering service provider* and request the date and time for the preparation of the Engineering Unit Report.

Engineering Unit Report

Following the receipt of notification from the *metering service provider* with the date and time for the Engineering Unit Report, the *IESO* will proceed with the process of preparing the Engineering Unit Report. Table C-1 below illustrates acceptable methods for the *metering service provider* to complete the Engineering Unit Report.

Table C-1: Acceptable Methods for Engineering Unit Report

Type of Load	Secondary Current	Engineering Unit Report Test Time	Meter Programming
7. True Load	Minimum 0.10A per phase	After *meter* is installed	Programmed as per Conforming Meter Framework prior being installed
8. Injected Load	Minimum 0.50A per phase	After *meter* is installed	Programmed as per Conforming Meter Framework prior being installed
		Up to 72 hours prior to *meter* being installed	Programmed as per Conforming Meter Framework prior to secondary load injection

Where the *IESO* determines the secondary current is below 0.1A per phase for the time and date specified by the *metering service provider*, an alternate time and date will be requested. The *metering service provider* may elect to perform a secondary injection test at minimum 0.5Aper phase to complete the Engineering Unit Report for the *metering installation*. An alternate arrangement to complete the Engineering Unit Report may be acceptable at the discretion of the *IESO* where completing the requirements above are deemed not practicable.

The Engineering Unit Report consists of:

- relevant *metering installation* information;
- detailed MDAS Engineering Unit report covering the period of 60 minutes before to 60 minutes after the time and date provided by the *metering service provider*; and
- detailed *meter* MDAS Master File listing used to interrogate the *meter point(s).*

The Engineering Unit Report is also used to indicate to the *metering service provider* if a commissioning report package is required to be submitted to complete the registration process of the *metering installation.* This requirement will be via Online IESO. The *IESO* will issue to the *metering service provider*, via Online IESO, the completed Engineering Unit Report.

Acceptance of Engineering Unit Report

Upon receipt of the Engineering Unit Report, the *metering service provider* shall verify that all information contained within the report accurately represents the *metering installation* and agree that the *metering data* recorded in a *metering installation* and the *metering data* recorded in the *metering database* is accurate. The *metering service provider* accepts the Engineering Unit Report via Online IESO.

Where Secondary Injection has been performed, the *metering service provider* shall indicate this to IESO Metering Registration Hotline staff and confirm the accuracy of injection information when accepting the Engineering Unit Report via Online IESO.

If there are any discrepancies with information contained within the Engineering Unit Report, the *metering service provider* must resolve such issues with the *IESO* Metering Registration Hotline staff.

– End of Section –

Appendix D: Emergency Restoration Plan for Instrument Transformers

Transactions in the *IESO-administered market* are settled based on readings from registered wholesale metering. Since *energy* trading takes place on a continuous, 7 days a week, 24 hours a day, basis, data from each *registered wholesale meter* must also be continuously available.

As no electromechanical system is hundred percent reliable, *market rules* do allow for the failure of *meters* or *instrument transformers* while, at the same time, requiring timely restoration measures. *Metering installations* are generally designed such as to support interchangeable *meters* and *metering service providers* are expected to have replacements available whenever responding to trouble calls.

According to the *market rules,* in the event of an *instrument transformer* failure, the *metering service provider* has 12 weeks to replace the failed element with a Measurement Canada approved device that conforms to the of 0.3 ANSI accuracy class. Since some *instrument transformers* have procurement lead times that exceed 12 weeks, the *metering service provider* is required to have in place a plan of action that will allow such devices to be replaced within the required time limits.

Upon the failure of an *instrument transformer*, the *metering service provider* has twelve *business days* to restore dial-up access to the *metering data*. During the interim, *metering data* need not comply with the full accuracy requirements of the *market rules*. For such interim periods, the *metering service provider* is required to file in advance a plan with the *IESO* showing how this dial-up access will be provided and the correction factor to be applied to the data by the *IESO*.

The "Emergency Instrument Transformer Restoration Plan" (EITRP) must specify the location of spare devices as well as details on the specific actions to be taken by the *metering service providers* staff in case of IT failure, including the correction factors to be applied. Thorough implementation of this plan will ensure a smooth restoration process with no negative impact on the continuity and accuracy of *metering data* collection.

The *market rules* require an EITRP to be developed for each *metering installation* submitted for registration. This submission is an integral part of the process of registering a *metering installation*.

Guiding Principles

The *market rules* impose the following obligations on the *metering service provider*:

- Resolution of all trouble calls within two *business days*;
- Repair of all metering defects, with the exception of *instrument transformer* failure, within two *business days*;
- Restoration of dial-up access to *metering data* and application of a suitable correction factor, within twelve *business days* of any failure of an *instrument transformer*;
- Replacement of failed *instrument transformers* with Measurement Canada approved devices that conform to the ANSI 0.3 accuracy class within 12 weeks of the issuance of the related trouble call.

Strategies for Emergency Instrument Transformer Restoration

In order to comply with the relevant requirements of the *market rules, metering service providers* are free to develop their own strategy with regard to IT failure. Such strategies may include, but not be limited to:

1. Use Relaying Instrument Transformers

In the *IESO* marketplace, revenue metering is normally installed at a generating plant or a transformer substation. Such *facilities* are always equipped with protective relaying driven by dedicated current and voltage transformers. These devices are often installed in a position such as to measure the same power flow as the *registered wholesale meter* and may thus be connected to the revenue metering during the interim between failure of the *instrument transformers* and their replacement. However, since *instrument transformers* used for relay protection are usually less accurate than ANSI 0.3 class imposed on similar devices employed for revenue metering, appropriate correction factors are required.

In the process of preparing the EITRP, the *metering service provider* would identify a suitable set of relaying *instrument transformers* to be used in the situation when either a metering CT or VT fails. To calculate the correction factors to be applied, a *revenue meter* or a calibrated analyzer should be temporarily connected to replacement, protection CTs and VTs and the *energy* measured during a one-hour interval. The values thus obtained should then be compared with the values recorded by the normally-connected *registered wholesale meter* during the same period. Correction factors would then be calculated based on the ratio of the two readings.

