

Bulletin 10-23-2
Grounding & bonding in farms
Rules 10-208(2) and 10-406(5)

Issued May 2016
Supersedes Bulletin 10-23-1

Scope

- (1) Grounding and bonding in milking areas
- (2) Grounding and bonding in buildings housing livestock

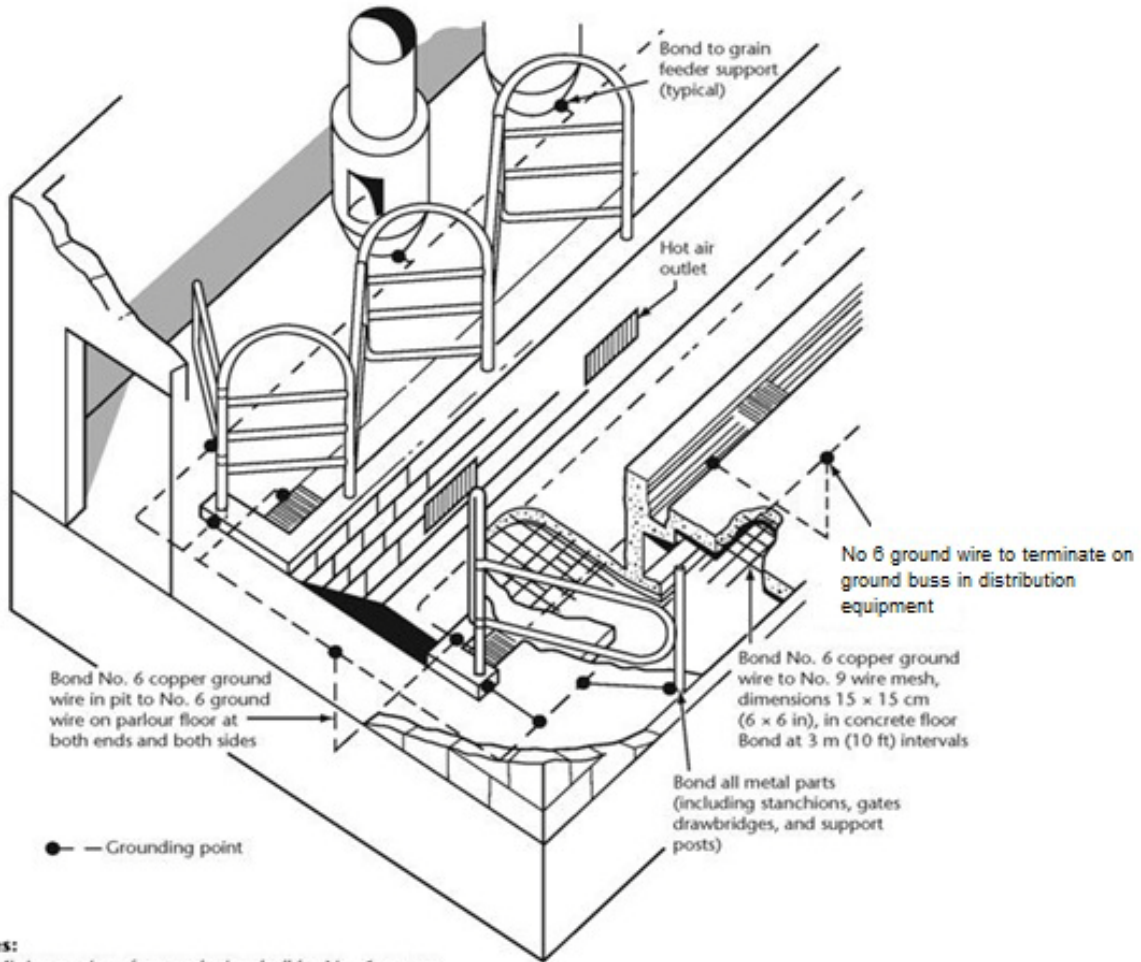
(1) Grounding and bonding in milking areas

Issue

The bonding requirements of Rule 10-406(5), in some cases, have been found to be insufficient to mitigate the effects of stray voltage in milking areas of buildings housing livestock. In addition to the minimum requirements of Rule 10-406(5), the Electrical Safety Authority (ESA) recommends the following;

- (1) Livestock waterers, wire mesh, grates, metallic water pipes, stanchions, water bowls, vacuum lines, grain feeders, gates, support posts, and other metals shall be bonded together by a separate stranded copper conductor not smaller than No. 6 AWG.
- (2) The metallic equipment bonded together as specified above shall be connected to the ground buss at the distribution panel by a separate copper conductor not smaller than No. 6 AWG. See Diagram B1.
- (3) In milking parlours, concrete floors are recommended to have a No. 9 gauge wire mesh, dimensions 15 cm x 15 cm (6 in x 6 in), and bonding should comply with the above requirements. See Diagram B2.

