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Transformer Loading Capability vs Transformer Rating: Resolving a 100-year-old dilemma

Part I

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ABSTRACT

Transformer Rating and Loading Capability are often treated as interchangeable, even though they describe two different things: an assigned limit and what a transformer can physically carry under specified conditions. The first part of this column looks back at the earliest transformer rating standards and loading guidance to show how the distinction emerged and why the terminology became blurred. It then follows the development of real-time thermal rating in overhead-line practice and compares how rating is understood for cables, overhead lines and transformers. Examples from PJM and EPRI show how calculated transformer loading capability can become an operating rating, or simply be erroneously labeled as one. The discussion will continue in the second part, to be published in an upcoming issue of Transformer Magazine. The proposed definitions of key terms are included in the upcoming issue.

KEYWORDS:

transformer rating, loading capability, dynamic rating, terminology, dynamic transformer ratings, rating methodology

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1. Opening

Back in 2006, at one of the Transformer Committee meetings, I did something a little unusual. I walked around and asked a few dozen transformer experts, smart, experienced, respected people, to define "Dynamic Rating" for me and how it is different from Dynamic Loading Capability. I got almost as many different answers as people I asked.

Some called it a technology, others said it was a system, and one or two got philosophical and called it a "paradigm shift" (which, for the record, is usually a sign that nobody actually knows what something means). But the answer that really struck me was the majority view: that Dynamic Rating and Dynamic Loading Capability are basically the same thing, just two terms for one idea.

The truth is: they are not. We have been using two terms to describe two genuinely different things for so long that most of the industry no longer notices the difference.

So, let's clear this up. Underneath this messy terminology is an actually important distinction: the difference between what a transformer can do and what we have agreed it is allowed to do, on paper.

2. The car and the roadside sign

Picture a supercar on an open road (Figure 1). The car's absolute top speed is a physical property of the vehicle. The speedometer shows how fast the car is travelling, but the maximum speed marked on it does not necessarily indicate the car's mechanical capability. In transformer terms, this is similar to **Loading Capability**: the maximum load that the transformer can physically carry under specified conditions.

Now picture a roadside sign displaying a speed limit. The sign says nothing about the mechanical capability of the car. It reflects risk tolerance, liability, road conditions, and the judgement of the authority that sets the limit. In transformer terms, that number is the **Rating**.

Loading Capability describes what the transformer can carry under defined thermal and operating conditions, while Rating is the limit assigned for use in planning and operation



Figure 1. Car analogy for transformer loading capability and rating. The car's maximum safe speed under specified conditions represents loading capability; the posted speed limit represents the authorised rating. The two values need not be equal.

In simple terms, Loading Capability describes what the transformer can carry under defined thermal and operating conditions, while Rating is the limit assigned for use in planning and operation.

This distinction between capability and rating appears in transformer standards, loading guides, monitoring systems and, more recently, in the development of Dynamic Transformer Ratings.

3. A 100-year-old question, asked again in 2026

This is not a new debate, and it was not revived specifically for this article. In 2026, Ildar Daminov, Tim Gradnik and Tor Laneryd reviewed the modern literature on Dynamic Thermal Rating (DTR) of power transformers for a CIGRE technical brochure [1]. They found that the terminology used in this field remains far from settled. Terms such as loading capability, transfer capacity, dynamic thermal rating, overload capacity and thermal limit are often used interchangeably or sometimes with different meanings. Their conclusion was clear: "*Although many specialists may confirm that there is a difference between these notions, there is no universal explanation of such difference, to the best of our knowledge*." The authors did not attempt to resolve the ambiguity. Instead, they traced it back more than one hundred years, to the earliest conceptual papers on transformer ratings. They wrote: "*The distinction between rating and capacity is a more-than-100-year-old question that was discussed in the earliest conceptual papers on transformer ratings.*" So, they called for "*a comprehensive discussion paper, similar to the foundational documents seen in early transformer literature,*" as a first step towards consolidating the arguments now scattered through publications and professional discussions.

This article has accepted that invitation.

