PD2CAEPIPE™ User's Manual

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Plant Design-to-CAEPIPE

User's Manual

Server Version 12.xx

Disclaimer

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1.0 Introduction

PLANT DESIGN-to-CAEPIPE: Plant Design-to-CAEPIPE translator program is a stand-alone program, which shall be used for transferring pipe geometry, section properties and other engineering properties from Plant Design Software to SST System Inc. Pipe Stress Analysis software CAEPIPE.

The sequence of this translator operation is shown diagrammatically in Figure 1-1.

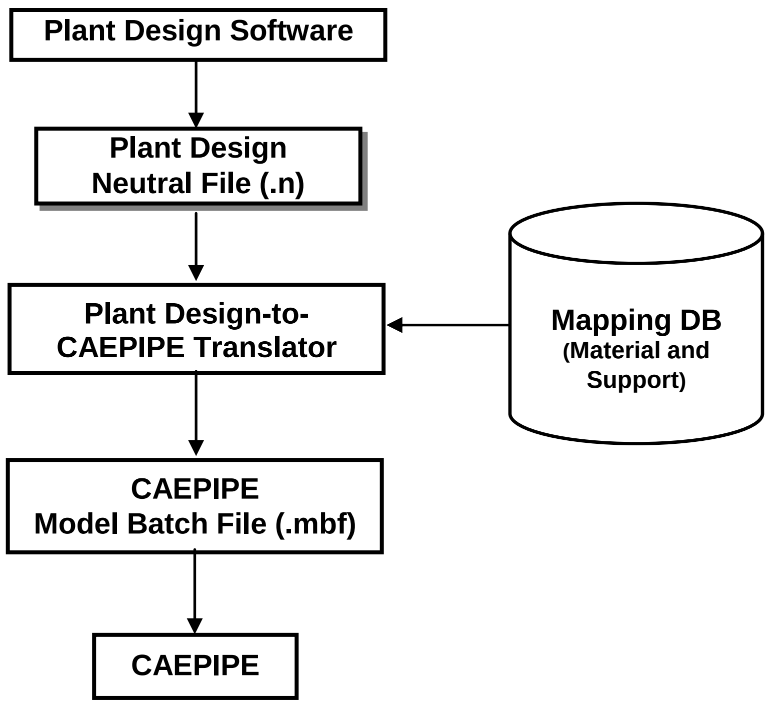


Figure 1-1

This manual describes the development done on PLANT DESIGN-to-CAEPIPE translator by InfoPlant Technologies Pvt. Ltd. It is assumed that the user is already familiar with the principles of Plant Design software piping application and the practices followed in Plant Design piping catalogue and specifications, and the user has used Plant Design software to generate the piping by using available facilities in Plant Design software. It is also assumed that the user is familiar with CAEPIPE. At this stage it is essential to know that Plant Design Software and CAEPIPE use different world coordinate systems; so, it is recommended that the user checks the CAEPIPE model once the PLANT DESIGN-to-CAEPIPE translator has generated it.

1.1 How the Translator works?

The Pipe(s) or Branches modeled in Plant Design Software are initially converted to an intermediate neutral file using the Neutral file creation program. Refer **.**HLP file available with the product for more details.

The Windows compatible executable file PD2CAEPIPE.exe reads this Plant Design Neutral File and maps it against the Material and Support mapping DB to identify the valid CAEPIPE material and support that correspond to the specified Plant Design material and support specification. This executable finally generates the Model Batch File (*.mbf), which can be imported into CAEPIPE to create model file (*.mod) that can be opened and viewed in CAEPIPE. Refer **Appendix B** for more details on Material Property.

2.0 Installing the Program

Refer Section 1 in SST License Manager User's Manual for details.

3.0 Limitations

Limitations defined in this Chapter are generic in nature and is not specific to any Plant Design application software. Limitations specific to each Plant Design application is listed in the corresponding Readme file (*.hlp) supplied along with the translator software for that Plant design application.

The present version of the Plant Design-to-CAEPIPE translator has the following limitations.

3.1 In Case of unavailability of CAEPIPE material detail corresponding to Plant Design material description (available in the neutral file), then program takes the CAEPIPE Material information specified in the first row of the material Mapping DB selected during transfer to CAEPIPE. Refer **Appendix B** for more details.

3.2 If OD (outer diameter) or Thickness (Wall thickness) for an element is not available in the neutral file, then OD and Thickness shall be extracted from the Mapping DB corresponding to the specified Nominal Size for that element.

