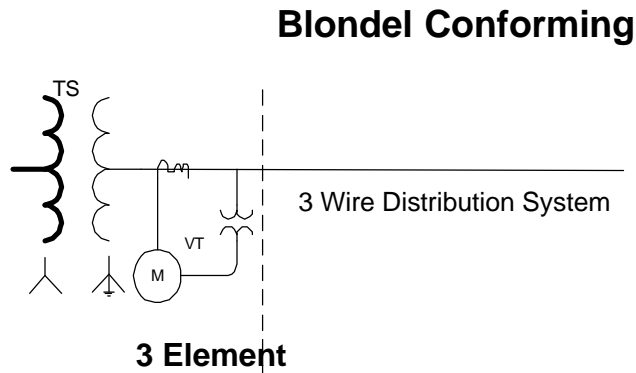




Blondel Conformance

Consumers' Perspective

Figure C-1 Example

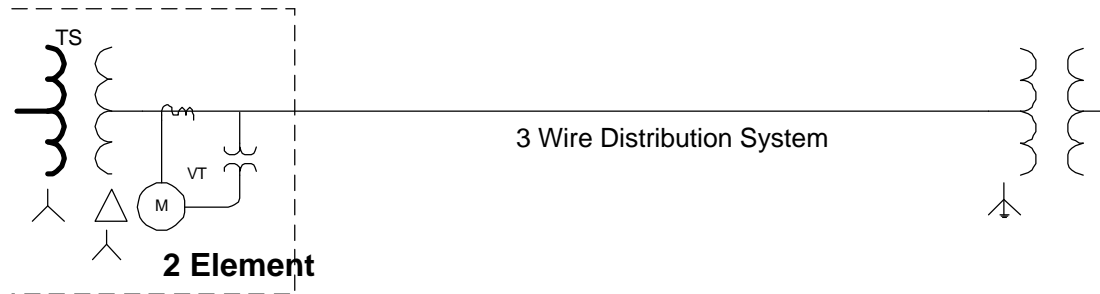


Transformer station (TS) has a wye secondary that is grounded through impedance or is solidly grounded. The ground/neutral is not brought outside the transformer station. Metering installation located inside the transformer station consists of three current transformers and three voltage transformers connected phase to ground/neutral and are inputs to a 3 element meter.

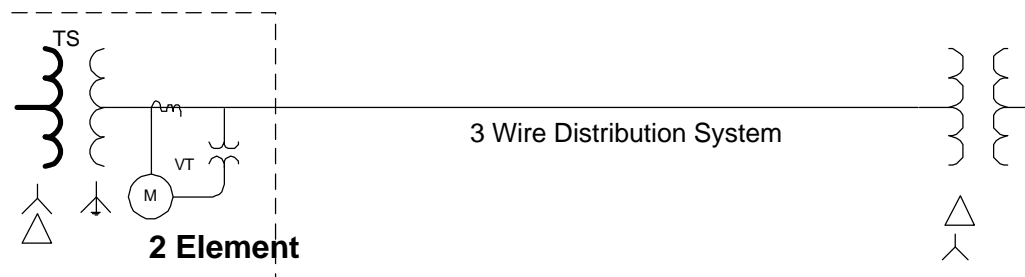
3 Wire Distribution System supplies delta or wye ungrounded loads.
Metering installations located within the distribution system are 2 element.

Load-end Considerations

Blondel Conforming



Blondel NON- Conforming ??



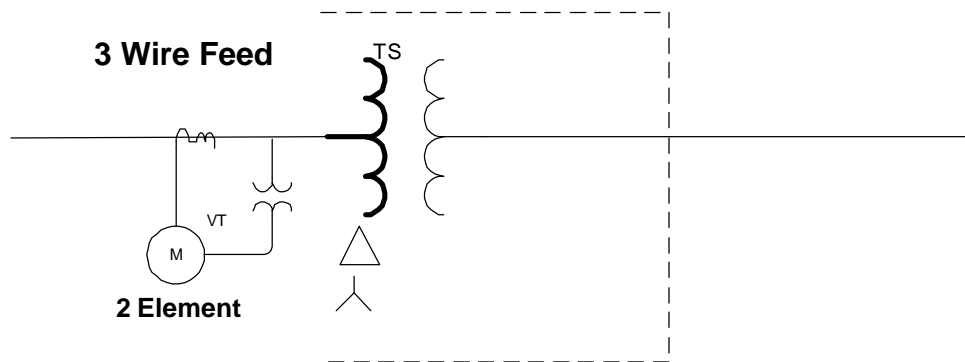
What makes this non-conforming ?

What effect does skywire have on Blondel conformance in these cases ?



High Voltage Metering

Blondel NON-Conforming ???



MSPs are specifying 3-element if major upgrade required

But what about ?

- 3 Wire Distribution System supplies delta or wye ungrounded loads. Metering installations located within the distribution system are 2 element.
- Does this mean this installation is “Blondel conforming” ?

Other cases

1.1.1 Elements Required in Typical Cases

New *metering installations* in the *IMO-administered market* shall conform with *Blondel's Theorem*. The table below lists the number of elements required to conform with *Blondel's Theorem* in typical cases:

Type of Power <u>Source</u>	Load end not considered ?	Elements Required
Three wire delta		2
Ungrounded wye		2
Solidly grounded wye	Really depends on load connection !	3
Wye grounded through impedance		3
Distribution circuit (three phases and a neutral)		3
Three-phase transmission circuit with grounded skywire or counterpoise		3

What has the skywire got to do with it if:

- Source is delta or ungrounded wye ?
- Load end is delta or ungrounded wye ?

Conditions of non-Blondel

Considerations for Installations that do not Comply with Blondel's Theorem

Subject to specific site approval by the *IMO*, as detailed in section 4.4, the following Non-Blondel-Compliant installations will be considered for registration:

- d) Two-element metering installation located at the transformer station where the power system neutral/ground is available but not used --- using two current transformers and two voltage transformers connected phase to phase and a two-element *meter*.

What is the interpretation of “ground is available but not used”

What does this mean about:

- Skywire where load is connected delta or ungrounded wye
- metal-armoured distribution cables ?

Non-Blondel Metering Requirements

The requirements for registration are:

- a). the magnitude of maximum error shall be determined and submitted to the *IMO* for approval;

What about the case in which Blondel conformance can be shown ?

Costs

- Blondel widely used to reduce costs of metering
 - Has this changed ?
- 3-element being prescribed where unnecessary
- MEC evaluation on grounded wye source systems unnecessary when load is Δ or ungrounded Y
 - Estimated cost is \$__,000 / meter point
 - Not value-added

Who Pays ?

Technical Sub-committee ?	Just advise
IMO ?	Doesn't have to pay
Transmitters ?	Cost-based regulation - pass on to customer
LDC ?	
Consumers ?	End up paying Cannot pass on to customer

Requirements must be value-added
and
Cost-effective

Recommendations

- Add HV Δ or ungrounded Y as Blondel conforming with 2-element
- Add grounded Y source to Δ or ungrounded Y load as Blondel conforming with 2-element
 - Eliminates MEC evaluation
 - Removes requirements for 3-element upon major upgrade
- Consider load connection details as evidence of Blondel conformance