4. When it all started

To understand how this distinction became blurred, we need to return to 1925. In that year, the American Institute of Electrical Engineers issued AIEE Standard No. 13, the first standard written specifically for transformers, induction regulators and reactors. The document was revised in 1930 as AIEE No. 13-1930 [2],

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Standards for Transformers, Induction Regulators and Reactors. It is a direct predecessor of today's IEEE C57.12.00 [3].

AIEE No. 13-1930 is important because it gave a formal definition of transformer rating. At the same time, it shows an early difficulty that remains with us today: the difference between a rating assigned under standard conditions and the loading that a transformer may carry in service under changing conditions.

Under the heading RATING, AIEE No. 13-1930 contains eleven paragraphs dealing with transformer rating. The first, Paragraph 13-150, states:

> *"A rating of a machine, apparatus or device is an arbitrary designation of an operating limit. For transformers specifically, the rating is the output, together with associated characteristics such as voltage, current, frequency, and power factor, assigned by the maker".* The standard further explains: *"rating is arbitrary in the sense that it must necessarily be established by definite fixed standards and cannot, therefore, indicate the safe operating limit under all conditions that may occur in service".*

In other words, rating is a declared designation. It is not a measure of the loading that a transformer may be capable of carrying at a particular time in service.

The expression "arbitrary designation" is significant because it recognises that a transformer rating is assigned under defined conditions. It provides a common basis for design, procurement, comparison of offers, acceptance testing and guaranteed performance. Using the analogy introduced earlier, rating is the number on the roadside sign, not the maximum speed that the car may be capable of achieving under the prevailing conditions.

The following paragraphs, however, introduce categories of rating that are closely connected with operating duty, and this is where the distinction between assigned rating and loading capability becomes less clear.

After defining rating as an arbitrary designation, the standard recognises several further categories: **continuous rating, nominal rating, short-time rating and grounding-transformer rating, set out in §§13-151 to 13-155** [2]. These categories do not just identify the nameplate quantity, but also describe the load that may be carried, the applicable duration and, in some cases, the associated thermal limitation.

The same term, *rating*, is therefore used for both the assigned kVA quantity and time-dependent operating duty. While this does not make the standard internally inconsistent, it does make the distinction between rating and loading capability less explicit.

The issue was already under discussion in 1928. A proposal was made to amend the rating standard by adding an appendix titled "Recommendations for the Operation of Transformers." The

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proposal would have placed loading-related operating guidance within the same document as the fixed rating standard. It was this proposed connection between rating rules and operating rules that Walter Dann, a Westinghouse engineer, Fellow of AIEE and former Chairman of the Transformer Subcommittee, addressed directly in his 1930 paper "*Operating Transformers by Temperature* ". [4].

4.1 Walter Dann on rating and operation

In his paper [4], Dann made a clear distinction between rating standards and operating rules. He stated:

> *"There is a distinct difference between rating standards and authorized rules for operation," Dann wrote. "Standards for Rating simply prescribe a measure of a machine under fixed and definite conditions… Rules for operation should take these changing conditions into account. Therefore, while the two sets of rules are not unrelated, they cannot be one and the same thing."*

Dann's point was not that loading guidance should simply appear in a different section of the document. He regarded rating and operation as different categories. Rating standards establish a standardised designation for procurement, guarantees and testing under fixed conditions, and operating rules deal with the conditions encountered in service.

He made the same point when describing the proposed Recommendations. They were *"not to be looked upon as rating standards"* and were "*not intended to be used in the purchase of transformers or to establish performance which is subject to guarantee and demonstration by test."* Their purpose was "*guidance in the safe operation of transformers in service under various conditions of ambient temperature."*

There is a clear difference. A transformer rating provides a defined reference quantity, while operating guidance determines how the transformer may be loaded when the conditions differ from those represented by that reference quantity. The two are related, but they are not the same thing.

The historical outcome is also relevant. The additional paragraphs **§§13-151 to 13-156** were later removed from the standard, and the proposed operating **Recommendations** did not become an appendix to it. The separation between rating standards and loading guidance therefore remained, although the terminology has continued to overlap.

4.2 The separation of rating and loading guidance

The debate at the time was not about whether transformer loading depended on temperature. That much was already understood. The real argument was institutional: should operating recommendations be incorporated into the standard itself, perhaps as an appendix, or should they remain outside the standard as guidance? The historical record suggests that consensus was never fully reached. The operating recommendations discussed in 1928 and defended by Walter Dann in 1930 did not become part of the 1930 rating standard in any lasting form.