Note: Thickness corresponding to Standard Schedule (ANSI) is entered in the Mapping DB and supplied with the standard product. User can change these values to suit their project requirement, if necessary. Refer **Appendix C** for more details.

3.3 The following items are currently not transferred from Plant Design to CAEPIPE at this time.

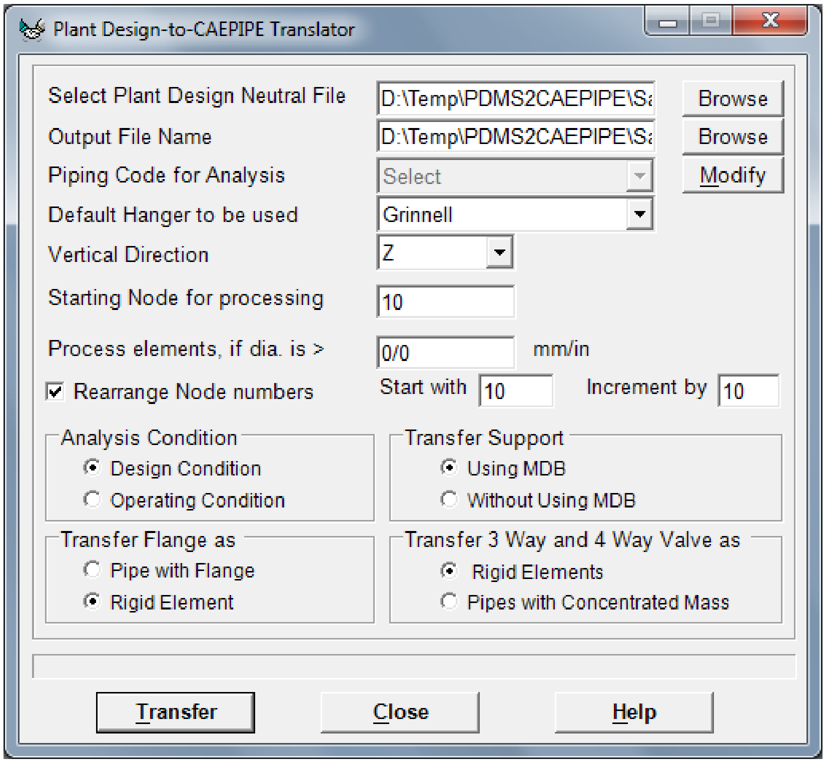
a. Insulation Density and Insulation Thickness of the section.

b. Corrosion allowance and Mill tolerance of the piping section and

c. Lining Density and Lining Thickness of the piping section.

3.4 By default, the translator program for PDS, AutoPlant and CATIA automatically generates all disconnected ends of the piping system as "Anchors". For other products, refer the section titled "Reference" in the Plant Design Readme file (.hlp) supplied along with the product for details on boundary conditions.

4.0 Working Procedure



4.1 From the Main menu, select Translator -> PD2CAEPIPE to launch the dialog box as shown in figure above.

4.2 Specify the name of the 3D Plant Design Neutral file or PCF file(s). This can be done in two ways viz. by

a. Entering the name of the 3D Plant Design neutral file or PCF file(s) along with the valid path in the text box provided.

b. Clicking the button available near the text box, which opens a file dialog and lets the user to navigate and select the Plant Design neutral file or PCF file.

Note: For AutoPlant-to-CAEPIPE, CATIA-to-CAEPIPE and PCF-to-CAEPIPE translators, the user can generate one stress model by combining number of PCF files. In such circumstances, user can select multiple PCF files by pressing, “Shift” or “Control” keys while using the option b above.

4.3 Similarly, enter the CAEPIPE neutral file name as explained in Step 4.2 above.

4.4 User can modify the Piping Code to be used in CAEPIPE by clicking the Modify button and then selecting the Piping Code from the list box as shown in figure above.

4.5 Specify the default hanger to be used in CAEPIPE. Translator shall use this information only when the hanger type in CAEPIPE corresponding to Plant Design Hanger is not specified/available in the Mapping DB.

4.6 User can also specify the Vertical Axis direction to be used in CAEPIPE by selecting the direction from the list box.

4.7 Enter the Starting node number for the program to process the network. i.e., program will start forming the network from the specified node number if the same is available in the neutral file. If the starting node number is not known to the user, then the same can be specified as 0.

