Electricity Specification 218

Issue 3 **May 2020**

Connections from either Bulk Supply Point (BSP) Transformers with a Capacity up to 120MVA (33kV) or from the 132kV Network with a Capacity up to 240MVA

Contents

Approved for issue by the
Policy Approval Panel

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Issue and Amendment Summary

Amendment No. Date	Brief Description and Amending Action
0 31/03/03	Issue 1 First Issue. Prepared by: Authorised by: Paul Whittaker Policy & Standards Manager:
1 27/07/07	Issue 1 Reference to ES366 and the requirement for customer to provide substation LV supply added. Prepared by: Peter Leather Approved by the Technical Policy Panel and signed on its behalf by Simon Rushton:
0 19/12/07	Issue 2 Company name changed to “Electricity North West Limited”. Requirements for the provision of pilot circuits modified. Prepared by: Peter Leather Approved by the Technical Policy Panel and signed on its behalf by Simon Rushton:
0 29/05/20	Issue 3 General update including company name changes and latest template. Prepared by: Peter Twomey Approved by the Policy Approval Panel and signed on its behalf by Paul Turner.

CONNECTIONS FROM EITHER BULK SUPPLY POINT (BSP) TRANSFORMERS WITH A CAPACITY UP TO 120MVA (33KV) OR FROM THE 132KV NETWORK WITH A CAPACITY UP TO 240MVA

1. SCOPE

This Specification details the requirements of a third-party provided new connection from either Bulk Supply Point (BSP) Transformers with a Capacity up to 120MVA (33kV) or from the 132kV electricity distribution network with a Capacity up to 240MVA, that connection being intended to be adopted by Electricity North West Limited (Electricity North West). It may be appropriate to provide connections of up to 90MVA capacity in accordance with ES 217.

This document shall be read in conjunction with ES210.

2. GENERAL

2.1 Any variation to this specification shall be agreed, in writing, with the Policy and Implementation Manager (the Engineer) prior to any design being accepted by Electricity North West.

2.2 The Owner's Works shall comply with the requirements of ES210.

2.3 It is a requirement that all work shall be carried out strictly in accordance with the provisions of all relevant legislation and industry best practice.

2.4 The Owner's Works shall comply in all respects with the provisions of Regulations 3 (1), 6, 7, 8 (1), 8 (3), 9, 10, 12 to 14 and 17 to 22 of the Electricity Safety, Quality and Continuity Regulations 2002 and with the Electricity at Work Regulations 1989.

2.5 Users will be supplied and metered at 132kV or 33kV.

2.6 Connections at 25kV or 11kV will be the subject of joint discussions.

2.7 With any single circuit arrangement, the agreed supply capacity shall not be considered to be firm.

2.8 New 132kV underground cables shall have pilot circuits laid with them or provision (eg, ducts and pits) made for the future installation of pilot cables. New and refurbished 132kV overhead lines shall have pilot circuits to be installed with them. The specifications for such pilot circuits, which may be required for protection, monitoring, control or other communications, shall be agreed, for each individual cable or overhead line, with the Engineer.

2.9 The design of the connection shall take account of the following system requirements:

2.9.1 Maximum Fault Levels on the Electricity North West electricity distribution system are:

- 132kV = 5000MVA
- 33kV = 1000MVA

2.9.2 The maximum short circuit ratings shall be:

- 132kV = 21.9kA for 3 second

- 33kV = 17.5kA for 3 second

2.9.3 System Earthing

- 132kV = Solid
- 33kV = Resistance

2.9.4 The maximum earth fault current is as follows:

- 132kV = value to be determined by United Utilities
- 33kV = 3500 Amps.

2.9.5 The minimum impulse withstand levels for new equipment connected to the 132kV distribution network is 650kV and for the 33kV network 170kV.

2.9.6 In particular, the rating of any switchgear and fusegear, forming part of any new connection, must be fully compatible with all the system parameters, as set out in this clause.

3. CONNECTION ARRANGEMENTS

3.1 The connection shall be provided from a Electricity North West BSP or direct from the 132kV electricity distribution system and be one of the following arrangements:

3.1.1 132/33kV Transformer connection – see example in Figure 1 of Appendix A.

3.1.1.1 The maximum load, which is subject to the existing loading on the Electricity North West electricity distribution network, supplied from a single 132/33kV transformer shall not exceed 60 MVA. If Electricity North West distribution network permits a second 132/33kV transformer then the capacity may be increased to 120MVA. An Automatic Load Reduction Scheme (ARLS) shall be installed with a second transformer.