When a *instrument transformer* fails, the *metering service provider* will remove the main and alternate *meters* from the *metering installation* and mount them on a portable metering panel equipped with pre-installed *meter* sockets, test blocks, and clip leads. When the failure occurs, the *metering service provider* will place this portable panel on the floor, beside the protective relaying panel, with the appropriate clip lead connections made, the current links on the test panel closed, and the current links of the relaying panel opened, thus allowing the *revenue meter* to record the power flow. The *metering service provider* will then connect the *meter* to the telephone line normally used for revenue metering. Finally, the *metering service provider* will place temporary barriers or appropriate warning tape thus preventing accidental contact with live connections or accidental disturbance of the connections.

In light of the above, the EITRP must:

- Identify the relaying *instrument transformers* to be used in case of failure of a *instrument transformer*; such identification must include the site, building, and the panel number of the relaying panel;
- Include a sketch clearly identifying the links and fuses on the relaying panel that are to be used in an *emergency* and the required connections to the temporary *meter* panel;
- Indicate the location and the specific place where the temporary *meter* panel, barriers, and warning tape are kept, if not in the trouble truck;
- Indicate the correction factor to be applied to the *metering data* by the *IESO*; and
- Indicate where the *metering service provider's* staff can find or requisition replacement *instrument transformers*.

2. Take Equipment Out of Service

If installation of a temporary *meter* panel is not feasible, a possible alternative is to take the equipment out of service. The equipment taken out of service must be physically *disconnected* from the *transmission system* or *distribution system* in order to ensure that no flow through the defective *instrument transformers* is possible.

In such cases the EITRP must:

- Identify the equipment to be taken out of service and the switching devices to be operated, locked, and tagged;
- Provide reminder to the *metering service provider* to contact the appropriate Operating Authority to arrange for the equipment to be taken out of service; relevant contact information is also to be provided; and
- (optional) Specify that the *metered market participant* be notified of the equipment being taken out of service.

3. Use Dual Redundancy Feature

At some *metering installations*, the main and alternate transformers are supplied from two different sets of current transformers, while sharing the same set of voltage transformers.

The EITRP for such situations must:

- Require that the failed set of current transformers be shorted out and the connections in the *meter* box altered so that both *meters* are supplied from the remaining, healthy set of current transformers; and
- Include sketches showing how the remaining current transformers are to be re-connected when the other set fails.

Some *metering installations* may also be equipped with redundant voltage transformers. In such cases, the EITRP must provide additional documentation to show how the *metering service provider* would deal with failure of each.

4. Embedded Metered Market Participants

An agreement between an embedded *metered market participant* and a host *metered market participant* indicating that during the EITRP, the host *metered market participant* is willing to include all the embedded *metered market participant's metering data*, the EITRP submission would be acceptable to the *IESO*. A statement stating that such an agreement is in place would be the only requirement. However, the settled amount between the host and embedded *metered market participant* shall be decided between themselves with no involvement from the *IESO* what so ever. The embedded *metered market participant's delivery point* will be kept active with zero values for the duration of the EITRP while the host's *delivery point* will include the *metering data* from the embedded *metered market participant* for the duration of the EITRP. The only other requirements would involve submission of Totalization Tables for both the embedded *metered market participant* and the host.

5. Use of Correction Factor in a Temporary Metering Installation

A Correction Factor (CF) may be calculated and applied to metered kWh for the duration of the IT repair in three specific failure cases:

a. Loss of one of the three CTs or VTs in a *metering installation* for a single circuit;
b. Loss of one, two or three of the six CTs (or one VT):
   - In a *metering installation* for one of two transformers T_1 and T_2,
   - Connected to a common load bus, and
   - Sharing a single set of bus VTs.
c. Loss of two or three of the six CTs (or VTs):
   - In a *metering installation* for one of two transformers T_1 and T_2,
   - Connected to a common load bus.

In all cases, the *metering installation* must consist of three-element *meters* which are included in the "Conforming Meter List".

In determining the Correction Factor, the *metering service provider* shall:

a. Analyze three continuous weeks of historical data from a period of similar load profile, immediately prior to the IT failure;
b. Calculate a CF for each time interval of the selected historical time period (excluding flagged intervals);
c. Discard all the computed CF values which are not within three standard deviations (if any), and select the highest value which is in favour of the *IESO-administered markets*;
d. Submit a Totalization Table in which the selected CF is applied to the registered *meter* within one week of the date of IT failure.

Case A: Loss of One of the Three CTs or VTs in a *Metering Installation* (Figure D-1)

If there is a failure of a CT on R phase (i.e. $I_R = 0$), the corresponding Correction Factor (CF_R) will be:

$$CF_R = \frac{I_R + I_Y + I_B}{0 + I_Y + I_B} \geq \frac{3}{2}$$

Where I_R,I_Y and I_B are the respective primary R, Y and B phase currents for one interval of the selected historical time period. CF calculation is required for the failed phase only.

Given that I_R, I_Y and I_B are not directly recorded values, the CF_R shall be calculated from the $\sqrt{I^2h}$ readings of the *meter*'s Channels 8, 9 and 10:

$$CF_R = \frac{Ch8 + Ch9 + Ch10}{Ch9 + Ch10}$$

Where Ch8, Ch9 and Ch10 are the respective values of Channel 8, 9 and 10 data for one interval of the selected historical time period.

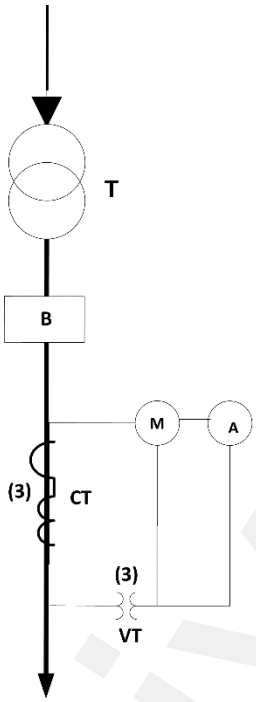

Figure D–1: Three CTs and Three VTs in a Metering Installation (Single Circuit)

Likewise, if there is a failure of a VT on R phase, the corresponding Correction Factor (CF_R) will be:

$$CF_R = \frac{V_R + V_Y + V_B}{V_Y + V_B} \geq \frac{3}{2}$$

Where V_R, V_Y and V_B are the respective voltages across the R, Y and B phases for one interval of the selected historical time period. CF calculation is required for the failed phase only.