4.8 The elements will be processed and converted to stress system only when the NS of the element is greater than the value specified in this field. For example, if you wish to eliminate all elements with NS less than 50mm then specify the value as 50/2 in this field. In other words, specifying 50/2 process only those elements whose NS is greater than 50 mm or 2 inch.

4.9 Loading condition for the CAEPIPE model can be selected from the "Select Analysis Condition" option as shown in figure above. User can select either design condition or operating condition. The Translator uses the Temperature and Pressure from the Neutral file corresponding to the option specified. This feature is valid and available only with PDS models at this time.

4.10 Specify whether Mapping DB to be used for transferring the support details to CAEPIPE or Not. Refer **Appendix D** for more details.

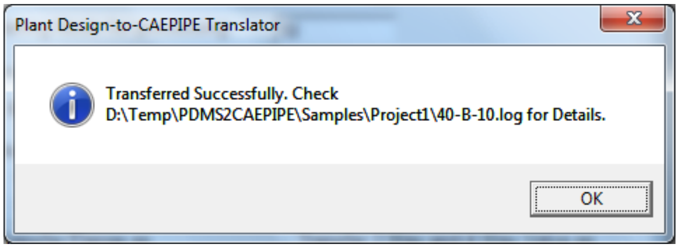
4.11 Flanges in CAEPIPE is a nodal element with length as 0 and whereas in 3D Plant Design they are modeled as pipe fittings with length greater than 0. Hence, in order to account the length and to have a proper mathematical model in CAEPIPE, they can be transferred as

a. Pipe plus Flange at pipe end with length of pipe equivalent to length of the flange or

b. Rigid Element. Please note, in 3D Plant design, weight entered at Flange catalogues is an empty weight and do not include fluid, insulation and lining weights. On the other hand, weight of Rigid Element in CAEPIPE shall include fluid, insulation and lining weight along with empty weight. Hence, to represent the weight of Rigid Element properly in CAEPIPE, user has to add these weights manually to the resulting Rigid Element weight at Flange locations.

4.12 Three (3) way and four (4) way valves can be transferred to CAEPIPE as Rigid Elements or Pipes with Concentrated Mass. User can select either 'Rigid elements' or 'Pipes with Concentrated mass' from the above dialog box.

4.13 Click the button "Transfer" to transfer model from Plant Design software to CAEPIPE model batch file format. Upon successful transfer, user gets the message box as shown below.



4.14 Launch CAEPIPE software and from the "File" menu, select "Import…" option, which opens a file dialog and lets the user to navigate and select the .mbf file transferred by the translator.

4.15 Upon successful import, user can see the CAEPIPE model.

5.0 Reference

This section describes in detail, the methodology followed for transferring the piping componenets from Plant Design software to CAEPIPE.

5.1 Loads

Temperature (Deg F or Deg C) and Pressure (psi or kg/cm2) entered in 3D Plant Design software is transferred to CAEPIPE for all the elements. If the specific gravity of the fluid (with respect to water) is specified during the neutral file extraction, the same will be transferred to CAEPIPE. If left blank then translator will transfer the same as 0.0.

5.2 Pipe

Pipe from 3D Plant Design software is transferred as Pipe to CAEPIPE. OD and Thickness (in or mm) is read from the Plant Design Database for that element and is written to the neutral file. If OD and/or Thickness are not available/entered in the 3D Plant Design software, then translator will read the OD and/or Thickness from the Mapping DB corresponding to the Nominal Size specified in the 3D Plant Design for that element. Material name for each pipe element is read from the 3D Plant Design Database and is written to the neutral file. The program then gets the CAEPIPE material information corresponding to the 3D Plant Design material through the Mapping DB and writes the same to CAEPIPE for that element.

5.3 Bend / Elbow

Bend/Elbow from 3D Plant Design software is transferred as “Bend” to CAEPIPE. The radius (in or mm) of the bend is extracted from the database, if available otherwise; it is calculated as the distance between the Near/Far end of the bend and Tangent Intersection Point divided by Tan (θ/2), Where θ is the included angle of the bend. The value thus obtained above shall be written to bend radius field in CAEPIPE.

5.4 Valve

Valve from 3D Plant Design software is transferred as “Valve” to CAEPIPE. Dry weight of valve (without Fluid weight [lb or kg]) is read from 3D Plant Design Database and transferred to “Weight” field of CAEPIPE valve element. If the operator weight (lb or kg) is specified in the model (valid for PDS) then the same will be transferred as “Additional Weight” to CAEPIPE.