3.1.1.2 The exit point shall be the outgoing terminals of the Electricity North West circuit breaker.

3.1.1.3 A customer's emergency trip facility shall be provided with this type of connection. The trip facility shall operate the Electricity North West owned circuit breaker.

3.1.2 Single feeder 132kV circuit connection – see example in Figure 2 of Appendix A.

3.1.2.1 The maximum load, which is subject to the existing loading on the Electricity North West distribution network, supplied from a single 132kV feeder shall not exceed 120 MVA.

3.1.2.2 The exit point shall be the outgoing terminals of the final Electricity North West owned 132kV isolator.

3.1.2.3 A customer's emergency trip facility shall be provided with this type of connection. The trip facility shall operate the Electricity North West owned circuit breaker.

3.1.3 Dual feeder 132kV circuit connection - see example in Figure 3 of Appendix A.

3.1.3.1 The maximum load, which is subject to the existing loading on the Electricity North West distribution network, supplied from a dual connection arrangement shall not exceed 240MVA.

3.1.3.2 The exit points shall be the outgoing terminals of the final Electricity North West owned 132kV isolators.

3.1.3.3 A customer's emergency trip facility shall be provided with this type of connection. The trip facility shall operate the Electricity North West owned circuit breaker.

3.2 Environmental Conditions

3.2.1 The equipment shall be designed and constructed to allow operation in environments defined in Clause 6 of BS EN 60947-1 as follows:

3.2.1.1 Equipment that is housed in a controlled environment shall be suitable for operation in Pollution Degree 2.

3.2.1.2 Equipment that is not housed in a controlled environment shall be suitable for operation in Pollution Degree 3.

3.2.2 All equipment shall be protected from the deposit of excessive levels of dust and from the influx of water or other substances liable to have a harmful effect.

3.3 Cable

3.3.1 The size and type of 132kV cables or overhead lines shall be approved by the Engineer. Cables shall comply with the requirements of ES400 C14. 29/05/20

3.3.2 33kV cables shall be in accordance with Electricity North West's specification ES400C10.

No other type or cross section of cable is permitted.

3.3.3 The conductor cross section selected for any particular installation shall be compatible with the load to be supplied and the system short circuit level.

3.4 Earthing conditions

All installations are to comply with Electricity North West 's EPD 333 and shall be discussed and agreed with the Engineer prior to the formal submission of an 'Outline Plan of Works' as described in ES210.

3.5 Cable installation and jointing

3.5.1 The installation and jointing of underground cables shall comply with the relevant parts of Electricity North West's ES400E4 and ES400E5. Jointing systems employed should be compatible with the cable used and type test evidence should be available to demonstrate that the performance of the complete system of cable and joints is appropriate for the service duty for which the system is installed.

3.5.2 Core crosses or rolls required for circuit phasing purposes shall be accommodated within underground cable joints, not in cable boxes.

3.5.3 Small wiring shall be ferruled in accordance with ENA BEBS S12.

3.6 Protection & Substation Control

3.6.1 The type of protection and control systems to be applied shall be discussed and agreed with the Engineer prior to the formal submission of an 'Outline Plan of Works' as described in ES210.

3.6.2 All protection systems shall comply with Electricity North West's EPD350 and ES396.

3.6.3 Protection settings and automation / control timings shall be agreed with Electricity North West prior to final commissioning.

3.6.4 Control and relay panels shall comply with United Utilities' ES337.

3.7 Cable Entry to Substations

Cable entry to substations shall comply with the following criteria:

3.7.1 132/33kV cable entries to substations shall be made at the laying depth of the cable, using red plastic duct of at least 150 mm diameter complying Electricity North West's specification ES400D4. Joints in entry ducts are not permitted.

3.7.2 Bends in cable ducts shall be of no smaller radius than that permitted for the cable.

3.7.3 All entry ducts including any ducts for earth conductors shall be sealed against the ingress of gas after installation of the cable. Sealing shall be achieved by means approved by Electricity North West. "Rayflate" by Tyco Electronics is approved.

3.8 Routeing of cables in buildings

The following provisions apply where substations are sited such that 132/33kV cables to be adopted by Electricity North West, must be routed through buildings:

3.8.1 Ducts for 132/33kV cables within buildings shall be at least 150 mm in diameter complying Electricity North West's specification ES400D4. Where ducted cable routes change direction in buildings, draw pits at least 1.5 m square shall be provided, allowing for future repair or replacement of cables. No single run of duct within a building shall exceed 25 m between draw pits.