Given that V_R, V_Y and V_B are not directly recorded values, the CF_R shall be calculated from the $\sqrt{V^2h}$ readings of the *meter*'s Channels 5, 6 and 7;

$$CF_R = \frac{Ch5 + Ch6 + Ch7}{Ch6 + Ch7}$$

Where Ch5, Ch6 and Ch7 are the respective values of Channel 5, 6 and 7 data for one interval of the selected historical time period.

Case B: On the Metering Installation for One of Two Transformers T1 and T2, Connected to a Common Load Bus, Sharing a Single Set of VTs (Figure D-2):

This case requires that the two transformers T_1 and T_2 be equivalent[1], individually metered, equally loaded (i.e. $I_{R1}=I_{R2}$), and connected in parallel on the load side.

[1] Equivalent transformers, per the SSLA standard MDP_STD_0005, are of same manufacturer, vintage, type, MVA rating(s), number of windings, voltages and impedances.

The EITRP document submitted shall include a statement that three spare VTs are available in stock for replacement within twelve *business days* of the IT failure.

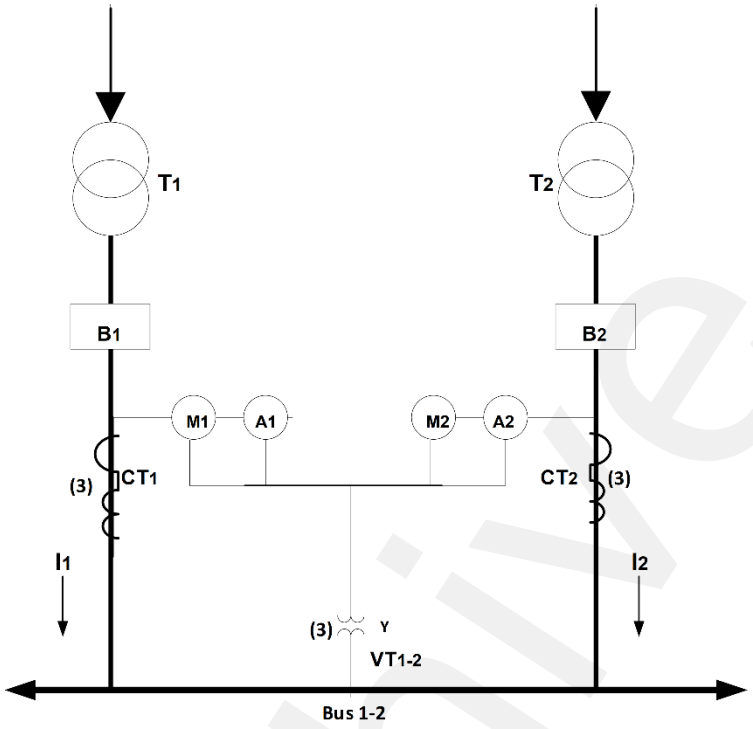

Figure D–2: Six CTs and Three VTs in a Metering Installation for Two Equally-Loaded, Equivalent Transformers T_1 and T_2, Connected to a Common Load Bus

B1: Loss of One of Six CTs (or One VT)

If there is a failure of a CT on R phase of T_1 (i.e. $I_{R1} = 0$), the corresponding Correction Factor (CF_{R1}) will be calculated as shown in Case A:

$$CF_{R_1} = \frac{I_{R1} + I_{Y1} + I_{B1}}{0 + I_{Y1} + I_{B1}} \geq \frac{3}{2}$$

Where I_{R1}, I_{Y1}, and I_{B1} are the respective primary phase currents on T_1, for one interval of the selected historical time period.

Given that the currents are not directly recorded, the CF_{R1} shall be calculated in the same way as in Case A:

$$CF_{R_1} = \frac{Ch8 + Ch9 + Ch10}{Ch9 + Ch10}$$

Where Ch8, Ch9 and Ch10 are the respective values of Channel 8, 9 and 10 data of the T_1 *meter*, for one interval of the selected historical time period.

For failure of a VT on R phase, the corresponding Correction Factors (CF_{R1} and CF_{R2}) for each T_1 and T_2 *metering installation* shall be calculated as shown in Case A.

B2: Loss of Two or Three CTs

If there is a failure of two or three CTs in the T_1 *metering installation*, and given that T_1 and T_2 are equally-loaded, the sum of T_1 and T_2 loads can be calculated by applying a CF_{T1} to the kWh delivered data of the T_2 *meter*.

Therefore, the corresponding Correction Factor (CF_{T1}) will be:

$$CF_{T_1} = \frac{T_1 + T_2}{T_2} \geq 2$$

and;

$$CF_{T1} = \frac{Ch1[T_1] + Ch1[T_2]}{Ch1[T_2]}$$

where Ch1[T_1] and Ch1[T_2] are the respective metered kWh delivered data on Channel 1 of T_1 and T_2 *meters* for one interval of the selected historical time period.

Case C: Loss of Two or Three of the Six CTs (or VTs) in a Metering Installation for One of Two Transformers T1 and T2, Connected to a Common Load Bus (Figure D-3)

This case requires that the two transformers T_1 and T_2 be equivalent, individually-metered, equally-loaded, and connected in parallel on the load side. Also, if a tie breaker (T_1-T_2) is present, then it will be closed and tagged for the duration of the EITRP.

If there is a failure of two or three CTs in the T_1 *metering installation*, and given that T_1 and T_2 are equally-loaded, the sum of T_1 and T_2 loads can be calculated by applying a CF_{T1} to the kWh delivered data of the T_2 *meter*.