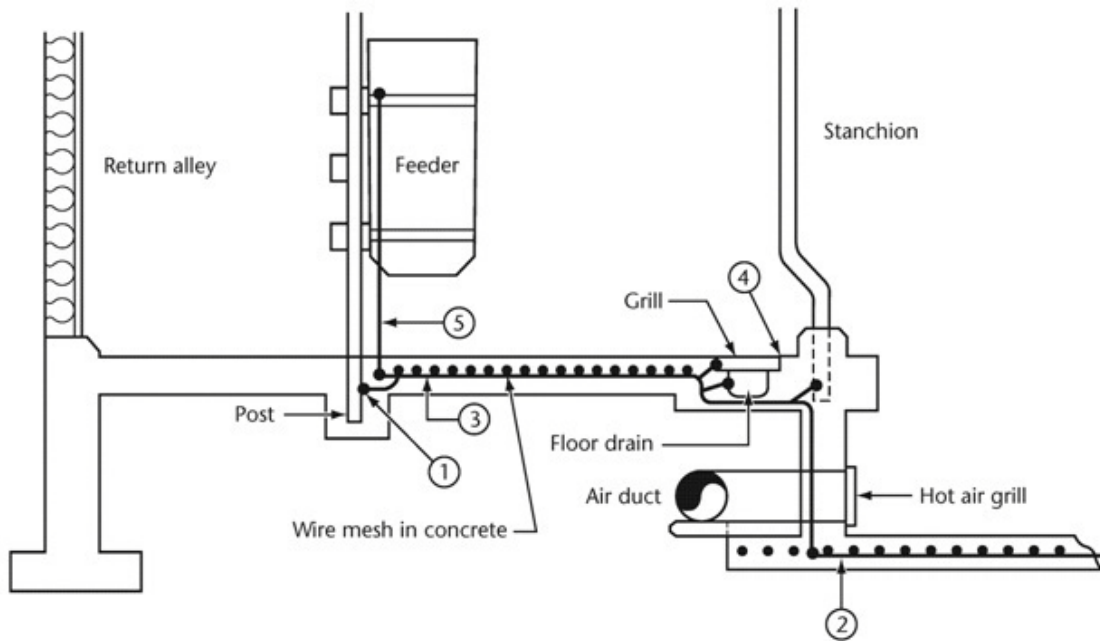
Diagram B1 – Grounding & bonding in milking areas



Notes:

- (1) Minimum size of ground wire shall be No. 6 copper.
- (2) Wire mesh shall be No. 9 gauge, dimensions 15 × 15 cm (6 × 6 in).
- (3) Wire mesh shall be bonded to ground wire at maximum intervals of 3 m (10 ft).
- (4) All steel posts, gate posts, support posts, feeder brackets, etc., shall be bonded to ground wire.
- (5) Angle iron grate supports for floor drains shall be bonded at both ends of parlour and both sides of grate.
- (6) Ground loop on floor of pit shall be connected to ground loop on floor parlour at both ends and both sides.
- (7) Grounding conductor size is given in American wire gauge.
- (8) For new and reconditioned existing parlours, wire mesh shall have concrete cover of 75 mm (3 in).

