The 100th meeting of NEC 10 since 1924

Dutch Standards Committee

ABSTRACT

The Dutch standards committee NEC 10 follows the international IEC TC 10. During one hundred years, the topics and scope changed as they were developed. In this article, we highlight the trends in technology since its establishment in 1924.

KEYWORDS:

insulating fluids; standards, NEC, IEC

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From insulating oils to fluids for electrotechnical resources – The NEC 10 standards committee celebrated its 100th meeting.

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1. History

In 1886, the first public electric street lamps in the Netherlands were lit at the Waalkade in Nijmegen. The power was generated in the first power station in the Netherlands by Willem Smit & Co's Transformers NV in Nijmegen under the direction of Ir. Rosskopf. He was a pioneer in building transformers and was also one of the co-founders of the Dutch Electrotechnical Committee (NEC) . The NEC was established on March 17, 1911, allowing the Netherlands to actively participate in international electrotechnical standardization within the International Electrotechnical Commission, IEC . One of the oldest standards committees is NEC 10, which was created around the same time as the IEC TC 10 in 1924 . NEC 10 is celebrating its 100th meeting and its almost 100-year anniversary.

2. Scope

The Dutch standard committees align with the international IEC TCs. The scope of TC 10 and NEC 10 is to prepare product specifications, test methods, and maintenance and usage guides for liquid and gaseous dielectrics. They also prepare specifications, maintenance, and usage guides for lubricants and control fluids for steam turbines, generators, and control systems. Additionally, they assist in the preparation of test methods for such fluids.

3. Writing history

TC 10 is one of the oldest IEC Technical Committees, established in 1924 and initially named "Transformer oils", obviously reflecting the only practical application of that era. In 1926, the title and the scope were expanded to include "Insulating oils". In 1961, the Chairmen of TC 10 and TC 15 reached an agreement based on which all matters concerning liquid and gaseous dielectrics would be handled by TC 10. This agreement fostered a permanent liaison between the two IEC committees, TC 10 and TC 15. In 1964, it was decided that TC 10 would also deal with insulating liquids other than oils and with insulating gases, including askarels, silicone fluids, synthetic dielectrics, sulfur hexafluoride and others. In 1966, three sub-committees were established to study the various insulating fluids:

- SC 10A: Insulating hydrocarbon oils
- SC 10B: Insulating liquids other than hydrocarbon oils
- SC 10C: Insulating gases

In 1980, the scope was extended to include lubricants for turbines and control fluids, thus prompting a name change to "Fluids for electrotechnical applications". The most recent reorganization of TC 10 took place in 1987 when all the sub-committees were disbanded, and all work was placed under the responsibility of the Secretary of TC 10. TC 10 publications, which include about 50 documents ranging from International Standards to Technical Reports, fall into the following 3 categories:

- Test methods
- Specifications
- Maintenance and use guides

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4. Trends in technology

The constant increase in the power of electrical equipment combined with reductions in size and manufacturing costs means that insulating fluids must satisfy increasingly demanding performance requirements. Product specifications, as well as the usage and maintenance guides, must be adapted to these requirements.

As also reported in the TC14 SBP, natural ester-based insulating fluids began to be used commercially in North America for small transformers, while their application for larger power transformers is under development. Important applications have been made, especially in South America. A significant advantage of this fluid is its greater environmental friendliness compared to mineral oil.

Recent work for NEC 10 was to approve the standard for natural esters, as an increasing number of transformers in the Netherlands are also being used with these specific liquids. Changes are planned for synthetic esters, which NEC 10 will monitor, review, and approve.

Additionally, more recent technologies now allow for the design and construction of advanced units, such as special transformers and shunt reactors, which operate at very high temperatures. This necessitates the use of insulating liquids with much higher performances, like those with a higher "fire point"".

The rapid proliferation of online and offline monitoring systems and the need for a more reliable diagnosis of HV strategic equipment, which generally still uses oil-paper insulating systems, require possible rapid standardization of simpler or alternative oil tests. Alternatively, an advanced approach to interpreting tests on insulating fluids could be introduced in the Standards to facilitate the use of these online and offline technologies.

When it comes to mineral oil, however, there have also been remarkable changes regarding its further classification into different qualities, such as standard- and high-grade oils. This is in contrast to earlier times when only one base oil type was mentioned. This relevant standard also offers the possibility of using recycled oil. The reuse of insulating oil was specifically documented in England in a British Standard around 2013. This concept was initially met with scepticism in the Netherlands, especially concerning the traceability of this reusable oil and the miscibility of different oil qualities. However, there was considerable pressure from the IEC to swiftly adopt this standard within the involved maintenance team. As always, this team comprised a diverse international group with highly committed individuals and a range of languages. NEC 10 was also involved (IEC-60296).

Very recently, trends in oil quality monitoring have evolved, and NEC 10 has contributed to updating the relevant standard (IEC 60422). Important changes include adjustments related to water content in oil and further classifications with the addition of tap changers, circuit breakers and switchgear, as well as bushings. The effects of water content on transformer paper and oil temperature have been thoroughly assessed under various operating conditions.

5. Anecdote

Here is a short anecdote from one of the members of the Maintenance Team of IEC 60296 and member of NEC 10, Mr. P. Salverda of TenneT: "During my time as a member of the NEC 14 committee, I was involved in merging the standards for new and reusable oil, namely the IEC 60296 standard. There was considerable pressure from the IEC to quickly adapt this standard within the Maintenance Team 38 (MT38). This involved many oil suppliers, some transformer manufacturers and end users. It was indeed an international company, with English as the working language. Imagine discussing content with a German chairman, Italian, Dutch and French experts, but also with team members whose native language is English. In those circumstances, language can sometimes be an obstacle. The meaning and connotation of certain words can vary significantly based on one's native language. It was also notable that various participants would sometimes revert to their own language or even use dialects during discussions. This resulted in some interesting misunderstandings that one does not encounter every day. Luckily, we always came to an agreement, likely because all participants hailed from Europe and had a common understanding across borders. The membership in this MT gave me a lot of insight into insulating oil laboratories."

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