Therefore, the corresponding Correction Factor (CF_{T1}) will be:

$$CF_{T_1} = \frac{T_1 + T_2}{T_2} \geq 2$$

and

$$CF_{T1} = \frac{Ch1[T_1] + Ch1[T_2]}{Ch1[T_2]}$$

where Ch1[T_1] and Ch1[T_2] are the respective metered kWh delivered data on Channel 1 of T_1 and T_2 *meters* for one interval of the selected historical time period.

Likewise, if there is a failure of two or more VTs in the T_1 *metering installation*, the corresponding Correction Factor (CF_{T1}) shall be calculated with the same equation and following the same process as shown above for the loss of two or more CTs.

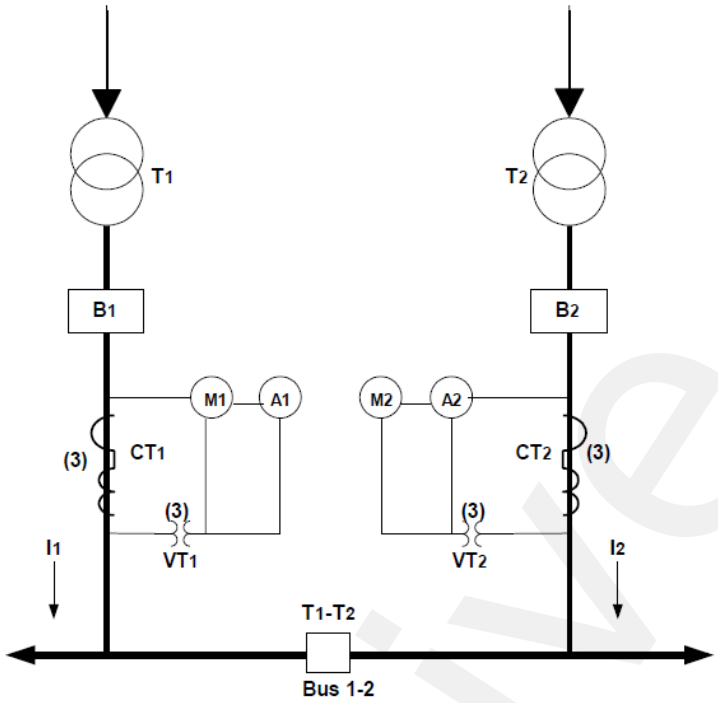

Figure D–3: Six CTs and Six VTs in a Metering Installation for One of Two Equally-Loaded, Equivalent Transformers T_1 and T_2, Connected to a Common Load Bus

Application of the Correction Factor (CF)

In all cases, the *metering service provider* shall submit, within one week of IT failure, a new Totalization Table, in which the calculated CF is applied to metered kWh of the appropriate T_1 and/or T_2 *meter(s)*, for a period not to exceed twelve weeks from the date of IT failure.

Essential Items to be Included in the EITRP

The EITRP must include the following items:

- Correction factor to be applied by the *IESO* for each failure scenario;
- Location of spares and contact information for obtaining spares;
- Essential requirements for spares such as BIL and nominal ratio; and
- Means of providing dial-up access if the equipment is to remain in service during the interim between *instrument transformer* failure and repair.

– End of Section –

Appendix E: Applying to Retain Registration under the Alternative Metering Installation Standard

E.1 Retaining Registration under the Alternative Metering Installation Standard - Description

This procedure details the process of applying to retain registration and assessing qualification for such continued registration under the alternative metering installation standard. It also lays out the cases and conditions that must be met for the *metering installation* to be considered for continued registration.

For example, a *metered market participant* may be granted the right to retain registration under the alternative metering installation standard in the situation where two *instrument transformers* continuing under the Measurement Canada dispensation fail. Under the present *market rules*, this failure would trigger a substantial upgrade of the entire *metering installation*. However, those *metering installations* that have been granted registration retention would only need to replace the *instrument transformers* with 0.3 ANSI and would not be required to upgrade the entire *metering installation*.

E.2 Conditions

The conditions that must be satisfied for *IESO* approval to retain registration under the alternative metering installation standard are:

The *metering installation* is currently registered under the alternative metering installation standard (does not apply to a new *metering installation* that requires a signed "Declaration of Compliance of Metering Installation").

The registration is being retained in relation to one or more of the following sections under the alternative metering installation standard in Appendix 6.2 of the *market rules*:

i) Section 1.2: Compliance with Blondel's Theorem;

ii) Section 1.6: Instrument Transformers – Power Switching;

iii) Section 1.7: Instrument Transformers – Accuracy Requirements;

iv) Section 1.8: Instrument Transformers – Secondary Cabling;

v) Section 1.9: Parallel Current Transformer Secondaries;

vi) Section 1.11: Instrument Transformers – Primary Connection Point;

vii) Section 1.12: Instrument Transformers – Primary Cable; and

viii) Section 1.13: Instrument Transformers – Burdens.

Each application shall be subject to review and approval by the *IESO*.

The *metering installation* is one of the cases below, either A, B or C.

Approval is at the sole discretion of the *IESO*.

E.3 Cases

The *IESO* will use the following cases to assess whether continued registration of a *metering installation* will be granted. In addition, the *IESO* may consider other circumstances applicable to each of these cases where, after investigation, the *IESO* agrees that upgrading the *metering installation* is impractical or cost prohibitive, or would create an unacceptable visual impairment.

Case A. Medium Voltage (MV) Indoor Metal-enclosed Switchgear < 69 kV

All of the following conditions must be present:

a) The *metering installation* is located in a substation supplying the *metered market participant*;

b) The *metering installation* is inside a medium voltage switchgear enclosed in metal housing;

c) The *instrument transformers* are shared and used for other purposes;

d) There is insufficient physical space to upgrade of the *metering installation* to be compliant with the *market rules*;

e) High voltage metering is either not possible due to physical space limitations or if the cost is greater than replacing the MV bus *metering installation*; and

f) It is not practical to install pole mounted metering units (PMEs) where:

   i) The upgrade will require four or more PMEs per medium voltage bus *metering installation*;

   ii) The substation is located in a congested area and there is no external room for poles and PMEs;

   iii) The egress feeders are underground and it is not practical to excavate a vault for the *metering installations*; or

   iv) The egress feeders are overhead, but space limitations remain.