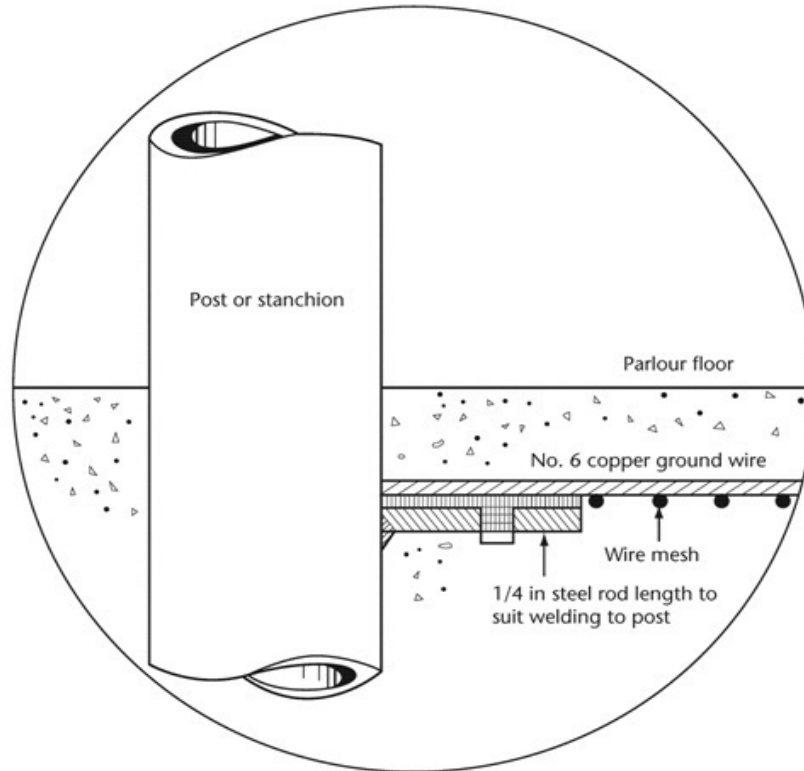
Diagram B2- Wire mesh in concrete floors



Notes:

- (1) All metal parts shall be bonded (including stanchion gates, drawbridges, and support posts).
- (2) No. 6 copper wire in parlour floor shall be bonded to No. 6 copper wire in pit at both ends and both sides.
- (3) No. 6 copper ground wire shall be bonded to No. 9 wire mesh, dimensions 15 × 15 cm (6 × 6 in), in concrete floor at 3 m (10 ft) intervals.
- (4) Angle iron grate supports for floor drains shall be bonded at both ends of parlour and both sides of grate.
- (5) See Detail 1.

Detail 1



Wire mesh, ground wire, and 1/4 in steel rod shall all be welded to ensure circuit continuity.

1/4 in round steel rod shall be welded to feeder — down to mesh.

1/4 in rod, mesh, and No. 6 copper ground wire shall be welded together, 2 per side.

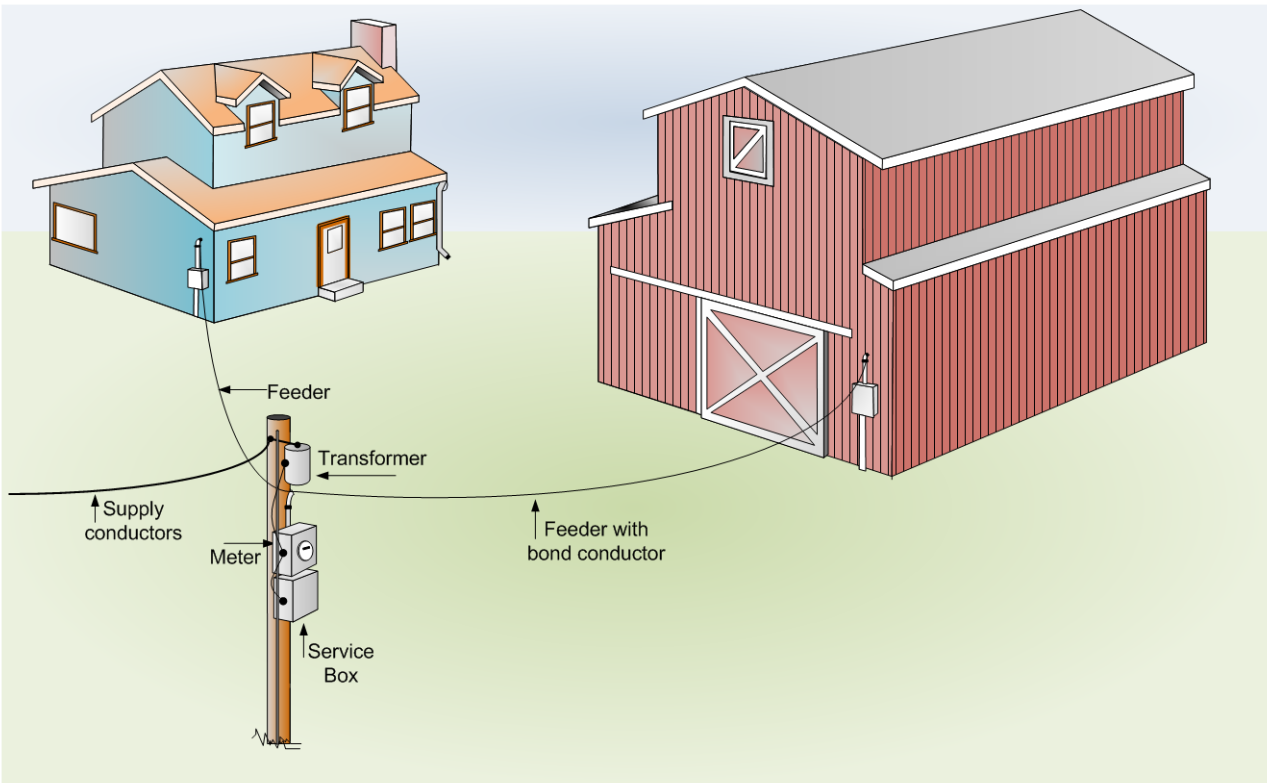
(2) Grounding and bonding in buildings housing livestock