This did not mean that operating guidance was rejected. On the contrary, the idea of loading transformers according to temperature continued to develop. V. M. Montsinger, another Fellow of AIEE, developed the temperature-based principles that helped establish the technical basis for transformer loading guidance. His 1930 paper, "*Loading Transformers by Temperature*", and his later work on transformer thermal characteristics and insulation life were important contributions to this development.

What changed was the place of this guidance in the industry's technical framework. Rating remained an assigned quantity established under standard conditions and loading guidance dealt with the conditions of service, including ambient temperature, load history and allowable duration. The two were related, but they served different purposes.

This distinction is central to the present discussion. In the early loading work, the assigned rating remained the reference point, while the operating guidance addressed permissible overload under changing service conditions.

5. Toward the loading guide

By the early 1940s, the Transformer Subcommittee was no longer trying to address overload operation by adding further categories of rating. The focus had moved to guidance for loading transformers in service.

The 1942 Interim Report on Guides for Overloading Transformers and Voltage Regulators [5] was prepared during wartime, when conserving critical materials and obtaining greater use from existing equipment were practical necessities. Its importance, however, went beyond that immediate context. The report addressed the maximum load that a transformer could carry above nameplate rating under specified service conditions.

This approach was carried forward in the 1945 Guides for Operation of Transformers, Regulators, and Reactors [6]. The rated kilovolt-ampere output remained the reference quantity, defined as the

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load deliverable continuously at rated secondary voltage without exceeding the prescribed temperature rise under test conditions. The guide then addressed the conditions under which additional loading could be permitted in service, particularly the effects of ambient temperature and loading duration.

The early loading work therefore retained the assigned rating as the reference point while providing a technical basis for permissible overload under changing service conditions.

6. 1977: The introduction of the dynamic rating concept

In 1977, Murray W. Davis, Fellow of IEEE and engineer at The Detroit Edison Company, published Part I of "*A New Thermal Rating Approach: The Real Time Thermal Rating System for Strategic Overhead Conductor Transmission Lines*" in IEEE Transactions on Power Apparatus and Systems [7]. Davis proposed a system that used actual meteorological data, conductor temperature and line loading to determine a real-time thermal rating for an overhead line.

Davis's system replaced assumed worst case weather condition with measured conditions. Conductor-temperature sensors and SCADA communications supplied data to a model that considered temperature history, loss of tensile strength, conductor sag and minimum-clearance requirements. The system also used a probabilistic loading forecast. Its result was called **a real-time thermal rating: a current limit calculated from prevailing conditions rather than from a fixed worst-case weather assumption**.

The use of the term "rating" in Davis's work reflects established cable and overhead-line practice. In cable engineering, the calculated permissible current-carrying capability is known as ampacity, and ampacity is the cable rating. Overhead-line practice adopted the same concept. The conductor ampacity, calculated from its temperature and mechanical limits under specified weather conditions, became the line rating. Davis's system did not change the quantity being determined. It replaced conservative assumed weather conditions with measured conditions and recalculated the ampacity, or line rating, in real time.

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Davis also noted that the same architecture could be extended "to include all elements of the power system, such as terminal equipment, power transformers, etc." He further suggested that a multichannel receiver could monitor the hot-spot temperature of power transformers or other power-system equipment.

This was an important development for the later concept of **Dynamic Thermal Rating**. It showed that an overhead-line rating could be recalculated from current conditions rather than remaining tied to conservative assumptions selected in advance. The approach was developed first for overhead conductors, but its thermal-modelling and real-time data architecture later influenced dynamic assessment of cables, transformers and complete transmission circuits.

6.1 Rating methodologies for cables, overhead lines and transformers

As we noted above, the development of dynamic thermal rating did not follow the same path for all electrical assets. Cables, overhead lines and transformers are governed by the same basic thermal principles, but their principal documents use the term "rating" in different ways.