Case B. Medium Voltage (MV) Open Bus Station < 69 kV

All of the following conditions must be present:

a) The *metering installation* is located in a substation supplying the *metered market participant*;

b) The *metering installation* is bus mounted or bushing mounted with difficult access;

c) The *instrument transformers* are shared and used for other purposes;

d) There is insufficient physical space to upgrade of the *metering installation* to be compliant with the *market rules*;

e) High voltage metering is either not possible due to physical space limitations or if the cost is greater than replacing the MV bus *metering installation*; and

f) It is not practical to install PMEs where:

   i) The upgrade will require four or more PMEs per open bus medium voltage *metering installation*;

ii) The substation is located in a congested area and there is no external room for poles and PMEs;

iii) The egress feeders are underground and it is not practical to excavate a vault for the *metering installations*; or

iv) The egress feeders are overhead, but space limitations remain.

Case C. High Voltage (HV) Open Bus Station > 69 kV

All of the following conditions must be present:

a) The *metering installation* is located in a substation supplying the *metered market participant*;

b) The *metering installation* is bus mounted with difficult access;

c) The *instrument transformers* are shared and used for other purposes;

d) There is insufficient physical space to upgrade of the *metering installation* to be compliant with the *market rules*;

e) Medium voltage metering is either not possible due to physical space limitations or if the cost is greater than replacing the HV bus *metering installation*; and

f) It is not practical to install PMEs where:

i) The upgrade will require four or more PMEs per open bus high voltage *metering installation*;

ii) The substation is located in a congested area and there is no external room for poles and PMEs;

iii) The egress feeders are underground and it is not practical to excavate a vault for the *metering installations*; or

iv) The egress feeders are overhead, but space limitations remain.

E.4 The Application Process

1. After reviewing the conditions and cases described above, the *metered market participant* shall file a completed IESO-FORM-1663: "Application to Retain Registration under the Alternative Metering Installation Standard" with supporting information. The application must contain sufficient information to enable the *IESO* to make a decision.

Any cost estimate provided by the applicant as part of the justification must be at least Class C (Indicative). Refer to Table E–1 for a Class C (Indicative) cost summary.

Table E–1: Class C (Indicative) Cost Estimate Summary

Project Details	Purpose	Methodology	Precision	Preparation Effort
Low (project plan)	Seeking preliminary project approval	Measured, priced, parameter quantities, where possible	Low (-15 to + 25% variance)	Low

Upon review of the submitted information, the *IESO* may:

i) Determine that the *metering installations* do not meet the conditions specified in this *market manual* and reject the application;

ii) Request additional information from the *metered market participant*; or

iii) Decide the application has merit.

Where the *IESO* decides the application has merit, the *IESO* shall conduct an on-site assessment of each *metering installation* forming part of the application. The *metered market participant* shall arrange access to the site in a timely manner.

The *IESO* may hold additional meetings with the applicant to obtain clarification.

The *IESO* shall provide a written report to the *metered market participant* detailing its decision and reasons for the decision. This report is to be provided within three weeks of the on-site assessment or within three weeks of any additional meetings concerning the application.

Applicants must agree that their application information will be posted in its entirety (except for Part 4 of IESO-FORM-1663) on the *IESO* Web site. The applicant shall obtain consent for the disclosure of any and all *confidential information* from third parties that forms part of the application. The *IESO's* decisions and reasons will also be posted.

The *IESO* shall report all applications received and decided to the Revenue Metering Sub-Committee.

The *metered market participant* shall pay the cost of processing the application and the cost of the on-site assessment:

i) The cost of an application is $1,000.00 per *facility,* to be submitted at the time of application.

ii) The cost for the on-site assessment is the greater of $1,000.00 per day or the actual cost to perform the on-site assessment. This cost would apply to all the days worked by the *IESO* or part thereof. This cost shall be paid by the *metered market participant* upon invoice.

E.5 Example of an Assessment to Retain Registration Under the Alternative Metering Installation Standard

1. Figure E–1 illustrates a typical example of a MV Bus *metering installation* registered under the alternative metering installation standard. This *metering installation* reflects Cases A and B described in Section E.4[2]. In this example, the following sections of Appendix 6.2 of the *market rules* apply to this *metering installation*:

   - Section 1.2: Compliance with Blondel's Theorem
   - Section 1.6: Instrument Transformers – Power Switching
   - Section 1.7: Instrument Transformers – Accuracy Requirements
   - Section 1.8: Instrument Transformers – Secondary Cabling
   - Section 1.9: Parallel Current Transformer Secondaries
   - Section 1.13: Instrument Transformers – Burdens

