TRANSPOWER

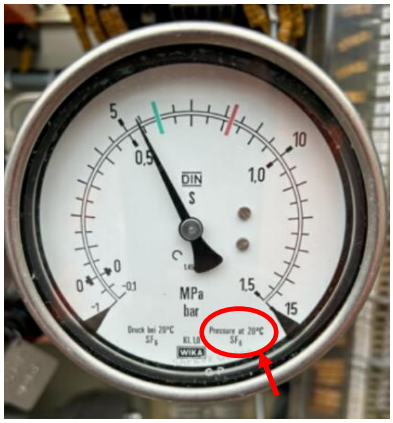
QUALITY ALERT!

17 June 2024
Maximo REF No. N/A

SF6 Gas Pressure and Temperature

ISSUE IDENTIFIED:

With the onset of Winter, this is a reminder that some SF_6 gas pressures can be affected by changes in ambient temperature. On colder days, the gas pressure will drop. This is normal, and pressure will rise as the ambient temperature warms up.



There are a range of different types of SF_6 pressure gauges (sometimes referred to as density switches) on Transpower Circuit Breakers (CBs), and some of these show pressure corrected to 20 degrees Celsius.

When checking SF_6 gas pressures (or when filling or topping up a CB), it is important to refer to the pressure vs temperature curves in the respective circuit breaker manual to find the correct pressure for the measured ambient temperature.

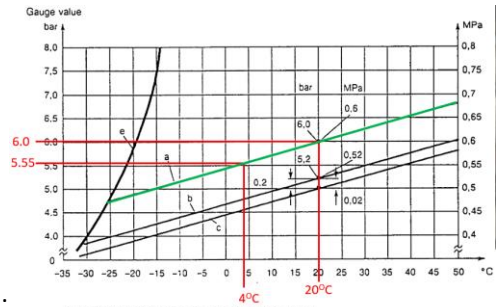
As an example, the SF_6 gas pressure on a CB was noted to be approximately 5.45 bar (relative) on 14/5/24, which is below the normal filling pressure of 6.0 bar (as indicated by the green line on the pressure gauge).

The ambient temperature was recorded as 4 degrees Celsius (a cold day).

According to the CB manual, a 4-degree temperature corresponds to a pressure of 5.55 bar (and noting that the gas temperature would be expected to be lower than ambient).

Based on this, the gas pressure was considered normal, and no top up was required.

If in doubt, the pressure should be re-checked on a warmer day.



a = SF6-Filling pressure (normal density line)
b = SF6 Low Alarm
c = SF6 Lockout Alarm
e = Liquefaction curve

WHY THIS IS NEEDED:

Failing to use the pressure vs temperature filling curves in the CB manuals can result in underfilling, or overfilling CBs. In overfilling instances, the SF6 gas top ups will be recorded as an SF6 emission, which could impact on Transpower's SF6 emissions reduction targets, and will result in avoidable financial penalties for Transpower's SF6 emissions.

IMPROVEMENT PLAN:

- Update associated SMPs to reinforce the requirements to check the CB manuals for the corresponding pressure at the measured ambient temperature.
- Update TP.SS 02.29 and MCG-02.97 to further clarify the pressure vs temperature factors
- Ensure that pressure vs temperature compensation is reinforced with learners in the SF6 Level 1 Training

LEARNINGS FROM THIS:

- **Refer to the CB manual for the pressure vs temperature filling curve.**
- **Equipment manuals can be found at the following location: Equipment Manuals - Home**

Quality Assurance

Quality Alert REF No: 2024-005

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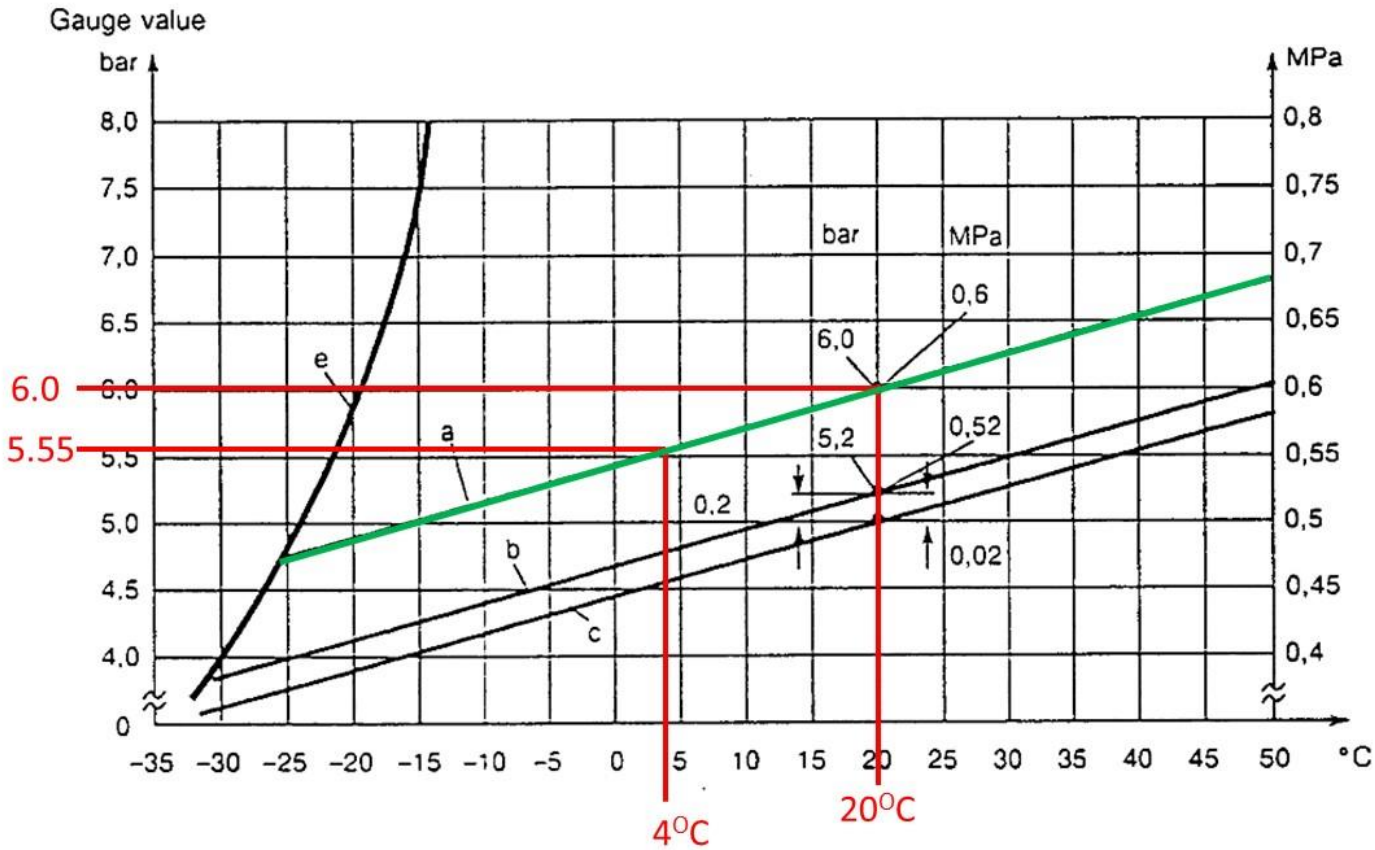

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