For cables, the principal standards are directly concerned with calculating current rating. An important foundation was the 1957 paper by J. H. Neher and M. H. McGrath, "*The Calculation of the Temperature Rise and Load Capability of Cable Systems*" [8]. Their method related cable current to conductor temperature, losses and the thermal characteristics of the cable installation, and became a basis for modern cable ampacity calculations. IEC 60287 [9] provides equations for continuous current rating, while IEC 60853 [10-12] addresses cyclic and emergency ratings. IEEE 835 [13, 14] provides ampacity tables based on the same general purpose. In cable practice, calculated current-carrying capability and rating are therefore closely connected.

For overhead lines, the situation is different. IEEE 738 [15] and IEC TR 61597 [16] provide methods for calculating the relationship between conductor current and temperature under specified environmental conditions. They do not prescribe the weather assumptions, conductor data, margins, duration, validity period or operating process that a transmission owner must use when establishing a line rating. Because they are standards, they are used as foundational references in overhead line rating methodologies. CIGRE technical brochures [17-21] provide substantial guidance on conductor thermal behaviour, weather parameters, direct monitoring systems, thermal-rating calculations and forecasting. However, CIGRE publications are not Standards. They can support the development of a rating methodology, but they do not by themselves establish a universal rating method.

Transformer practice is different again. IEEE C57.12.00 and IEC 60076-1 establish the framework for the rated quantities assigned by the manufacturer, including

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rated power, voltage, frequency and cooling conditions.

IEEE C57.91 [22] and IEC 60076-7 [23] serve a different purpose. They are loading guides. They provide methods for assessing transformer thermal behaviour and permissible loading under specified service conditions, including ambient temperature, load cycle, cooling state, thermal limits, insulation ageing, and water-vapour bubble risk. They do not provide a general method by which a utility must establish normal, emergency, or seasonal transformer ratings; much less ambient-adjusted or Dynamic Thermal Ratings. Moreover, because they are not standards, they can only be recommended in support of a rating methodology. Table 1 summarises the relationship between technical documents and rating methodology for three asset classes.

A utility may use IEEE C57.91 or IEC 60076-7 to calculate transformer loading capability in detail. It may also establish an operating rating using a simpler approved rule based on nameplate rating, cooling stage, season or ambient temperature. In either case, the utility operating rating is a decision made within its own methodology. It is not automatically identical to the loading capability predicted by a thermal model.

The distinction can be seen in a transmission-transformer methodology used by BC Hydro [24]. Its winter loading limit is defined as the fully forced cooling rating plus 0.75% for each degree Celsius by which ambient temperature is below 25 °C. The method limits this temperature-based allowance to 0 °C, resulting in a winter planning limit of 118.75% of fully forced cooling rating. A real-time analysis is required only where a higher winter loading is expected. This is a rating methodology based on assigned rating, cooling condition and ambient temperature. It does not purport to calculate full dynamic loading capability under IEEE or IEC loading-guide methods. Most transmission and distribution network operators around the world do not utilise loading guides to their fullest.

The recent work of Lupandina et al. [25] provides a useful contrast. Their paper evaluates dynamic loading capability using a dynamically calculated thermal state, selected thermal limits and a dynamic thermal model based on IEC 60076-7. The method determines steady-state loading limits and, from the initial thermal state and available thermal reserve, the permissible dynamic loading for a specified duration. This is the correct description of what the model calculates. It determines what the transformer can carry for the stated assumptions; it does not by itself assign an operating rating for a utility network.

This difference between calculated capability and adopted rating becomes particularly relevant when dynamic methods are introduced. The next section considers how real-time thermal monitoring, first developed for overhead conductors, created the technical basis for calculating changing capability in service.

6.2 When transformer capability quietly becomes “rating”

The difference between assigned transformer rating, calculated loading capability and utility operating rating may appear clear when stated in principle, but in practice, the same terms are often used for more than one of these quantities. This is most evident in the documents and software tools that utilities

Most transmission and distribution network operators around the world do not utilise loading guides to their fullest

Table 1. Relationship between technical documents and rating methodology for three asset classes

Asset class	Major technical documents	Relationship to rating methodology
HV cable	IEC 60287, IEC 60853, IEEE 835	The standards directly calculate continuous, cyclic and emergency current ratings.
Overhead line	IEEE 738, IEC/TR 61597, CIGRE TB 207, 299, 498, 601 and 969	IEEE and IEC documents calculate conductor current-temperature behaviour. CIGRE publications provide important guidance, but neither CIGRE nor the calculation standards alone constitute a complete utility rating methodology.
Power transformer	IEEE C57.12.00, IEEE C57.91, IEC 60076-1, IEC 60076-7	IEEE C57.12.00 and IEC 60076-1 establish assigned rated quantities. IEEE C57.91 and IEC 60076-7 are loading guides. No general transformer rating-methodology standard or guide exists.

use to assess transformer loading and establish operating limits.