3.8.2 Alternatively, covered trenches may be used to route cables. On completion of cable work, cable trenches shall be filled with sand and covered with a 100mm thick screed.

3.8.3 Where 132/33kV cables are fixed to racks or cleated to walls, adequate mechanical protection shall be provided.

3.8.4 All cables shall be securely supported. Particular consideration shall be given to the secure support of cables in vertical runs.

3.9 132/33kV Switchgear for adoption by Electricity North West

3.9.1 132kV switchgear shall be of non-oil design. Approval for the use of specific types of switchgear shall be obtained, in writing, from the Engineer.

3.9.2 132kV Gas Insulated Switchgear (GIS) shall comply with Electricity North West's ES310.

3.9.3 33kV Switchgear shall comply with Electricity North West's ES312.

3.9.4 Substation, circuit and plant Identification shall as directed by the Engineer, prior to the commissioning of the equipment.

3.10 Substation Construction

3.10.1 All 132kV substation arrangements shall be discussed and agreed with the Engineer prior to the formal submission of an 'Outline Plan of Works' as described in ES210.

3.10.2 Substation designs shall ensure compliance with all relevant statutory regulations.

3.10.3 Buildings shall be of sufficient dimensions to ensure that the switchgear is capable of safe operation, inspection and maintenance.

3.10.4 Substation doors and any access doors or gates shall always open outwards and access to substations (including if appropriate access within buildings) shall be such that rapid egress of personnel is facilitated. Locking arrangements shall comply with Electricity North West CP 606 Procedure S16.

3.10.5 Substations shall be accessible by personnel authorised by Electricity North West at all times, including out of hours, and during weekends and public holidays.

3.10.6 Notices and nameplates shall comply with Electricity North West's ES356.

3.10.7 The substation shall be fitted with a low voltage electrical installation generally conforming with ES366, supply being provided, where necessary, by the customer. The actual requirements for those parts of the substation to be occupied by Electricity North West shall be agreed, in any particular case, between the designer of the substation and Electricity North West.

3.11 Metering

3.11.1 Metering for 132/33kV transformer connection, as shown in Fig. 1, Appendix A, shall be before the customer Exit Point with the metering ct's contained within the Electricity North West 33kV circuit breaker housing. The metering vt shall have a 110V secondary winding.

3.11.2 Metering for 132kV single and dual connection arrangements, as shown in Figs. 2 and 3, Appendix A, shall be before the customer Exit Point with the metering ct's contained within the Electricity North West 132kV circuit breaker. The metering vt shall be of the capacitor type with a 110V secondary winding.

3.11.3 Metering ct's and vt's shall comply with ES501.

3.11.4 Metering ct Burdens

In order to ensure the accuracy of metering, the burden of cts shall be restricted by limiting the length of multicore cables connecting the cts to the meter. The maximum permissible length of 2.5 mm2 multicore cable, measured from the flange mounted cabinet multicore cable gland to the meter panel cable gland , shall not exceed 40m for 1 A and 5 A rated cts.

3.12 Transformers & Ancillary Equipment for adoption by Electricity North West

3.12.1 Transformers shall be in accordance with Electricity North West's ES324.

3.12.2 Transformer neutral earthing resistors shall comply with ES350.

3.12.3 The initial utilisation factors shall not be less than 0.6.

3.13 Supplier

The Installer shall be responsible for ensuring that a Supplier is appointed on behalf on the User.

4. EQUIPMENT RECORDS

The Installer shall provide records of all equipment installed, using Form C of ES210 and marked upon the latest available edition of the Ordnance Survey map for the area, at 1/500 scale with any relevant detail shown on 1/250 enlargements. The colour codes and symbols to be used for marking shall comply with Electricity North West's' CP012.

5. DOCUMENTATION

Documentation shall be as described in ES210.

