Application of Low Voltage Spreaders

INTERIM INSTRUCTION # AMS 2020/001

Document Control		
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STAKEHOLDERS *The following positions shall be consulted if an update or review is required:*	
Manager Asset Services	Works Delivery Managers
Manager Safety and Wellbeing	Field Practices Coordinator
Regional Managers	EPCM Contracts Manager
Asset Managers	

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1. OVERVIEW

Conductor clashing can not only cause damage to equipment, it can also impose safety risk including blackouts and bushfire. Most frequently, conductor clashing takes place as a result of inadequate clearances between adjacent conductors. For this reason, Low Voltage (LV) spreaders have historically been used in occasions where adjacent LV conductors are suspected to be too close to one another.

In-line with Horizon Power's Distribution Design Rules, any new low-voltage overhead circuit shall be built using LV ABC. LV bare conductors may still be used under exceptional circumstance. However, any new LV circuit utilising LV bare conductors must be designed to meet AS7000 without having to rely on use of LV spreaders.

The use of LV spreaders as a conductor clashing prevention strategy must therefore be limited to existing LV circuits. This document provides an interim application guide for LV spreaders.

2. APPLICATION

The application of LV spreaders on existing LV span can be considered where:

1. It has been identified as the most economically and practically justifiable option to implement. This typically involves situations where undergrounding and immediate re-conductoring with LV ABC is found to be cost prohibitive and one or more of the following apply:
    a. The span length is in excess of 55m;
    b. Historically there has been known clashing or the installation is within high fire risk area or an area deemed to have high-risk of clashing due to reason such as:
        i. Heavy vegetation/overhanging trees;
        ii. Use of dissimilar conductors on same span;
        iii. Separation distance between LV conductors of less than 0.535m (typical separation distance between LV conductors);
        iv. Transposition of conductors from a horizontal to a vertical arrangement.
2. Site assessment has been carried out to ensure that the associated conductors, cross-arms and poles are in good, serviceable condition

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3. SIMULATION

The need for an LV spreader as well as the number of LV spreader required for a particular span can be determined by performing the necessary simulation in Poles'n'Wires. A mid-span clearance assessment shall be performed based on:

1. Mid-span separation constant of :
   a. 0.4 in low fire-risk/non-cyclonic area or
   b. 0.6 in any other circumstance;
2. On-site measurements of attachment points in particular for:
   a. Scenario with least separation distance between the adjacent conductors;
   b. Scenario with greatest potential difference (voltage) between adjacent conductors
3. Conductor with the greatest sag (where there are dissimilar conductor used within the same span);
4. Conductor temperature of 50 deg C
5. On-site verified conductor tension (recommended) or otherwise conductor tension as per the following:
   a. For spans up to 55m:
      i. (Old) Copper – 10% tension (7/12)
      ii. AAC – 10% tension (7/2.75, 7/4.75, 19/3.25)
      iii. AAAC – 7% tension (7/2.75, 7/4.75, 19/3.25)
   b. For spans greater than 55m:
      i. (Old) Copper – 25% tension (7/12)
      ii. AAAC – 18% tension (7/2.75, 7/4.75, 19/3.25)

<u>IMPORTANT:</u> Additional assessment will be required where transposition of conductor from a horizontal to a vertical arrangement takes place – please request for assistance/review from the Standards group

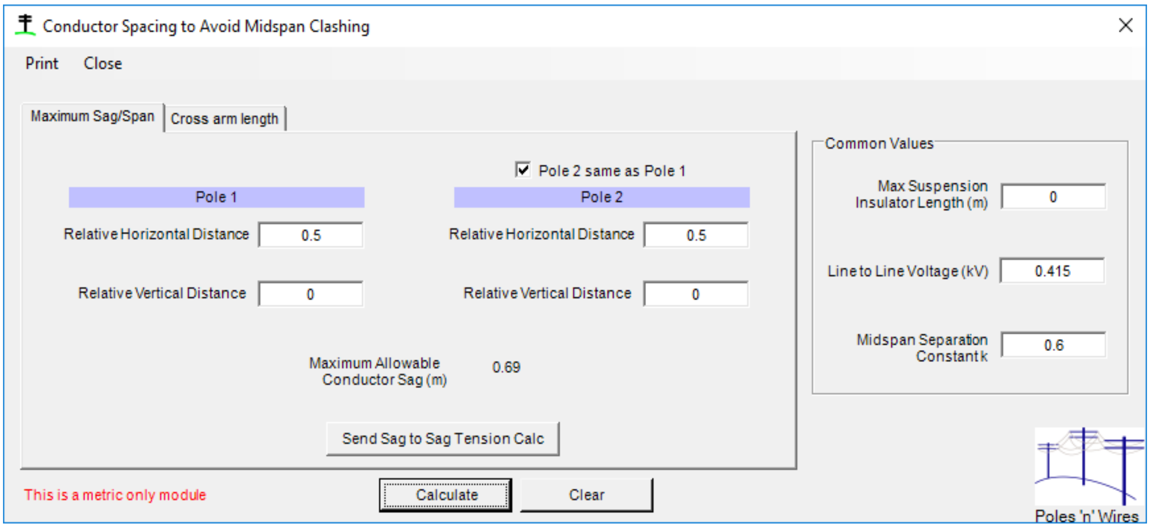
4. EXAMPLE

Consider the following scenario:

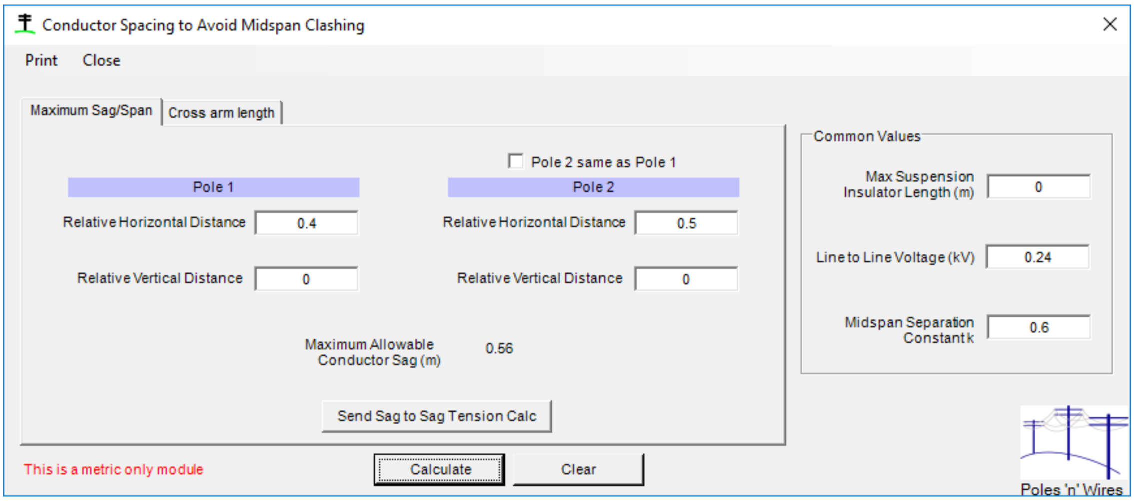
1. Bay length: 52m
2. Ruling span: 40m
3. Phase conductor: 7/12Cu
4. Neutral conductor: Moon (7/4.75 AAC)
5. Environment: Region A – heavily vegetated area
6. Construction arrangement on poles at both ends [Construction type (separation distance)]:
    a. Pole 1: intermediate x-arm (phase to phase: 0.5m; phase to neutral: 0.4m)
    b. Pole 2: intermediate x-arm (phase to phase: 0.5m; phase to neutral: 0.5m)

Solution:

1. Due to high fire risk area, a mid-span separation constant k of 0.6 is selected
2. The maximum allowable sag shall be checked for phase-to-phase and phase-to-neutral:
    a. Phase-to-phase (line-line voltage of 0.415kV)



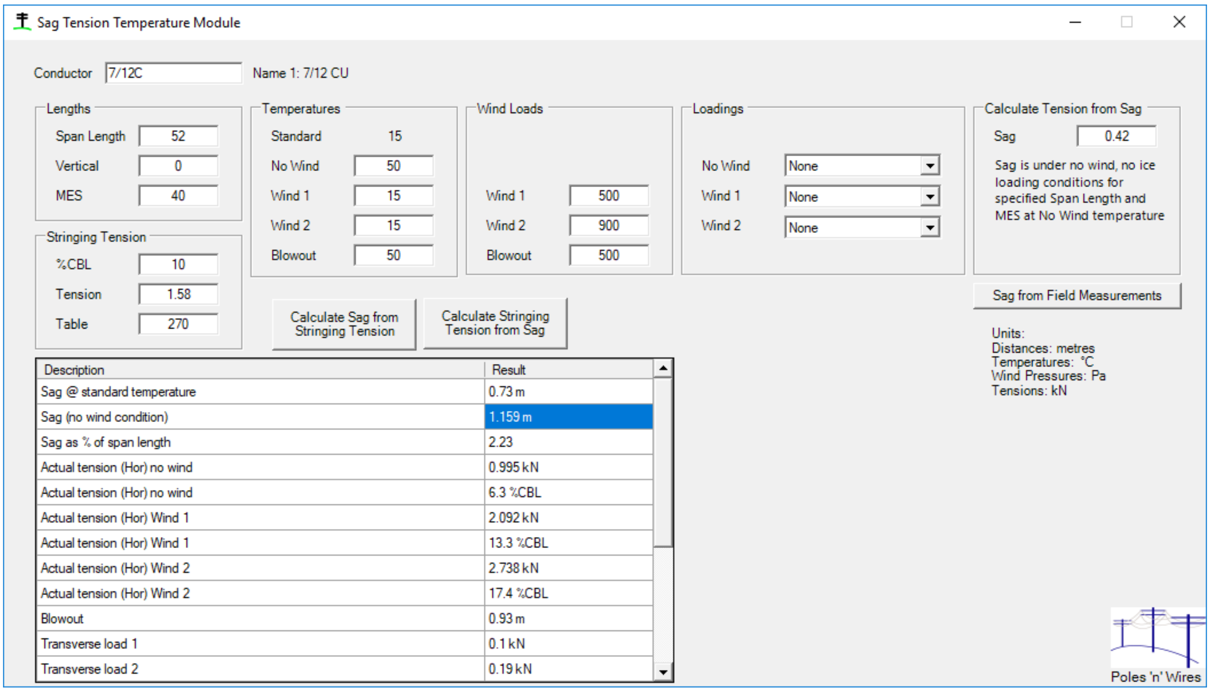
b. Phase-to-neutral (line-line voltage of 0.240kV)



