NTB
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FHO Fachhochschule Ostschweiz

WPZ
Wärmepumpen-Testzentrum

Database Breakdown

Introduction

This guide will go into detail to explain the layout of the database, what each table is used for, and how the tables connect to each other in order to properly link the data being stored. Basic knowledge of SQL is recommended.

Table Structure

The structure of the database is comprised of eleven different tables, each with a specific purpose. The purpose of each table has been focused so that it only performs a single function. For example, the first table we will discuss is the Auftraggeber table.

Auftraggeber

This table serves a singular purpose: to store all of the necessary information for the customers that have their heat pumps tested by the WPZ. The Auftraggeber table has four fields where it stores this data, shown below. The first field, *AuftraggeberID*, is a field used to index each entry into the database. This ID is the primary key for this table and allows it to be easily linked to by other tables. It is also referenced by the Verbindung table as a foreign key. The second field, *Auftraggeber*, is the name of the company that has requested their heat pump be tested. The third field, *Adresse_Part1*, is the first line of the address where this company is located at. The final field, *Adresse_Part2* is the second line of the address.

Field	**Data Type**
AuftraggeberID	Integer (Auto-Incrementing)
Auftraggeber	Varchar (500 character maximum)
Adresse_Part1	Varchar (500 character maximum)
Adresse_Part2	Varchar (500 character maximum)

Bauart

The Bauart table contains information about the construction of the heat pump: whether it's a split heat pump, indoor or outdoor, etc. This table contains four fields, as shown below. The first field, *BauartID*, is the indexing field and primary key of this table. It is also referenced by the BauartInfo table as a foreign key. The second field, *Bauart*, is used to differentiate which construction type it is, using the letters a-e. The third and fourth fields, *Bauart_Bezeichnung_DE* and *Bauart_Bezeichnung_EN*, are more detailed descriptions of the type of construction, in German and English, respectively.

Field	**Data Type**
BauartID	Integer (Auto-Incrementing)
Bauart	Varchar (500 character maximum)
Bauart_Bezeichnung_DE	Varchar (2000 character maximum)
Bauart_Bezeichnung_EN	Varchar (2000 character maximum)

BauartInfo

The BauartInfo table serves as a linking table between the Bauart table and the Info table, discussed later. This table contains three fields, as shown below. The first field, *IndexID*, is the indexing field and primary key of this table. The second field, *InfoID*, is a foreign key referencing the *InfoID* field in the Info table. The third field, *BauartID* is a foreign key referencing the *BauartID* field in the Bauart table.

Field	**Data Type**
IndexID	Integer (Auto-Incrementing)
InfoID	Integer (Foreign Key)
BauartID	Integer (Foreign Key)

Bedingung

The Bedingung table contains information about the various testing conditions used when testing the heat pumps. This table contains six fields, as shown below. The first field, *BedingungID*, is the indexing field and primary key of this table. It is also referenced by the Resultat table as a foreign key. The second field, *Bedingung*, is the full text representation of the testing condition (e.g. A7 / W35). The third field, *Umgebungstemperatur*, is the ambient temperature of that testing condition (e.g. 7 degrees in A7 / W35). The fourth field,

Wasserversorgungstemperatur_Part1, is the secondary water supply temperature (e.g. 47 degrees in B0 / W47-55). This field can be null. The fifth field, *Wasserversorgungstemperatur_Part2*, is the primary water supply temperature (e.g. 55 degrees in B0 / W47-55 or B0 / W55). This field cannot be null. The final field, *Standardwert*, is a true/false value (represented as 1 and 0 respectively) that states whether or not this testing standard is a common/universal standard tested across all heat pumps (e.g. A7 / W35, B0 / W35, W10 / W35, etc.)

Field	**Data Type**
BedingungID	Integer (Auto-Incrementing)
Bedingung	Varchar (200 character maximum)
Umgebungstemperatur	Integer
Wasserversorgungstemperatur_Part1	Integer
Wasserversorgungstemperatur_Part2	Integer
Standardwert	TinyInt (value of 0 or 1)

BedingungenRelativ

The BedingungenRelativ table serves as a linking table between test conditions from the Bedingung table. The two BedingungID's that are linked in this table are believed to be so similar that they are relatively the same test condition, and should be used in the installer search (i.e. A-7/W35 and A-7/W34). This table contains three fields, as shown below. The first field, *IndexID*, is the indexing field and primary key of this table. The second field, *BedingungID1*, is a foreign key referencing the *BedingungID* field in the Bedingung table. The third field, *BedingungID2* is a foreign key referencing the *BedingungID* field in the Bedingung table.