5.5 Reducer

Reducer (Concentric and Eccentric) from 3D Plant Design software is transferred as Reducer to CAEPIPE. The OD (in or mm) and Thickness (in or mm) obtained from the Arrive position shall be written to “OD1” and “THK1” fields of CAEPIPE. On the other hand, the OD and Thickness obtained from the Leave position shall be transferred to “OD2” and “THK2” fields in CAEPIPE.

5.6 Instrument

Instruments from 3D Plant Design software are transferred as “Rigid” element to CAEPIPE. Dry weight (lb or kg) of Instrument is read from 3D Plant Design database and the same is transferred to “Weight” field of the rigid element in CAEPIPE.

5.7 Flange

Flange from 3D Plant Design software can be transferred as “Pipe with Flange” or “Rigid element” to CAEPIPE. If the user selects “Pipe with Flange” option from PD2CAEPIPE form then the translator creates a pipe with the length of the pipe equivalent to length of flange and creates a Flange at the pipe end in CAEPIPE with flange type as “Weld Neck”. The OD and Thickness (in or mm) from corresponding to Flange Nominal Size is transferred to pipe in CAEPIPE.

If the user selects “Rigid element” option then, the translator will transfer the same as “Rigid Element” to CAEPIPE. Dry weight of flange is read from 3D Plant Design database and the same is transferred to “Weight” field of the Rigid Element in CAEPIPE.

5.8 Olet

Olet from 3D Plant Design software is transferred as Pipe to CAEPIPE with a Branch SIF defined at the intersection (i.e., where the branch pipe intersect the main run of the pipe).

5.9 Tee

Tee from 3D Plant Design software is transferred as three pipes connecting the near end & center, far end & center and branch point & center with a Branch SIF (Welding Tee) specified at the center point of the Tee. OD and Thickness read from the 3D Pant Design database for this component is transferred to each CAEPIPE pipe fields thus created as mentioned above.

5.10 Three Way Valve

Three Way Valve from 3D Plant Design is transferred as “Three Rigid Elements” or “Three Pipes with one Concentrated Mass at its Centre” to CAEPIPE by connecting the near end & center, far end & center and branch end & center. From the section property, weight of fluid (kg/lb) is calculated and is added to the dry weight (kg/lb) of Three Way valve read from 3D Plant Design database. The total weight thus obtained is transferred to each rigid element in proportion to its length.

In the later option, the dry weight of Three Way valve is transferred as weight of the Concentrated Mass at the intersection of the three pipes.

5.11 Cross

Cross from 3D Plant Design software is transferred as four pipes connecting near end & center, far end & center and two branch points & center with Branch SIF (Welding Tee) at the pipes intersection in CAEPIPE. OD and Thickness read from the 3D Pant Design database for this component are transferred to each pipe fields thus created as mentioned above.

5.12 Four way Valve

Four Way Valve from 3D Plant Design is transferred as “Four Rigid Elements” or “Four Pipes with one Concentrated Mass at its Centre” to CAEPIPE by connecting the near end & center, far end & center and two branch end & center. From the section property, weight of fluid (kg/lb) is calculated and is added to the dry weight (kg/lb) of Four Way valve read from 3D Plant Design database. The total weight thus obtained is transferred to each rigid element in proportion to its length.

In the later option, the dry weight of Four Way valve is transferred as weight of the Concentrated Mass at the intersection of the three pipes.

5.13 Material

Material name from Plant Design software is mapped to get the corresponding CAEPIPE material and then transferred to CAEPIPE. Refer **Appendix B** for details.

5.14 Support

Support information (Location and its type) from Plant Design software can be transferred to CAEPIPE in two ways viz.

a. With the use of mapping DB and

b. Without using Mapping DB

Refer **Appendix D** for details.

5.15 Thermal Anchor Movement (TAM)

Thermal Anchor Movement (TAM) values entered in global X, Y and Z directions at Equipment Nozzle where the piping layout (selected for transfer) is connecting to. These values thus entered can be transferred to CAEPIPE. TAM values should be defined in "mm" for SI units and in "Inch" for English units.