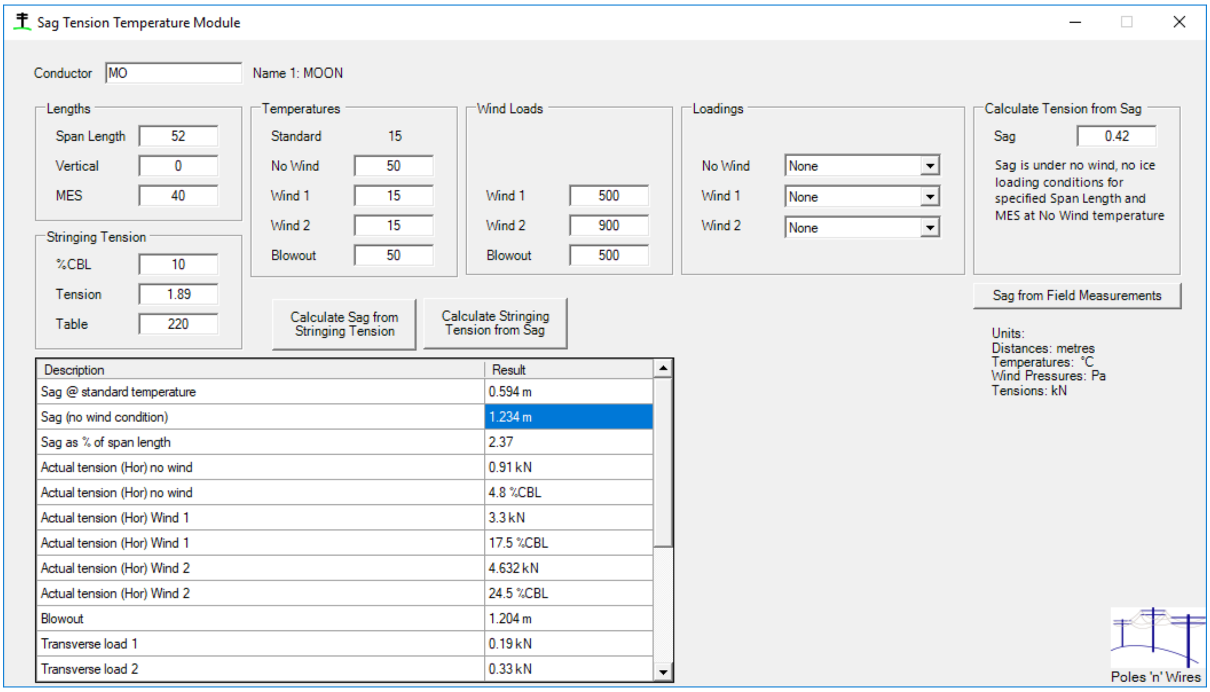
Based on the above, the phase-to-neutral presents the worst case scenario of allowable conductor sag.

3. As dissimilar conductor is used in the same span, an assessment must be carried out to determine the one with the greater sag. Given a ruling span of 40m, the applicable tension for both conductors is 10%. Setting the conductor temperature to 50deg C under no wind condition yield the following results:

a. 7/12Cu



b. Moon



Description	Result
Sag @ standard temperature	0.594 m
Sag (no wind condition)	1.234 m
Sag as % of span length	2.37
Actual tension (Hor) no wind	0.91 kN
Actual tension (Hor) no wind	4.8 %CBL
Actual tension (Hor) Wind 1	3.3 kN
Actual tension (Hor) Wind 1	17.5 %CBL
Actual tension (Hor) Wind 2	4.632 kN
Actual tension (Hor) Wind 2	24.5 %CBL
Blowout	1.204 m
Transverse load 1	0.19 kN
Transverse load 2	0.33 kN

Any breach on the maximum allowable sags suggests there is a need for an LV spreader. Since both conditions are breached in this particular scenario, an LV spreader can be recommended:

1. Phase to phase check: 1.159m > 0.69m
2. Phase to neutral check: 1.234m > 0.56m

5. DUE DATE

This interim instruction is effective on the date it is approved.

6. WITHDRAWAL OF THIS INTERIM INSTRUCTION

This interim instruction will be withdrawn from publication 6 months after the Distribution Design Rules has been aligned and amended.

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