Field	**Data Type**
IndexID	Integer (Auto-Incrementing)
BedingungID1	Integer (Foreign Key)
BedingungID2	Integer (Foreign Key)

Heizungstyp

The Heizungstyp table contains information regarding the type of heating being provided: floor heating, radiator heating, or mixed heating. This table contains four fields, as shown below. The first field, *HeizungstypID*, is the indexing field and primary key of this table. It is also referenced by the Verbindung table as a foreign key. The second field, *Heizungstyp*, is used to describe the heating type provided by the heat pump: Low (floor heating), Medium (radiator

heating), or Low & Medium (mixed). The third and fourth fields, *Heizungstyp_Bezeichnung_DE* and *Heizungstyp_Bezeichnung_EN*, are more detailed descriptions in German and English respectively of the provided heating type.

Field	**Data Type**
HeizungstypID	Integer (Auto-Incrementing)
Heizungstyp	Varchar (500 character maximum)
Heizungstyp_Bezeichnung_DE	Varchar (2000 character maximum)
Heizungstyp_Bezeichnung_EN	Varchar (2000 character maximum)

Info

The Info table contains the miscellaneous information about the heat pump being tested along with some calculated values. This table contains 25 fields, as shown below. The first field, *InfoID*, is the indexing field and primary key of this table. It is also referenced by the Verbindung, BauartInfo, and NormInfo tables as a foreign key. The second field, *Geraet*, is the full text representation of the heat pump build/model information. The third and fourth fields, *Geraet_Part1* and *Geraet_Part2*, are the separated values of the *Geraet* field. The fifth field, *Pruefnummer*, is the test number, given in the format ###-##-##. The next four fields, *Kaeltemittel* and *Kaeltemittelmenge* types 1 and 2, refer to the type(s) of refrigerant used in the heat pump and the refrigerant capacity for those types. The *Produktart* field stores what stage of production the heat pump is in when tested (e.g. production model, prototype, etc.). The next three fields, *Bivalenzpunkt* and *Bivalenzepunkt_Wert* 1 and 2, reference the testing condition that is the bivalent point, and the Wert_1 and Wert_2 values are the the ambient and supply temperatures for the testing condition (e.g. *Bivalenzpunkt* = A7 / W35, *Bivalenzpunkt_Wert_1* = 7, *Bivalenzepunkt_Wert_2* = 35). The next four *Volumenstrom* fields reference the single volume flow rate value from newer testing standards and the values at 35, 45, and 55 degrees Celsius from the older testing standards. The *SCOP* field stores the calculated standard coefficient of performance value. The next four fields, *Schall_Aussen* and *Schall_Innen*, store the outdoor/indoor sound in dB and the testing condition at which the measurement was taken, if applicable. The *Bemerkung* field stores any comments of particular importance about the heat pump being tested. Currently it only has a value when indicating whether or not the test being conducted was using 1 or 2 compressors, if applicable. The *Bild* field stores a PNG image of the heat pump being tested. Currently this field is not being utilized. Finally, the *Sichtbarkeit* field denotes whether the test results are publicly visible or not (e.g. 0 for private, 1 for public).

Field	**Data Type**
InfoID	Integer (Auto-Incrementing)

Geraet	Varchar (500 character maximum)
Geraet_Part1	Varchar (500 character maximum)
Geraet_Part2	Varchar (500 character maximum)
Pruefnummer	Varchar (9 characters exactly, formatted ###-##-##)
Kaeltemittel_Typ1	Varchar (500 character maximum)
Kaeltemittelmenge_Typ1	Decimal (up to 4 decimal places)
Kaeltemittel_Typ2	Varchar (500 character maximum)
Kaeltemittelmenge_Typ2	Decimal (up to 4 decimal places)
Produktart	Varchar (500 character maximum)
Bivalenzpunkt	Varchar (500 character maximum)
Bevalenzpunkt_Wert_1	Integer
Bevalenzpunkt_Wert_2	Integer
Volumenstrom_Standard	Decimal (up to 4 decimal places)
Volumenstrom_V35	Decimal (up to 4 decimal places)
Volumenstrom_V45	Decimal (up to 4 decimal places)
Volumenstrom_V55	Decimal (up to 4 decimal places)
SCOP	Decimal (up to 4 decimal places)
Schall_Aussen	Decimal (up to 4 decimal places)
Schall_Aussen_Bedingung	Varchar (200 character maximum)
Schall_Innen	Decimal (up to 4 decimal places)
Schall_Innen_Bedingung	Varchar (200 character maximum)
Bemerkung	Varchar (2000 character maximum)
Bild	Longblob
Sichtbarkeit	TinyInt (value of 0 or 1)