6. DOCUMENTS REFERENCED

6.1 Regulations (Statutory Instruments)

Electricity Safety, Quality and Continuity Regulations 2002

Electricity at Work Regulations 1989

6.2 Standards (British Standards and Energy Networks Association)

BS EN 60947-1 - Specification for Low Voltage Switchgear and Control Gear

ENA BEBS S12 - Specification for Standard Numbering for Small wiring for Switchgear and Transformers together with their Associated Relay and Control Panels

Note: The above standards may be obtained from the British Standards Institute or the Energy Networks Association as appropriate. They cannot be supplied by United Utilities

6.3 United Utilities' Documents

EPD333 - Supply System Earthing

EPD350 - Protection for 132kV, 33kV and 11/6.6kV Systems

CP012 - Electricity Geographical Information System (GIS)

CP606 - Procedure S16 - Substation & Switchgear Locks

ES210 - General Specification for Third Party Constructed New Connections, Extensions and Alterations

ES217 - 33kV Connection up to 90MVA

ES310 - Gas Insulated Switchgear

ES312 - 36kV Single Busbar Indoor Switchgear

ES324 - 132kV/Lower Voltage Transformers, Earthing / Auxiliary Transformers

ES337 - 19" Rack Control & Relay Panels for use in BSP & Primary Substations

ES350 - Neutral Earthing Resistors at BSP & Primary Substations

ES356 - Notices & Nameplates

ES366 - Heating and Lighting Installations in Primary Substations

ES396 - Protection in Primary Substations

ES400C10 - 33kV Distribution Cables

ES400D4 - Plastic Ducts, Conduit & Accessories

ES400E4 - Installation, Commissioning and Repair of Solid Type Underground Cables Operating on the LV and 6.6/11kV Systems, and the Restoration of Excavated Areas

ES400E5 - Installation, Commissioning and Repair of Underground Cables Operating at 33kV and 132kV, and the Restoration of Excavated Areas

ES501 - Metering Current & Voltage Transformers

7. KEYWORDS

132kV; 33kV; third party; connection;