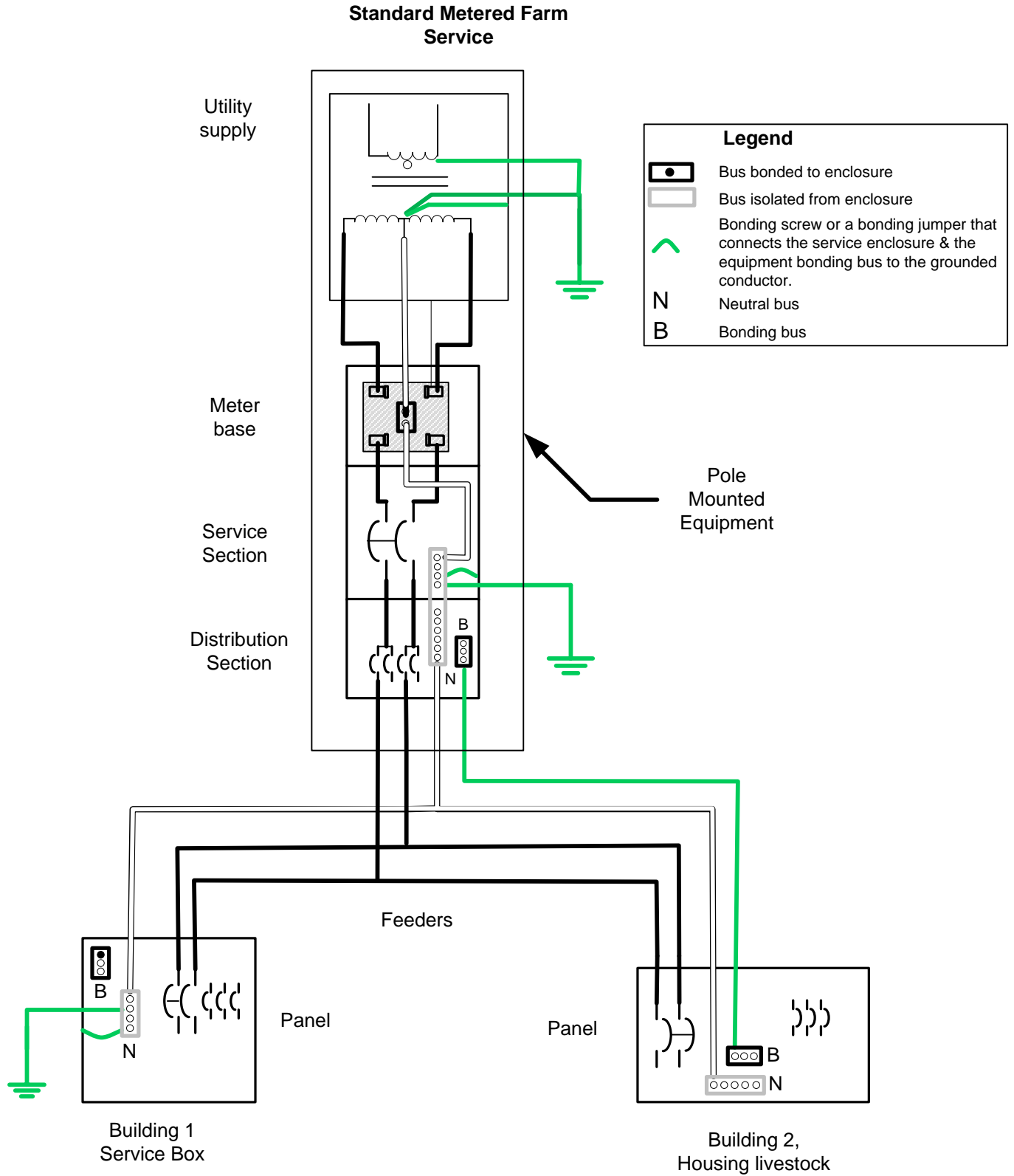
Background

For new installations, on properties with multiple buildings, the practice of neutral grounding in buildings housing livestock is not permitted. Rule 10-208(2) mandates that a bonding conductor be installed with the feeder or branch circuit feeding buildings housing livestock when supplied from distribution equipment.