Kategorie

The Kategorie table contains information about what type of heat pump is being tested: Air/Water, Water/Water, or Geothermal. This table contains four fields, as shown below. The first field, *KategorieID*, is the indexing field and primary key of this table. It is also referenced by the Verbindung table as a foreign key. The second field, *Kategorie*, is used to describe the

inputs necessary for the heat pump to operate: Air/Water, Water/Water, Geothermal, and Geothermal and Water/Water combined. The third and fourth fields, *Kategorie_Bezeichnung_DE* and *Kategorie_Bezeichnung_EN*, are more detailed descriptions in German and English respectively of the type of heat pump.

Field	**Data Type**
KategorieID	Integer (Auto-Incrementing)
Kategorie	Varchar (500 character maximum)
Kategorie_Bezeichnung_DE	Varchar (2000 character maximum)
Kategorie_Bezeichnung_EN	Varchar (2000 character maximum)

Norm

The Norm table contains information about the various testing standards used to test the heat pumps. This table contains four fields, as shown below. The first field, *NormID*, is the indexing field and primary key of this table. It is also referenced by the NormInfo table as a foreign key. The second field, *Norm*, is the textual representation of the testing standard (e.g. EN 14511:2011) and for exporting purposes must include a colon between the year and testing standard components. The third field, *Norm_Standard,* is the number representation of the testing standard (e.g. 14511 in EN 14511:2011). Likewise, the *Norm_Year* field is the year of that testing standard (e.g. 2011 in EN 14511:2011).

Field	**Data Type**
NormID	Integer (Auto-Incrementing)
Norm	Varchar (500 character maximum)
Norm_Standard	Integer
Norm_Year	Integer

NormInfo

The NormInfo table serves as a linking table between the Norm table and the Info table, discussed later. This allows for a many-to-many relationship between testing info and testing standards. This table contains three fields, as shown below. The first field, *IndexID*, is the indexing field and primary key of this table. The second field, *NormID,* is a foreign key referencing the *NormID* field in the Norm table. The third field, *InfoID*, is a foreign key referencing the *InfoID* field in the Info table.

Field	Data Type
IndexID	Integer (Auto-Incrementing)
NormID	Integer (Foreign Key)
InfoID	Integer (Foreign Key)

Resultat

The Resultat table contains the measured and calculated results for each test at a specific test condition. This table contains seven fields, as shown below. The first field, *IndexID*, is the indexing field and primary key of this table. The second field, *ResultatID*, is the ID for each set of tests designated by a specific test number that are performed. Every test within a set should share the same ID value within this field to show that the calculated results all come from the same pump. This ID is also referenced by the Verbindung table as a foreign key. The third field, *BedingungID,* is a foreign key which references the *BedingungID* from the Bedingung table associated with the test condition under which these results were measured. The *Heizleistung* field is the calculated heat capacity at said test condition. The *Leistungsaufnahme* field is the input power calculated at said test condition. The *COP* field is the coefficient of performance calculated at said test condition. And finally, the *Luftfeuchtigkeit* field is the relative humidity under which the heat pump was tested.

Field	Data Type
IndexID	Integer (Auto-Incrementing)
ResultatID	Integer
BedingungID	Integer (Foreign Key)
Heizleistung	Decimal (up to 4 decimal places)
Leistungsaufnahme	Decimal (up to 4 decimal places)
COP	Decimal (up to 4 decimal places)
Luftfeuchtigkeit	Integer

Verbindung

The Verbindung table links together all the necessary tables for any given heat pump test. This table contains seven fields, as shown below. The first field, *VerbindungID*, is the indexing field and primary key of this table. The second field, *KategorieID*, is a foreign key referencing

the *KategorieID* field in the Kategorie table. The third field, *HeizungstypID,* is a foreign key referencing the *HeizungstypID* field in the Heizungstyp table. The *AuftraggeberID* field is a foreign key referencing the *AuftraggeberID* field in the Auftraggeber table. The *InfoID* field is a foreign key referencing the *InfoID* field in the Info table. The *ResultatID* field is a foreign key referencing the *ResultatID* field in the Resultat table. And finally, the *Datum* field is the date and time at which the test results were recorded.

Field	**Data Type**
VerbindungID	Integer (Auto-Incrementing)
KategorieID	Integer (Foreign Key)
HeizungstypID	Integer (Foreign Key)
AuftraggeberID	Integer (Foreign Key)
InfoID	Integer (Foreign Key)
ResultatID	Integer (Foreign Key)
Datum	DateTime