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Question 1.4: Which requirements are necessary for HVDC converter transformers to do a risk and condition assessment to ensure that they will perform satisfactorily?

The requirements for condition assessment of HVDC converter transformers are similar to the "conventional" inter bus (AC) power transformers. However, there are distinctive HVDC-specific features which should be considered to ensure the best effectiveness of the condition assessment.

Some examples hereunder.

- HVDC transformers are specific in design as well as the operational stresses they face during operating life. This leads to differences in failure distribution by component and influences the choice of methods utilized for condition assessment.
- Specifics of design and operational stresses may also lead to necessity to set specific thresholds for some diagnostic parameters (such as typical gas concentrations for DGA).
- If a converter station is served by a group of transformers identical in design (e.g., 3 or 6 single-phase units), then for many diagnostic methods, measurement results obtained on one unit may be used as a baseline for another one.
- There may be HVDC-specific limitation factors on site such as:
  - sometimes DC terminals are located inside the valve hall, while AC terminals are outside. If it is not possible to pull the test lead through the valve hall wall, the measurements which require connection to AC and DC terminals at the same time are not applicable.
  - it is sometimes a problem to remove external connections from DC terminals which influences the choice of methods utilized for condition assessment.
  - often service outage time is very limited.