

IEEE Std 738-2006

“IEEE Standard for Calculating Current-Temperature Relationship of Bare Overhead Conductors”

– An Overview

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Monday, July 27, 2009

Conductors and Accessories WG Meeting

Calgary Telus Convention Centre South – Macleod, Hall E4

Calgary, Alberta, Canada

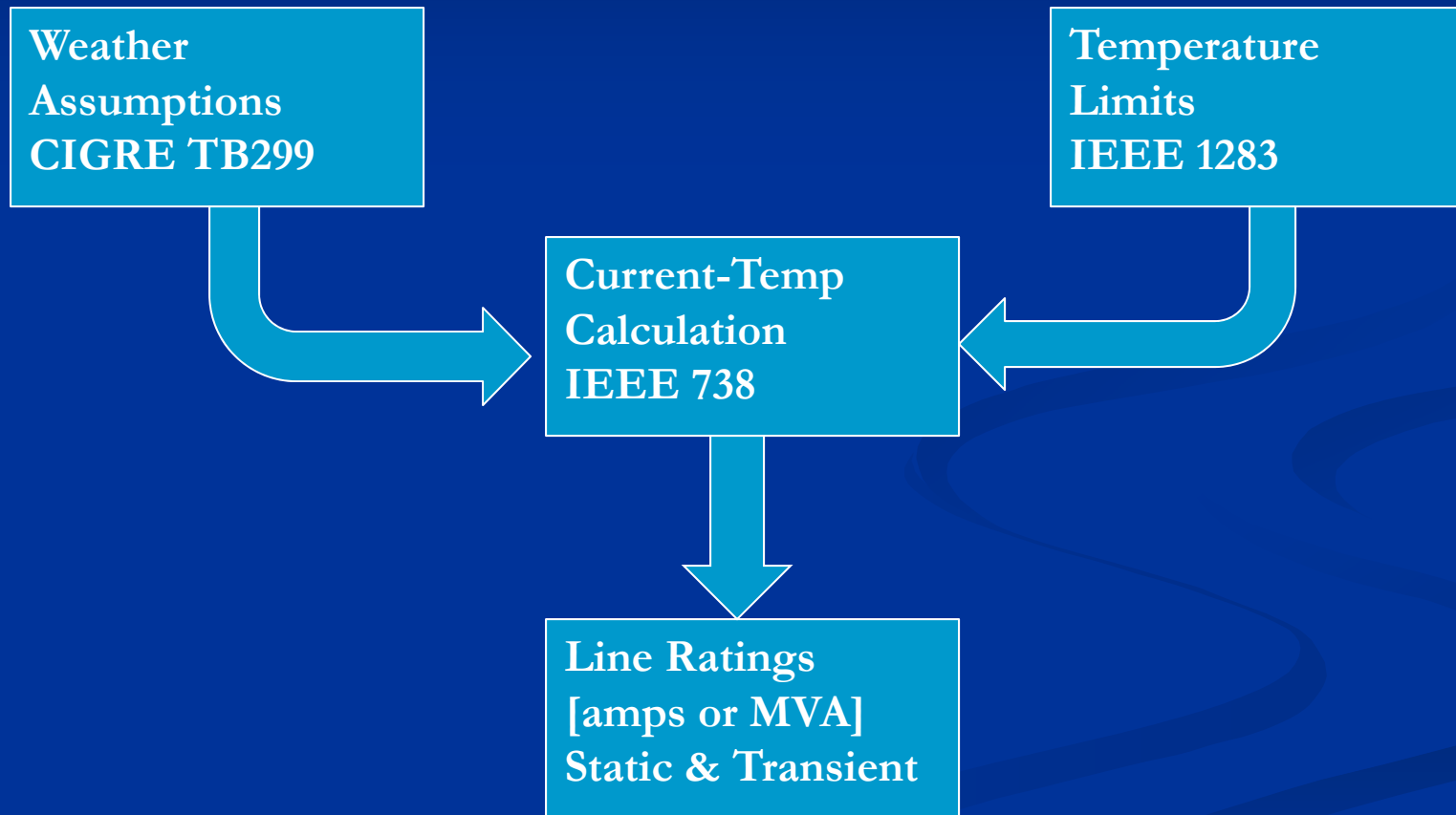


IEEE Std 738 - Purpose and Type

- This standard is entirely analytical. It provides a mathematical method by which the temperature of a bare overhead conductor may be related to the current through it for specified weather conditions.
- It is used by most utilities in North America to determine both steady-state and transient line ratings but it does not recommend rating weather assumptions nor does it suggest conductor temperature limits.



IEEE Line Rating Method



IEEE Std 738 - Deliverables

- The analytical methods provided in the standard allow both hand and numerical calculations.
- A simple numerical BASIC program is attached to illustrate the numerical method.
- An example problem is included



IEEE Std 738 - Outline

- History & Background
- Definitions of terms and parameters
- Heat Balance – Steady & Transient
- Heat Loss Terms – Convection, etc.
- Heat Input - Solar & I^2R losses
- Input Data – Weather and T_{max}



Convection Heat Loss

Natural

$$q_{\text{cn}} = 0.283 \rho_f^{0.5} D^{0.75} (T_c - T_a)^{1.25} \text{ W/ft}$$

Forced

$$q_{\text{cf}} = \left[0.1695 \left(\frac{D \rho_f V_w}{\mu_f} \right)^{0.6} k_f K_{\text{angle}} (T_c - T_a) \right] \text{ W/ft}$$

Steady-State Rating Example

$$q_c = 25.1 \text{ W/ft}$$

$$q_r = 7.461 \text{ W/ft}$$

$$q_s = 4.26 \text{ W/ft (from equations)}$$

$$R(100) = 2.862 \times 10^{-5} \text{ } \Omega/\text{ft}$$

$$I = \sqrt{\frac{25.1 + 7.46 - 4.26}{2.862 \times 10^{-5}}}$$

$$I = 994 \text{ A}$$

IEEE Std 738 - Status (as of Summer 2009)

- A task force has been working on a revision of 738 since 2007.
- A first draft of the revised standard was prepared for discussion at this meeting.
- We will be asking for permission to submit a PAR at this meeting in Calgary.
- Likely balloted in 2010



Questions??