See Diagram B3 for examples of farm service wiring and grounding requirements where a building housing livestock is present:

Diagram B3 – Grounding & bonding in a building housing livestock supplied from a farm service





Farm installations utilizing a Central Metering System (CMS) must be considered carefully given a grounding electrode shall not be installed at the building housing livestock. For installations employing a CMS where buildings housing livestock are present a bonding conductor shall be provided with the feeder conductors. Given this requirement the building housing livestock shall be fed from distributions equipment that includes provisions for the distribution of the bonding conductor. For example, Diagram B4 shows a building housing livestock fed from the distribution equipment in another building.

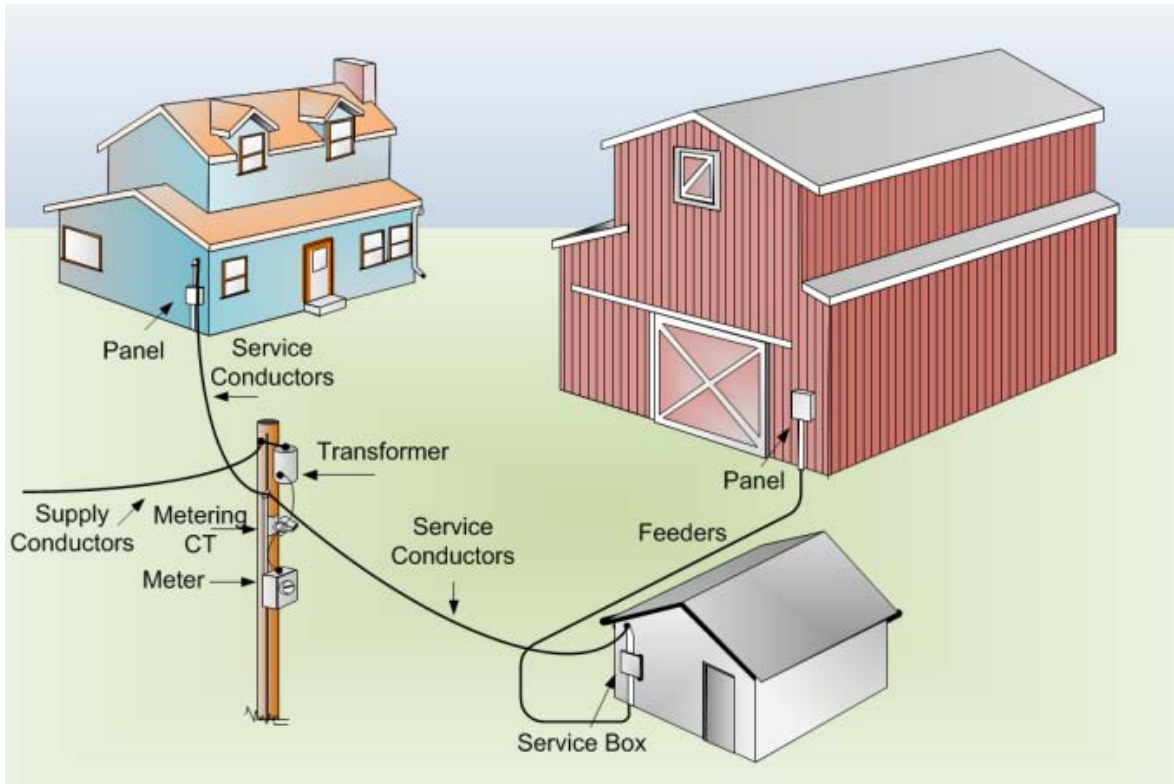
Caution:

