

Temperature Correction Factors – PowerDB Lookup Tables

A file called LookupTables.mdb is part of the PowerDB installation files. This file contains a number of industry standard temperature correction factors. Some of the data in the file is used for:

- Correcting insulation power factor data values to 20°C, for transformers and bushings.
- Correcting insulation resistance data values to 20°C, for equipment with oil or solid insulation.
- Correcting insulation resistance data values to 40°C, for rotating machines.
- Correcting insulation resistance data values to 15.56°C (60°F), for insulated cables.

In this document is a basic description of some of the data and tables that are in LookupTables, and how the values in the tables can be accessed via scripting on a typical test form.

Table Name: Transformer_Tcf

Description: Values taken from Doble correction tables for power factor temperature correction. These correction factors are used for converting overall PF results from the test temperature to 20°C.

Columns: (Table name to left, applicable description/equipment to right)

TC = Temperature °C

TF = Temperature °F

Table_5 = Askarel Filled Transformers

Table_7 = Free Breathing, Conservator, Oil Filled, Pre-1955 Power Transformers

Table_9 = Oil Filled, Post-1950, Distribution Transformers

Table_11 = Oil Filled, Sealed and Gas Blanketed, Conservator, Post-1955 Power Transformers

Table_13 = Silicone Filled Transformers

Table_15 = Askarel Filled Transformers (same as Table 5)

Table_17 = Oil Filled, Pre-1950, Distribution Transformers (same as Table 7)

Table_19 = Modern Oil Filled PTs, VTs, CTs and MOs, >220kV (same as Table 9)

Table_21 = Silicone Filled Transformers (same as Table 13)

Table_22 = Oil Filled PTs, VTs, CTs, and MOs, Rated Below 220kV

Table_23 = Oil Filled Voltage Regulators (same as Table 7)

Table_24 = Oil Filled, HV/EHV Shunt Reactors (same as Table 11)

To use these TCFs, use scripting similar to this:

```
.TCF = GetTcf_TC(.Temp, "Transformer_Tcf", .Table)
```

Note: Power Transformers are designated >500kVA and Distribution Transformers <500kVA

Table Name: Table_100_14_2003

Description: Insulation resistance conversion factors from NETA MTS_2011. These correction factors are used to convert insulation resistance measurements from the test temperature to 20°C, for equipment either insulated with oil or insulated using solid/dry materials. Conversion to 20°C is used for most apparatus other than rotating machines.

Columns: (Column name to left, description to right)

TempC = Temperature °C

K_Oil = Apparatus containing oil immersed insulation.

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K_Solid = Apparatus containing solid insulation.

Mult1556 = Conversion factor to 15.56°C.

To use these TCFs, use scripting similar to this:

```
.TCF = GetTcfEx(.Temp, "Table_100_14_2003", "K_Oil")
```

Table Name: Table_100_14_2_Fourty

Description: Insulation resistance conversion factors from NETA MTS_2011. These correction factors are used to convert insulation resistance measurements from the test temperature to 40°C, for equipment insulated with oil or insulated with solid/dry materials. Conversion to 40°C is generally used for rotating machines.

Columns: (Column name to left, description to right)

TempC = Temperature °C

K_Oil = Apparatus containing oil immersed insulation.

K_Solid = Apparatus containing solid insulation.

Mult1556 = Conversion factor to 15.56°C.

To use these TCFs, use scripting similar to this:

```
.TCF = GetTcfEx(.TempC, "Table_100_14_2_Fourty", "K_Oil")
```

Table Name: Transformer_Tcf2

Description: Power factor temperature correction factors (20°C) used for condenser bushings, from Doble, ABB, and other industry literature.

Columns: (Column name to the left, Bushing Type to the right)

5_O_C = ABB Type O+C

7_GO_25_765 = ABB Type GO (25-765 kV)

9_CTF_20_60 = ABB Types CTF (20-60 kV), CTFK (20-60 kV)

11_CT_KF_85_330 = ABB Types A, CTF (85-330 kV), CTFK (85-330 kV), LCRJ, OTHER

13_B = GE Type B

15_F = GE Type F

17_L_LC_LI_LM = GE Types L, LC, LI, LM

19_OF_OFI_OFM = GE Types OF, OFI, OFM

21_S_SI_SIM = GE Types S, SI, SIM

23_T_U = GE Type T, GE Type U

25_COT_COS_SOT = Haefely Types COS, COT, COTA, SOT

27_ERC = Lapp Type ERC (15-23 kV)

29_PRC = Lapp Type PRC (15-69 kV)

31_POC = Lapp Type POC (15-765 kV)

33_P_PA_PB = McGraw Edison Types P, PA, PB

35_WTXF = Micafil Type WTxF

37_MI_25_69 = Micafil (25-69 kV)

39_MI_GT_69 = Micafil (Above 69 kV)

41_OB_G_L = Ohio Brass Types G (46-138 kV), L (46-138 kV)

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43_OB_L = Ohio Brass Type L (7.5-34.5 kV)
45_OB_GK = Ohio Brass Type GK (15-500 kV)
47_OB_LK = Ohio Brass Type LK (15-69 kV)
49_PTAO = Passoni Villa Types 3 PV.F (25-230 kV), PTAO (25-230 kV)
51_WEST_O = Westinghouse Condenser Except Type O
53_WEST_O_A1 = Westinghouse Types O, O-A1, OC
55_WEST_O_C = Westinghouse Type O+
57_ABB_T = ABB Type T
59_ABB_OIP = ABB Oil Impregnated Paper Types AB, GOA, GOB, GOE, GOH, GOM
61_ABB_RIP = ABB Resin Impregnated Paper Types GSA-OA, GSB, RTKF/CORIP, RTKF/PORIP, RTXF

To use these TCFs, use scripting similar to this:

```
.BushTCF = GetTcf_TC(.BushTempC, "Transformer_Tcf2", "[" & "5_O_C" & "]")
```

Table Name: LKP_Tcf_i

Description: Insulation resistance conversion factors (20°C), for oil-filled transformers, from Megger “A Stitch In Time” publication.

Columns: (Column name to left, description to right)

C_O = Temperature °C

Tcf_o = Correction factor

To use these TCFs, use scripting similar to this:

```
.TCF = GetTCF(.InsulTemp, "I")
```

Table Name: LKP_Tcf_I

Description: Values taken from Doble correction tables for power factor temperature correction. These correction factors are applicable for oil-filled distribution transformers, newer than 1950, to convert overall PF results from the test temperature to 20°C.

Columns: (Column name to left, description to right)

C_O = Temperature °C

Tcf_o = Correction factor

To use these TCFs, use scripting similar to this:

```
.TCF = GetTCF(.InsulTemp, "L")
```

Table Name: LKP_Tcf_n

Description: Insulation resistance conversion factors (20°C), for rotating equipment with Class B insulation, from Megger “A Stitch In Time” publication.

Columns:

C_O = Temperature °C

Tcf_o = Correction factor

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To use these TCFs, use scripting similar to this:

```
.TCF = GetTCF(.InsulTemp, "N")
```

Table Name: LKP_Tcf_o

Description: Identical details as Table LKP_Tcf_i listed above.

Table Name: LKP_Tcf_e

Description: Identical details as Table LKP_Tcf_n listed above.

Table Name: LKP_Tcf_d

Description: Insulation resistance conversion factors (20°C), for rotating equipment with Class A insulation, from Megger “A Stitch In Time” publication.

Columns:

C_O = Temperature °C

Tcf_o = Correction factor

To use these TCFs, use scripting similar to this:

```
.TCF = GetTCF(.InsulTemp, "D")
```