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To whom it may concern

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Approval of MIDELeN1204 - Official  
Letter MR.docx

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## **Subject                      Approval of MIDELeN1204 for MR Tap-Changers**

Herewith we grant approval for MIDELeN1204 Natural Ester Liquid to be used in combination with MR tap-changers.

The approval is valid for the following tap-changer types:

- VACUTAP® VV
- VACUTAP® VM (except VM 300;  $U_m \leq 245$  kV)
- VACUTAP® VRC, VRE, VRS, VRM, VRL ( $U_m \leq 245$  kV)
- DEETAP® DU (all variants)
- COMTAP® ARS

Other on-load tap-changer types and models of the MR product range are also available.

Please consult MR for review and approval for the required application.

The operating conditions for above tap-changer product range have been defined by thorough tests with MIDELeN1204 on original tap-changer equipment and also by representative model tests.

The following items have been investigated:

- Dielectric strength
- Mechanical fatigue strength
- Switching sequence / cold-start behavior
- Switching capacity of change-over selector
- Current carrying capacity / Temperature-rise of contacts
- Material compatibility of insulating materials

All results were very similar to the results gained from identical tests with other natural ester liquids.

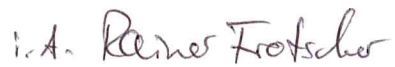
Because MIDELeN1204 shows equivalent performance, the same operating conditions apply as for other natural ester liquids approved by MR, e.g. ENVIROTEMP FR3.

### Notes:

- a) In MIDELeN1204, the approved tap-changer types may only be operated in hermetically sealed environment. Appropriate sealing solutions are:
  - rubber bag
  - nitrogen blanket.
- b) The standard oil-flow relay is used as protective device for the approved VACUTAP® on-load tap-changer models in combination with above sealing solutions.

- c) In case of retrofilling (exchange of mineral oil with MIDEL eN1204), the electrical and thermal operating conditions must be reviewed. Beyond that, full material compatibility must be ensured, and an appropriate sealing method must be applied.

Best regards

A handwritten signature in dark ink, reading "i.A. Rainer Frotscher". The signature is written in a cursive style.

Rainer Frotscher  
Maschinenfabrik Reinhausen GmbH