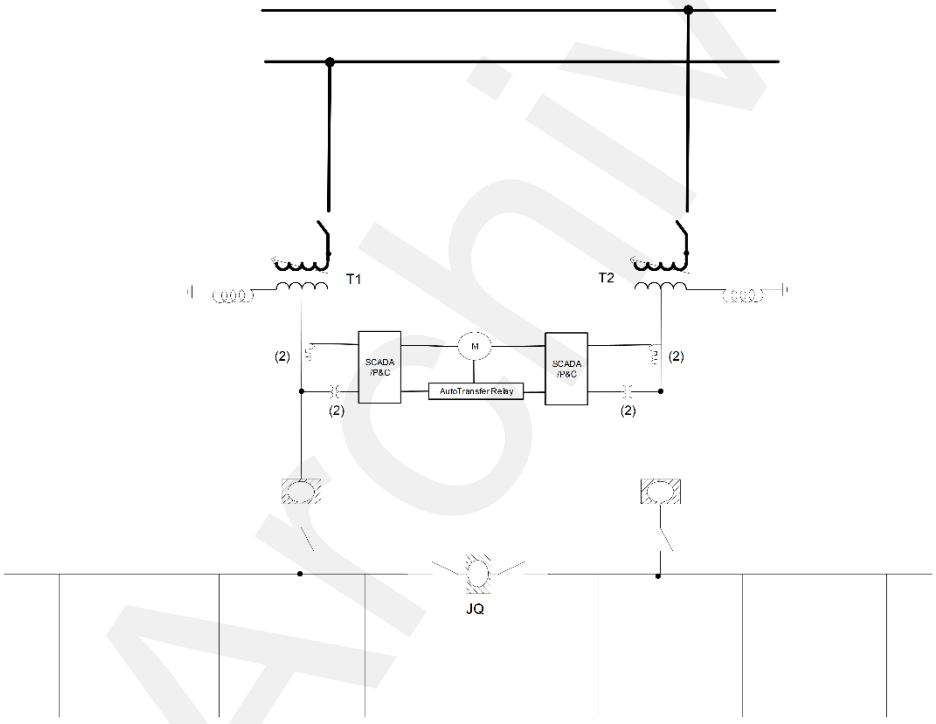

Figure E–1: MV Bus Metering Installation Registered under the Alternative Metering Installation Standard

[2] This example also applies to Case C. The Bus *metering installation* illustrated in Figure E–1 would be located on the HV side of the T1/T2 power transformers.

2. When the substantial upgrade clause is triggered, the *metering installation* must be upgraded to meet full compliance of Section 4.1 of Chapter 6 of the *market rules*. The *metered market participant* has three options when upgrading the *metering installation*.

Option 1 – HV Metering Installation:

The existing MV Bus *metering installation* is replaced with a HV *metering installation* that is compliant with Section 4.1 of Chapter 6 of the *market rules* as illustrated in Figure E–2.

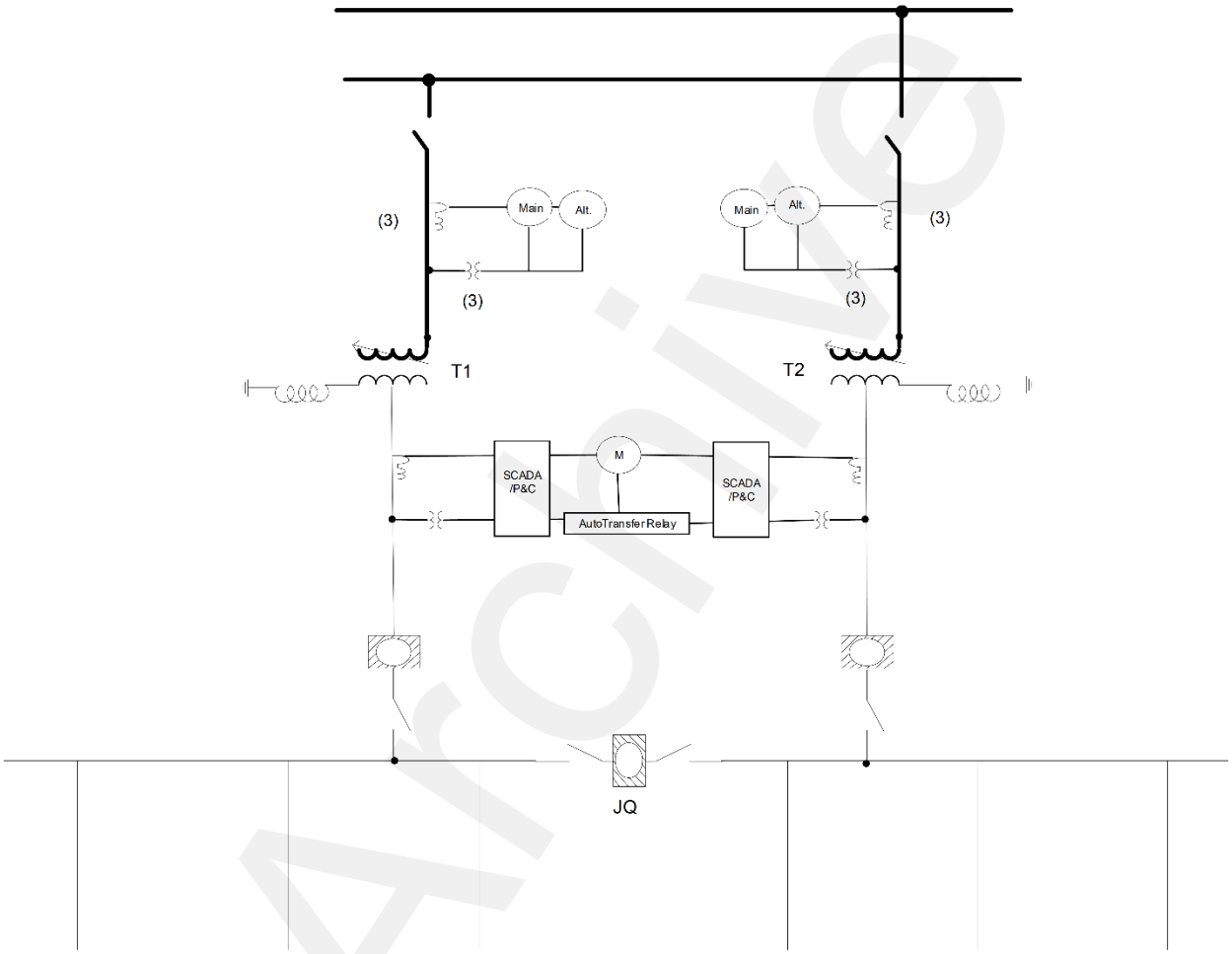

Figure E–2: HV Metering Installation Registered under Section 4.1 of Chapter 6 of the Market Rules

Option 2 – MV Bus Metering Installation:

The existing MV Bus *metering installation* is replaced with a MV Bus *metering installation* that is compliant with Section 4.1 of Chapter 6 of the *market rules* as illustrated in Figure E–3.