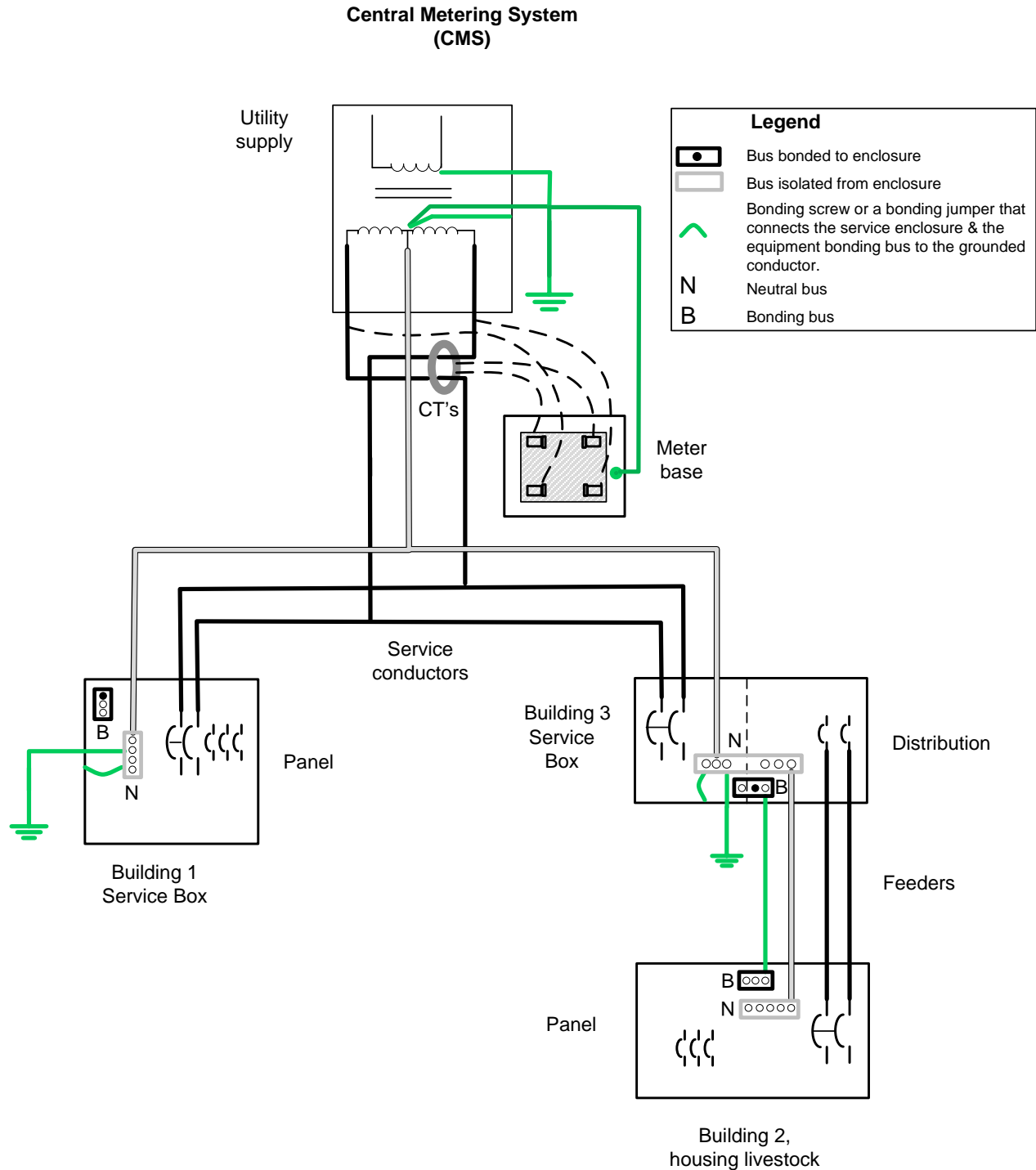
If the distribution equipment installed in the building housing livestock is service entrance rated, the bond screw or jumper joining the enclosure to the neutral block shall be removed.

Where overhead conductors are used to distribute 3-wire 120/240 V feeders, acceptable methods of installations for the conductors feeding a building housing livestock include:

- triplex, for example triplex Type NS75, a bonding conductor shall be lashed over triplex conductors; or
- quadruplex, for example quadruplex Type NS75, a bonding conductor is permitted to be bare. A neutral conductor is required to be insulated, Rule 4-022, and properly identified, Rule 4-030.

Diagram B4 – Grounding & bonding in a building housing livestock supplied from CMS





Rationale

It has been demonstrated that the use of the bonding conductor run with the feeder conductors provides superior safety performance for livestock. The fact that the earth serves as a parallel path for neutral currents back to source is to be considered as a cause for stray current problems for livestock. It has been well recognized and proven that re-establishing neutral grounding in buildings housing livestock, does not eliminate problems with voltage transients and tingle voltage which has an adverse effect on livestock. However, this method of grounding will not mitigate the utility source stray currents.