5.16 User defined Equipment Nozzle Allowable Loads

Equipment Nozzle Allowable Loads (forces and moments) provided by the equipment manufacturer or calculated using Applicable codes / Finite Element Methods can be entered in global X, Y and Z directions at Equipment Nozzle where the piping layout is connecting to. These values thus entered at the Equipment Nozzle of the 3D Plant Design software can be transferred to CAEPIPE. Please note, the force values should be entered in "lb" for English units and in "N" for SI units. Similarly, the moment values should be entered in "ft-lb" for English units and in "Nm" for SI units.

5.17 Units

This section describes the units of measurement used to transfer the information from 3D Plant Design software to CAEPIPE.

Length (Inches or mm)

Length related dimensions such as OD, Wall thickness, Insulation thickness, Bend radius and Nominal Size from 3D Plant Design software are transferred as Inches or mm for English and SI units respectively.

Temperature (Deg F or Deg C)

Temperature from Plant Design software is transferred as Deg F or Deg C for English / SI units respectively.

Pressure (entered as psi or kg/cm2 in Plant Design)

Pressure from Plant Design software is transferred as psi or bar for English / SI units respectively.

Mass or Weight (lb or Kg)

Dry weight and Wet weight of components from Plant Design software are transferred as lb or Kg for English and SI Units respectively.

Density (lb/in3 or kg/m3)

Material Density, Insulation Density and Fluid Density from Plant Design software are transferred as lb/in3 or Kg/m3 for English and SI units respectively.

Translational Stiffness (lb/in or N/mm)

Translational stiffness from Plant Design software is transferred as lb/in or N/mm for English and SI Units respectively to CAEPIPE.

Rotational Stiffness (in-lb/deg or N-m/deg)

Rotational Stiffness from Plant Design software is transferred as lb-in/deg or N-m/deg for English and SI Units respectively to CAEPIPE.

Force (lb or N)

Force values from Plant Design software is transferred as lb or N for English and SI Units respectively to CAEPIPE.

Moment (ft-lb or Nm)

Moment values from Plant Design software is transferred as ft-lb or Nm for English and SI Units respectively to CAEPIPE.

Appendix A

3D Plant Design–to–CAEPIPE Component Mapping

All components available in Plant Design software are mapped with CAEPIPE component and how Plant Design software to CAEPIPE translator transfers the component to CAEPIPE as tabulated below.

Type of Component in Plant Design software	Type of Component in CAEPIPE	Keywords used in Neutral File
Pipe	Pipe	PI
Valve	Valve	VA
Flange	Rigid Element / Pipe with Flange	FL
Instrument	Rigid Element	RB
Reducer Concentric	Reducer Concentric	RD
Reducer Eccentric	Reducer Eccentric	ER
Cross	Four Pipes with Branch SIF (Welding Tee)	CR
Elbow / Bend	Bend	EL
Three way Valve	Three Rigid Elements / Three Pipes with Concentrated Mass	3W
Four way Valve	Four Rigid Elements / Four Pipes with Concentrated Mass	4W
Tee	Three Pipes with Branch SIF (Welding Tee)	TW
Olet	Pipe with Branch SIF (Weldolet)	TO
Support	Restraint Data Type(s)	HA
Hanger	Hanger Data Type	HA

Note: Refer Plant Design software specific Readme file (.hlp) supplied with the product for detailed component mapping.

Appendix B

Material

Material name for each element is read from the 3D Plant Design database and is written to the neutral file. The translator then gets the CAEPIPE material information corresponding to 3D Plant Design material information as follows.

a. Reads the Piping Code for Analysis from neutral file.

b. Get the CAEPIPE Analysis Code and the Material Mapping DB file name from the table "code" available in Codedb.mdb corresponding to the Analysis Code specified in neutral file.

c. If CAEPIPE Analysis Code is not available corresponding to the Code specified in neutral file, then program prompts the user to select the same from the PD2CAEPIPE dialog box. Once selected, the program will then read the Material Mapping DB file name from the table "code" of Codedb.mdb corresponding to the selected Analysis Code.

d. Gets the CAEPIPE Material properties from the Material Mapping DB (thus obtained above) corresponding to 3D Plant Design material description.

In case of unavailability of CAEPIPE material property corresponding to 3D Plant Design material description available in the neutral file, then program reads the CAEPIPE Material property specified in the first row of the Material Mapping DB (obtained above) and transfers the same to CAEPIPE.