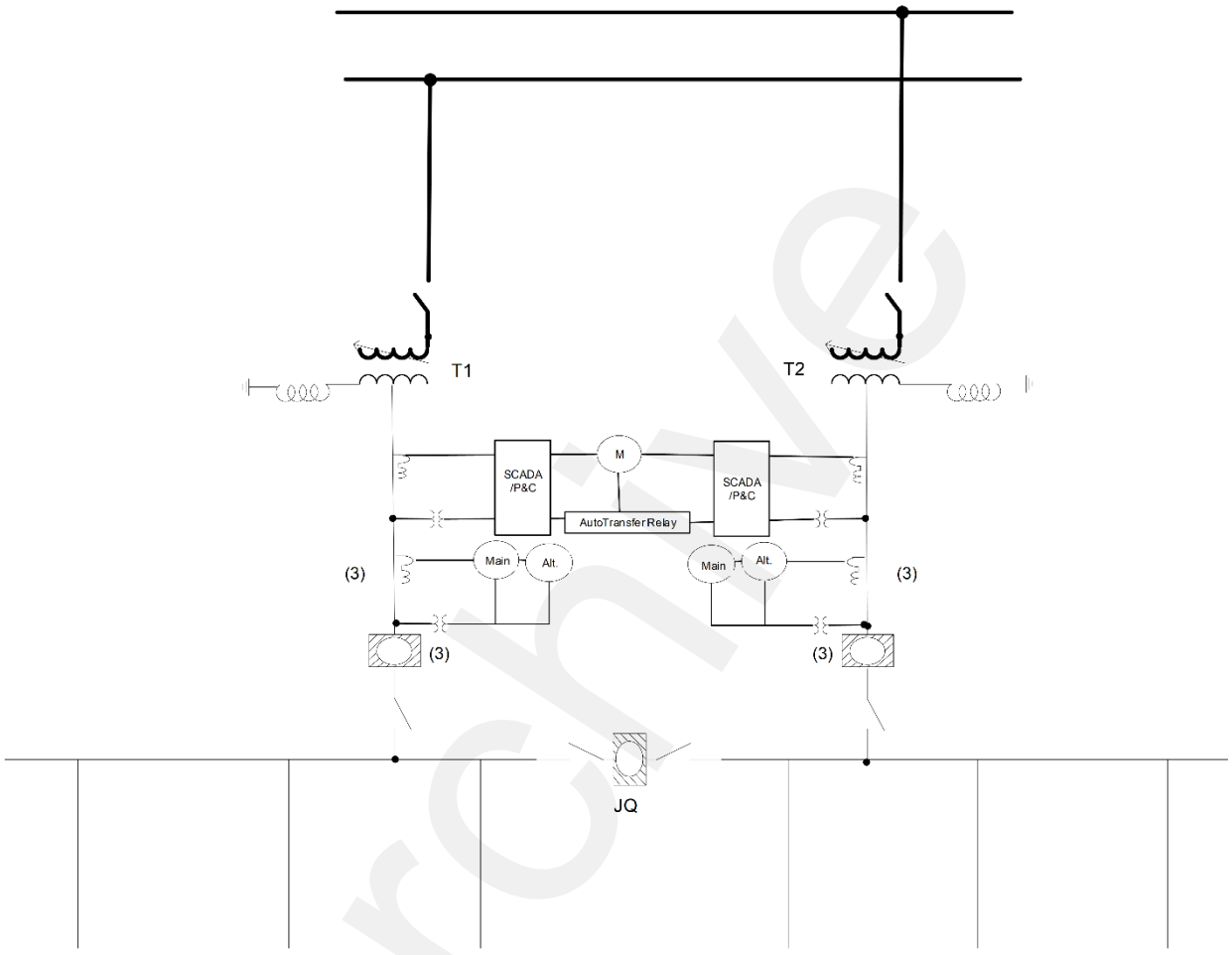

Figure E–3: MV Bus Metering Installation Registered under Section 4.1 of Chapter 6 of the Market Rules

Option 3 – MV Feeder Metering Installation:

The existing MV Bus *metering installation* is replaced with one or more MV feeder *metering installation(s)* that is compliant with Section 4.1 of Chapter 6 of the *market rules* as illustrated in Figure E–4. This is a viable option only when there are three or fewer feeders per bus *metering installation*.