APPENDIX A

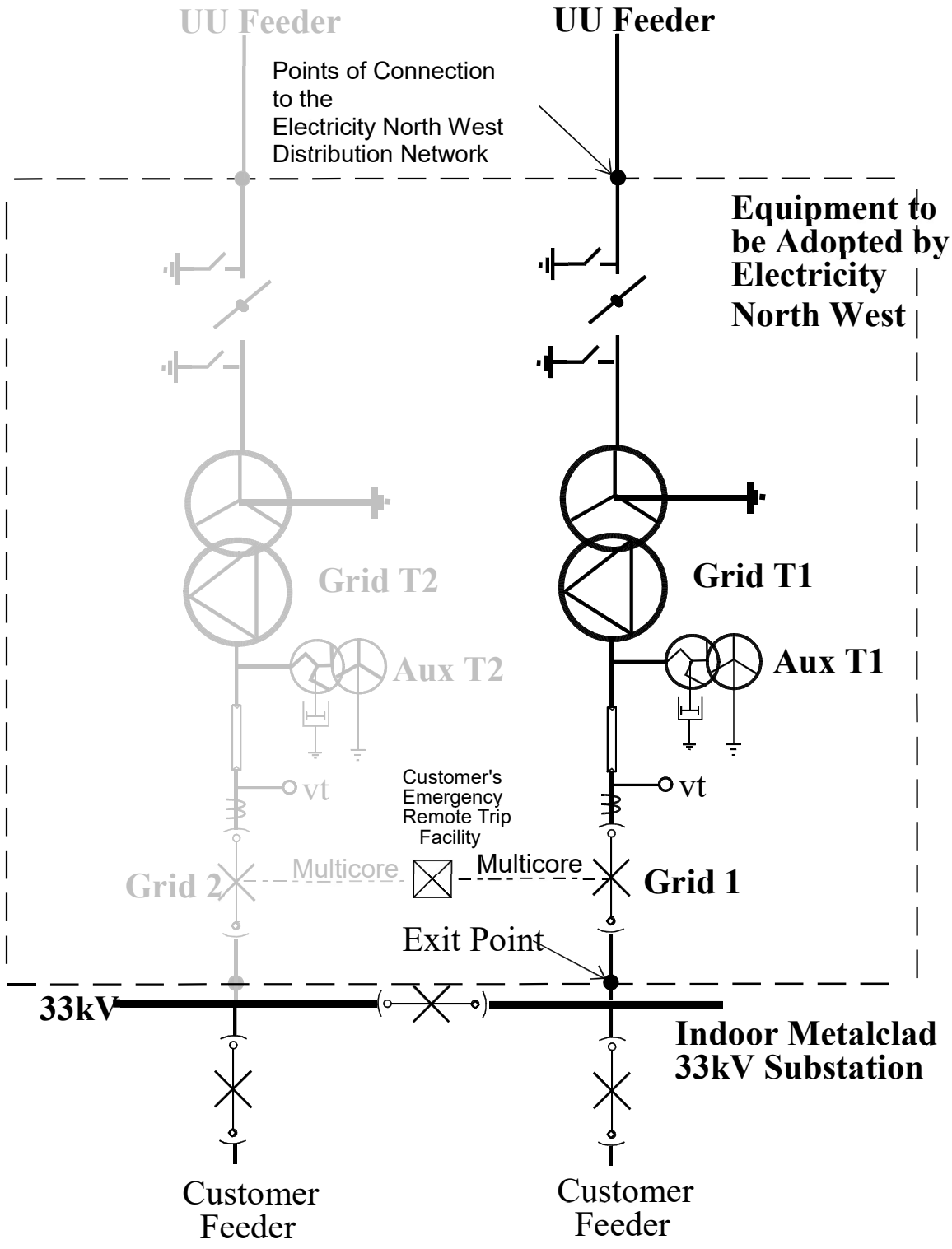

Fig. 1 Example of a 132/33kV Transformer Connection Arrangement

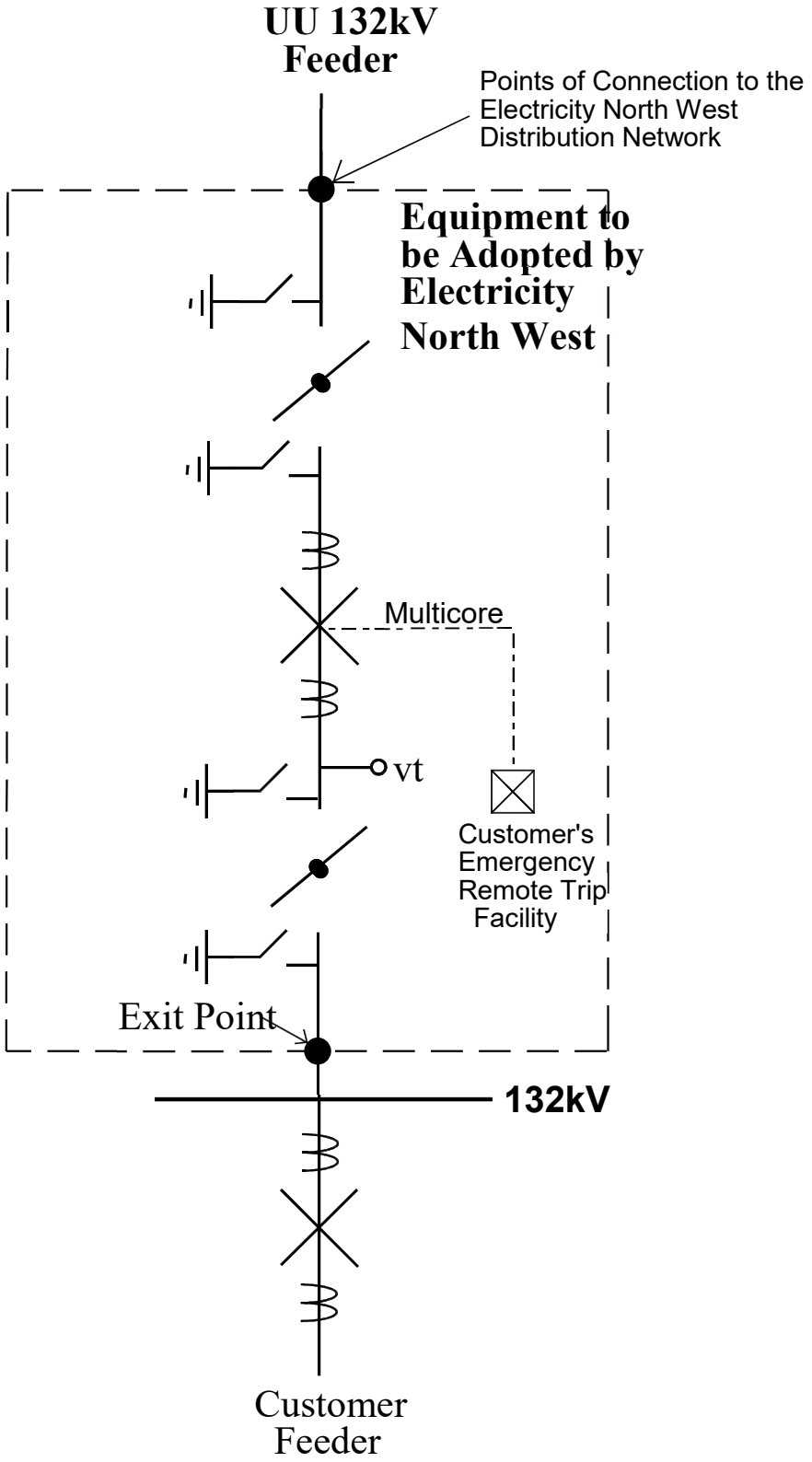