Material DB Modification / Creation

User is allowed to create their own material table and can use the same by modifying/adding the name of Material Mapping DB file name in table "code" of "Codedb.mdb" supplied along with this software. This table contains four fields viz. PdCode, KpCode, KpMat and KpSect. The first field "PdCode" contains the name of Piping Codes that can be specified in 3D Plant Design Software. The second field "KpCode" contains the name of Piping Codes that are available in CAEPIPE corresponding to Analysis Code defined in 3D Plant Design Software. Third field "KpMat" defines the name of the Material DB file to be used (to get the CAEPIPE Material property) during transfer. Fourth field "KpSect" defines the name of the Schedule Table to be used (to extract OD and Thickness if not available in the Neutral file for an element) during transfer. Please note, the Material DB must exist before it is used in the Codedb.mdb. The procedure for creating a Material DB and modifying the Codedb.mdb is listed below.

a. Copy the existing file (B311.mdb) and rename the file with a desired name by pasting it to the directory where the source file was stored.

b. The newly created DB contains four tables viz. MaterialE, MaterialS, MdetailE and MdetailS. The MaterialE and MdetailE table in the DB are used to define material properties in English units whereas MaterialS and MdetailS tables are used to define the material properties in Metric units.

c. Enter the Plant Design Material description (available in 3D Plant Design Database) into the field "MatName" of "MaterialE/MaterialS" table and enter the engineering property of the material such as Density, Nu, Joint factor, etc., depending upon the availability of the information in the code selected and leave the rest of the fields as "None". For example, the fields Tensile, CircFactor and Yield is not valid for B31.1 and hence it should left as "None".

d. Enter the Temperature related property such as Young's Modulus, Alpha, Allowable, etc., into "MDetailE/MdetaiS" table by expanding it using the button "+". Fill the fields that are relevant to the Material Code selected and leave the rest as "None".

e. Modify the contents of each table with new values and save the DB. Fill the table fields with the appropriate values available depending upon the type of piping code. Other fields can be left as "None".

f. After successful creation of material Mapping DB as explained above in steps a to e, open the DB codedb.mdb and enter the name of the Material DB file thus created above in the field "KpMat". For example, if you have created your own material Mapping DB file corresponding to B31.5 as B315.mdb, then enter the name of the file (B315.mdb) in the field "KpMat" as "B315" where the value of the field "PdCode" is equal to B31.5 and then enter the corresponding CAEPIPE Section details table name in the field "KpSect".

g. A sample "Code" mapping DB with Material DB is given below for reference.

Sample "Code" DB

PdCode	KpCode	kpMat	Kpsect
ASME CLASS2(1980)	ASME	B311	STDsch
ASME CLASS2(1986)	ASME-86	B311	STDsch
ASME CLASS2(1992)	ASME-92	B311	STDsch
B31.1	B311	B311	STDsch
B31.1(1967)	B311-67	B311	STDsch
B31.3	B313	B313	STDsch
B31.4	B314	B314	STDsch
B31.5	B315	B315	STDsch
B31.8	B318	B318	STDsch
BS806	BS806	B311	STDsch
CODETI(1995)	SNCT	B313	STDsch
Default	B311	B311	STDsch
EN13480	EUROPEAN	EN13480	STDsch
Norwegian(1983)	NORWEGIAN-83	B313	STDsch
Norwegian(1990)	NORWEGIAN-90	B313	STDsch
RCC-M(1985)	RCC-M	B311	STDsch
Stoomwezen(1989)	STOOMWEZEN	B311	STDsch
Swedish(1978)	SWEDISH	B311	STDsch
Z183(1990)	Z183	B313	STDsch
Z184(1992)	Z184	B313	STDsch

Fields in Code DB Table:

PdCode - Name of the Piping Code than can be specified in Plant Design Software.

KpCode - CAEPIPE Analysis code corresponding to Plant Design Code.

KpMat - Material DB name from where the material details are specified.

KpSect - Section DB name from where the Schedule details are specified.

Sample "Material DB" (B315.mdb)