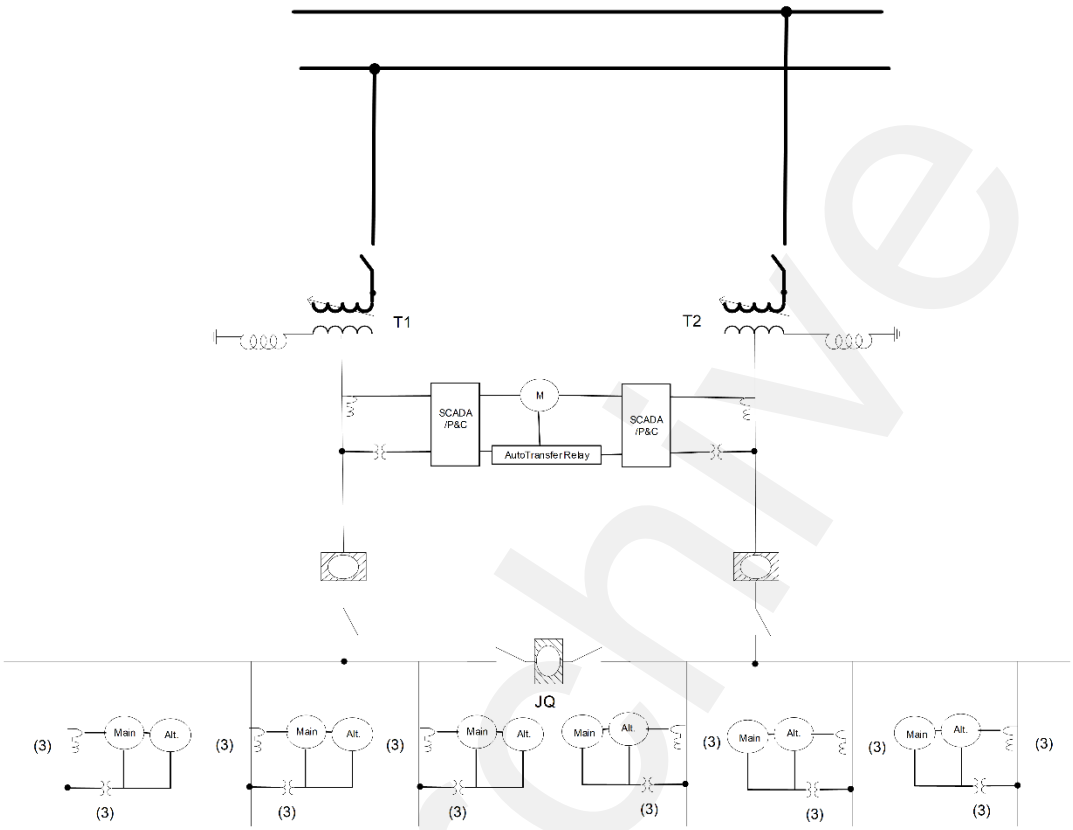

Figure E–4: MV Feeder Metering Installations Registered under Section 4.1 of Chapter 6 of the Market Rules

3. Where the *metered market participant* can demonstrate that Options 1, 2 and 3 require rebuilding of major components of the *facility* or power system and is, therefore, impractical, they may apply to retain registration under Section 4.4.8 of Chapter 6 of the *market rules*.

4. When the application to retain registration under the alternative metering installation standard is accepted by the *IESO*, the *metered market participant* is permitted to retain registration of the following components of the *metering installation* under Appendix 6.2 of the *market rules*:

    - Section 1.2: Compliance with Blondel's Theorem;
    - Section 1.8: Instrument Transformers – Secondary Cabling; and

- Section 1.13: Instrument Transformers – Burdens.

All other sections under Appendix 6.2 of the *market rules* no longer apply to this *metering installation* and the *metering installation* must be in full compliance with Section 4.1 of Chapter 6 of the *market rules*. Figure E–5 illustrates the final configuration of the *metering installation* that has been granted the right to retain registration under the alternative metering installation standard.

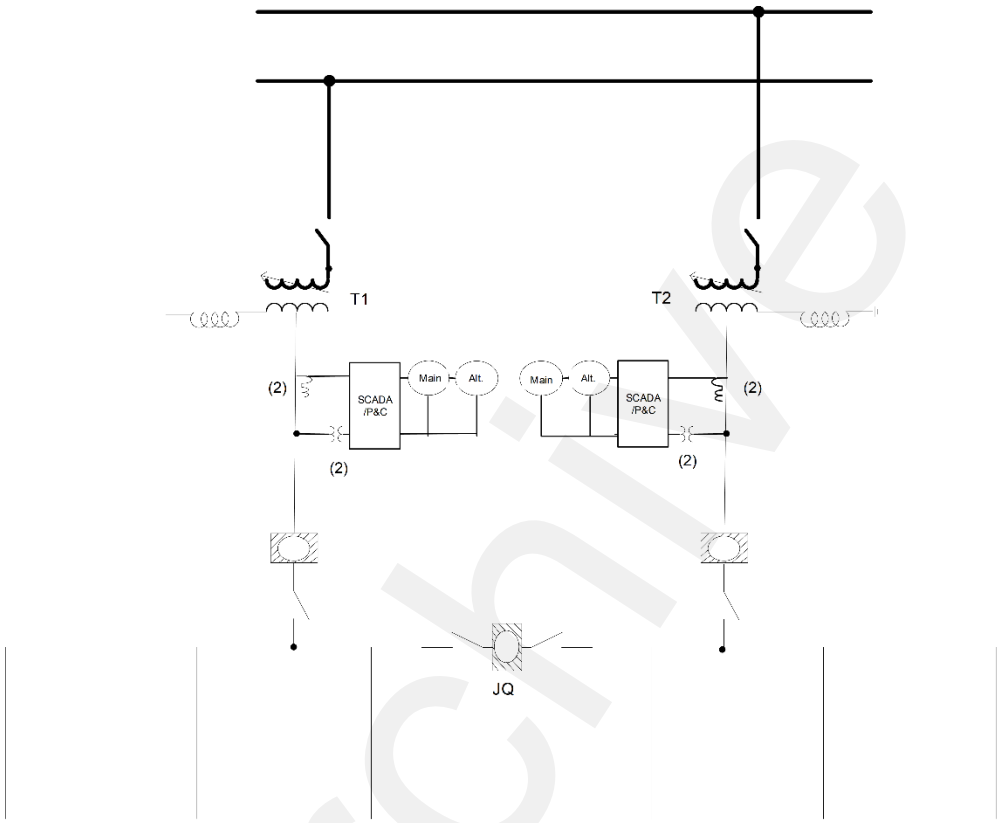

Figure E–5: MV Bus Metering Installation Registered under Section 4.4 of Chapter 6 of the Market Rules

– End of Section –

References

Document ID	Document Title
N/A	Electricity and Gas Inspection Act (Canada)
MDP_RUL_0002	Market Rules
MDP_STD_0004	Wholesale Revenue Metering Standard—Hardware
PRO-408	Market Manual 1: Connecting to Ontario's Power System, Part 1.5: Market Registration Procedures
MDP_PRO_0017	Market Manual 2: Market Administration, Part 2.1: Dispute Resolution
MDP_PRO_0007	Market Manual 3: Metering, Part 3.1: Metering Service Provider (MSP) Registration, Revocation, and De-registration
MDP_PRO_0010	Market Manual 3: Metering, Part 3.4: Measurement Error Correction
MDP_PRO_0011	Market Manual 3: Metering, Part 3.5: Site-Specific Loss Adjustments
MDP_PRO_0012	Market Manual 3: Metering, Part 3.6: Conceptual Drawing Review
IMP_PRO_0047	Market Manual 3: Metering, Part 3.7: Totalization Table Registration
IMP_PRO_0057	Market Manual 3: Metering, Part 3.8: Creating and Maintaining Delivery Point Relationships
N/A	MIRT Online Help
MDP_MAN_0003	Market Manual 3: Metering Overview
	Alternate Metering Standard

– End of Document –