Two useful examples are PJM's transformer rating procedure [26] and EPRI's PTLOAD software [27]. Both use transformer loading-guide methods to assess condition-dependent loading capability. PJM adopts specified capability values as operating ratings within a defined rating procedure. PTLOAD, by contrast, uses the term "rating" directly for the result of its loading calculations.

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6.2.1 PJM: Capability used to establish ratings

PJM's 2011 transformer document is titled, without irony, "*Guide for Determination of Power Transformer Load Capability Ratings*" [26]. The title brings together three related, but distinct, ideas: a guide for calculation, loading capability and an operational rating.

PJM defines Loading Capability as "loading that can be carried for a specified period of time, at the selected ambient temperature, which will result in an acceptable loss of insulation life while not exceeding the acceptable maximum operating temperatures or percent of nameplate rating." This is a loading-capability definition, which is dependent on time, ambient temperature, thermal limits, insulation ageing and the selected load cycle.

PJM then defines Normal Rating as Normal Loading Capability: "the peak load value calculated for a specified load cycle and ambient temperature that will result in a percent loss of life equivalent to that produced by operation at a hottest spot temperature of 110 °C for 24 hours." It similarly defines Emergency Rating as Emergency Loading Capability, allowable for a maximum period of four hours.

The same document separately defines Nameplate Rating as the manufacturer's fixed MVA value established under specified conditions without exceeding prescribed temperature or other limiting criteria. PJM therefore distinguishes the manufacturer-assigned nameplate rating from condition-dependent loading calculations.

Its terminology, however, treats calculated loading capability and the resulting operating rating as equivalent expressions. A more precise description would be that PJM calculates loading capability for defined normal and emergency duty conditions, then adopts the relevant values as Normal and Emergency Ratings within its established procedure. The thermal calculation provides the technical basis; the PJM methodology determines which calculated values become operating ratings for use in planning and system operation.

6.2.2 PTLOAD: Loading-guide software with a rating label

PTLOAD is an EPRI software package developed to help utilities plan safe transformer loading under a range of operating conditions. It implements the calculation methods of IEEE C57.91 and IEC 60076-7. The program uses transformer thermal parameters together with a 24-hour ambient-temperature profile and load-cycle shape to calculate oil and winding temperatures, hottest-spot temperature, insulation loss of life and the likelihood of gas bubble formation.

The meaning of its "Continuous rating" calculation is clear from the PTLOAD manual [27]. The program performs iterative calculations using the specified transformer parameters, ambient-temperature cycle and load-cycle shape. It varies the load multiplier until the selected limits for top-oil temperature, hot-spot temperature and insulation loss of life are satisfied. The result is the peak electrical load that can be sustained for the defined repeated 24-hour cycle.

This is a loading-capability calculation. It determines the maximum permissible load for specified ambient conditions, load shape and thermal limits. It does not alter the transformer's assigned factory rating.

PTLOAD nevertheless calls this calculation a "Continuous rating" and describes its output as a thermal rating. This terminology did not arise by accident. EPRI's Dynamic Thermal Circuit Rating framework was intended to establish unified common terminology for an entire transmission circuit comprising overhead lines, cables, transformers and terminal equipment. Dale A. Douglass, IEEE Fellow and a principal investigator in the EPRI work, was a leading proponent of dynamic line rating and real-time thermal rating of transmission circuits. He faced the practical task of applying common terminology to assets with different rating histories and calculation methods.

For a circuit-level operating limit, rating was a natural common label, and it was also operationally useful. However, it concealed an important difference: the term had developed from calculated ampacity in cable practice, from calculated current-temperature limits in overhead-line practice, and from the manufacturer-assigned nameplate quantity in transformer practice.

