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NRS 048 PART 2- A SHORT DESCRIPTION

This part of NRS 048 covers voltage quality parameters, which affect the normal operation of the electricity dependant processes of customers. Each of the voltage quality parameters is described and the minimum standards for each parameter are specified.

1.1.1.1 Voltage harmonics

The total harmonic distortion (THD) of the supply voltage, including all harmonics up to the order 40, shall not exceed 8 % on LV and MV systems and 3% on HV networks. All three phases of a three-phase system shall be monitored. In the case of systems with solidly earthed transformer neutrals, the phase-to-earth voltages shall be measured. In the case of delta-connected systems or systems with impedance earthing or which are unearthed, the phase-to-phase voltages shall be monitored.

1	2	3	4	5	6
Odd harmonics non-multiple of 3		**Odd harmonics multiple of 3**		**Even harmonics**	
Order Harmonic	**Harmonic voltage** (%)	**Order** Harmonic	**Harmonic voltage** (%)	**Order** Harmonic	**Harmonic voltage** (%)
5	6	3	5	2	2
7	5	9	1,5	4	1
11	3,5	15	0,3	6	0,5
13	3	21	0,2	8	0,5
17	2	>21	0,2	10	0,5
19	1,5			12	0,2
23	1,5			>12	0,2
25	1,5				
>25	0,2 + 1,3 × 25/h				
Total harmonic distortion (THD) ≤ 8 %					

TABLE 3.1: *Compatibility levels for harmonic voltages expressed as a percentage of the declared voltage of LV and MV power systems*

For each harmonic, the harmonic voltage distortion compatibility level is given as a percentage of the magnitude of the declared (fundamental frequency) voltage. The compatibility levels for harmonics on LV and MV networks are given in *Table 3.1*. The THD of the supply voltage, including all harmonics up to the order 40, shall not exceed 8 %.

1.1.1.2 Voltage unbalance (UB)

The compatibility level for unbalance on three-phase networks is 2 %. On networks where there is a predominance of single-phase or two-phase customers, the assessed unbalance may be up to 3%.

UB can be described in terms of the contribution of zero sequence voltages and the contribution of negative sequence voltages. In this part of NRS 048 only the contribution of the negative sequence voltages are given because this is the relevant component when considering the impact on equipment connected to the system. Voltage unbalance is not applicable on single-phase systems.

1.1.1.3 Voltage regulation

NRS 048 states that unless otherwise agreed in a supply contract, the compatibility levels for the magnitude of supply voltage shall be as specified in *table 3.2* below. In the case of nominal system voltages below 500 V, in the absence of any agreement to the contrary, the supply voltage shall not deviate from the declared or agreed voltage by more than 10% for any period longer than 10 consecutive minutes. It also states that unless otherwise specified in the supply agreement, the declared voltage shall be the nominal voltage.

1	2
Voltage level	**Compatibility level**
V	%
< 500	±10
≥500	±5

Table 3.2: *Deviation from standard or declared voltages*

All phases of the supply voltage shall be monitored. In the case of systems with solidly earthed transformer neutrals, the phase-to-earth voltages shall be measured. In the case of delta-connected systems, or systems with impedance earthing or which are unearthed, the phase-to-phase voltages shall be monitored.

Where applicable, parameters shall be defined as a deviation from a fixed reference voltage. In the case of LV networks, the reference voltage shall be standard voltage (230 V/400 V) as defined in the Regulations of the Electricity Act, 1987 (Act No. 41 of 1987).

For customers supplied at LV, the standard voltage shall be 400 V phase to phase, and 230 V phase to neutral.