Fig. 2 Example of a Single 132kV Connection Arrangement

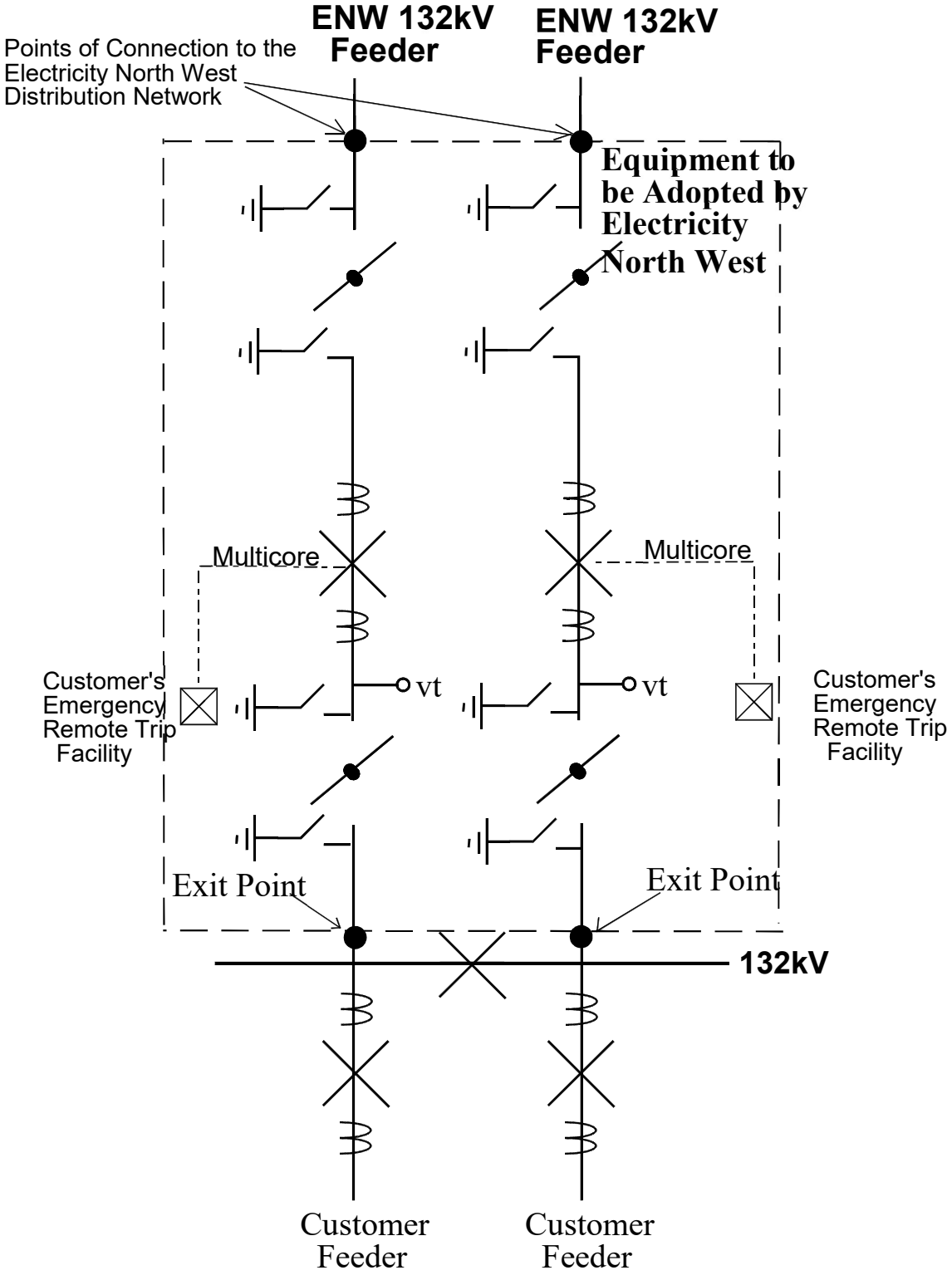

Fig. 3 Example of a Dual 132kV Connection Arrangement