The second part of this column will be published in an upcoming issue of Transformer Magazine.

PJM distinguishes the manufacturer-assigned nameplate rating from condition-dependent loading calculations

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7. References

[1] Daminov, I., Gradnik, T., Laneryd, T. "Dynamic Thermal Rating of Power Transformers: Concepts, Standards, and Applications," ICTRAM, 2026

[2] AIEE Standard No. 13-1930, American Institute of Electrical Engineers, 1930.

[3] IEEE C57.12.00-2021 IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

[4] Dann, W. M., "Operating Transformers by Temperature," AIEE Transactions, 1930.

[5] AIEE Subcommittee on Transformers, "Interim Report on Guides for Overloading Transformers and Voltage Regulators," 1942.

[6] AIEE/ASA, "Guides for Operation of Transformers, Regulators, and Reactors," 1945.

[7] Davis, M. W., "A New Thermal Rating Approach: The Real Time Thermal Rating System for Strategic Overhead Conductor Transmission Lines, Part I," IEEE Transactions on Power Apparatus and Systems, 1977.

[8] Neher, J.H. and M. H. McGrath, "The calculation of the temperature rise and load capability of cable systems," in Transactions of the American Institute of Electrical Engineers. Part III: Power Apparatus and Systems, vol. 76, no. 3, pp. 752-764, April 1957.

[9] IEC 60287-1-1:2023, Electric cables — Calculation of the current rating — Part 1-1: Current rating equations (100 % load factor) and calculation of losses — General., 2023

[10] IEC 60853-1:1985, Calculation of the cyclic and emergency current rating of cables — Part 1: Cyclic rating factor for cables up to and including 18/30 (36) kV, 1985

[11] IEC 60853-2:1989, Calculation of the cyclic and emergency current rating of cables — Part 2: Cyclic rating of cables greater than 18/30 (36) kV and emergency ratings for cables of all voltages, 1989

[12] IEC 60853-3:2002, Calculation of the cyclic and emergency current rating of cables — Part 3: Cyclic rating factor for cables of all voltages, with partial drying of the soil, 2002.

[13] IEEE Std 835-1994, IEEE Standard Power Cable Ampacity Tables, 1994.

[14] IEEE Std 835a-2012, IEEE Standard Power Cable Ampacity Tables Amendment 1, 2012.

[15] IEEE Std 7382023: Standard for Calculating the CurrentTemperature Relationship of Bare Overhead Conductors, 2023.

[16] IEC/TR 61597:2021, Overhead electrical conductors — Calculation methods for stranded bare conductors, 2021

[17] CIGRE Working Group 22.12, Thermal Behaviour of Overhead Conductors, CIGRE Technical Brochure 207, 2002.

[18] CIGRE Working Group B2.12 Guide for Selection Of Weather Parameters For Bare Overhead Conductor Ratings, CIGRE Technical Brochure 299, 2006.

[19] CIGRE Working Group B2.36, Guide for Application of Direct Real-Time Monitoring Systems, CIGRE Technical Brochure 498, 2012.

[20] CIGRE Working Group B2.42, Guide for Thermal Rating Calculations of Overhead Lines, CIGRE Technical Brochure 601, 2014.

[21] CIGRE Working Group B2.59, Forecasting Dynamic Thermal Line Ratings, CIGRE Technical Brochure 969, 2025

[22] IEEE C57.91-2025: IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators," 2025.

[23] IEC 60076-7:2018 Loading guide for mineral-oil-immersed power transformers, 2018

[24] BC Hydro, Bulk Electric System Facility Rating Methodology, Transmission Maintenance Standard 80.10-08-00, Rev. 8, 25 November 2020.

[25] Lupandina, I., Gawlik, W., Schrammel, M., Ilgevicius, A., Kürten, M., Viereck, K., "Evaluation of dynamic loading capability for optimal loading strategies of power transformers," Elektrotechnik & Informationstechnik, vol. 137, no. 8, pp. 515–522, 2020.

[26] PJM Interconnection, "VI-B Power Transformer Rating Procedures," 1999.

[27] Electric Power Research Institute (EPRI), "PTLOAD 6.2 User Manual," EPRI.

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