Sample Table "MaterialE" in English Units

	Index	MatName	Density	Nu	JointFactor	MaterialType	Tensile	CircFactor	Yield
+	1	A53-A	0.283	0.3	1	CS	None	None	None
+	2	A53-B	0.283	0.3	1	CS	None	None	None
+	3	A106-A	0.283	0.3	1	CS	None	None	None
+	4	A106-B	0.283	0.3	1	CS	None	None	None
+	5	A106-C	0.283	0.3	1	CS	None	None	None
+	6	API-5L-A	0.283	0.3	1	CS	None	None	None
+	7	API-5L-B	0.283	0.3	1	CS	None	None	None
+	8	A312-TP304	0.283	0.3	1	AS	None	None	None
+	9	A312-TP304L	0.283	0.3	1	AS	None	None	None
+	10	MonelB165-Annealed	0.283	0.3	1	CS	None	None	None
+	11	CopperB42-Annealed	0.283	0.3	1	CA	None	None	None
+	12	CopperB42-Drawn	0.283	0.3	1	CC	None	None	None
+	13	RedBrass-B43	0.283	0.3	1	CA	None	None	None
+	14	Aluminum-B241-A96061T6	0.283	0.3	1	AL	None	None	None
+	15	Aluminum-B241-A96063T6	0.283	0.3	1	AL	None	None	None

Fields in each table and their descriptions are given below in detail.

Fields in MaterialE/MaterialS Tables:

Index	- Unique Material Id
MatName	- Material Name
Density	- Density of the Material in English units (lb/in3 or kg/m3)
Nu	- Poisson Ratio
JointFactor	- Joint Factor of the Material
MaterialType	- Type of Material (2 chars)
Tensile	- Tensile Strength (psi or MPa)
CircFactor	- Circular Factor
Yield	- Yield Strength (psi or MPa)

Sample Table "MaterialE" from B315.mdb in English Units

MatName	Temperature	E	Alpha	Allowable	Yield	Rupture	Design	Proof	fh	fCR
A106-A	-20	2.99E+07	5.89E-06	12000	None	None	None	None	None	None
A106-A	70	2.95E+07	6.08E-06	12000	None	None	None	None	None	None
A106-A	100	2.93E+07	6.14E-06	12000	None	None	None	None	None	None
A106-A	300	2.83E+07	6.88E-06	12000	None	None	None	None	None	None
A106-A	350	2.80E+07	6.85E-06	12000	None	None	None	None	None	None
A106-A	400	2.77E+07	6.82E-06	12000	None	None	None	None	None	None
A106-A	150	2.91E+07	6.24E-06	12000	None	None	None	None	None	None
A106-A	200	2.88E+07	6.35E-06	12000	None	None	None	None	None	None
A106-A	250	2.86E+07	6.62E-06	12000	None	None	None	None	None	None
A106-B	300	2.83E+07	6.88E-06	15000	None	None	None	None	None	None
A106-B	350	2.80E+07	6.85E-06	15000	None	None	None	None	None	None
A106-B	400	2.77E+07	6.82E-06	15000	None	None	None	None	None	None
A106-B	-20	2.99E+07	5.89E-06	15000	None	None	None	None	None	None
A106-B	70	2.95E+07	6.08E-06	15000	None	None	None	None	None	None
A106-B	100	2.93E+07	6.14E-06	15000	None	None	None	None	None	None
A106-B	150	2.91E+07	6.24E-06	15000	None	None	None	None	None	None
A106-B	200	2.88E+07	6.35E-06	15000	None	None	None	None	None	None
A106-B	250	2.86E+07	6.62E-06	15000	None	None	None	None	None	None

Fields in MDetailE/MDetailS Tables:

MatName - Material name

Temperature - Material Temperature (deg. F or deg. C)

E - Young's Modulus (psi or MPa)

Alpha - Alpha value for material (in/in/F or mm/mm/C)

Allowable - Allowable Stress (psi or MPa)

Yield - Yield Strength (psi or MPa)

Rupture - Rupture Stress (psi or MPa)

Design - Design Stress (psi or MPa)

Proof - Proof Stress (psi or MPa)

fh - Allowable Stress at Maximum Temperature (psi or MPa)

fCR - Allowable Creep Stress (psi)

For FRP/GRP materials (with "MaterialType" field = "FR" or "F1" or "F2"), the fields given below should be entered with the values specified.

E - Axial Modulus of FRP/GRP (psi or MPa)

Alpha - Alpha value for material (in/in/F or mm/mm/C)

Allowable - Hoop Allowable for FRP/GRP (psi or MPa)

Yield - Torsional Allowable for FRP/GRP (psi or MPa)

Rupture - Axial Allowable for FRP/GRP (psi or MPa)

Design - Hoop Modulus for FRP/GRP (psi or MPa)

Proof - Shear Modulus for FRP/GRP (psi or MPa)

Material properties for piping codes B31.1, B31.3, B31.4, B31.5, B31.8, ISO 14692, ASME-NM1 and EN13480 are available in the “Materials” folder. The piping code list will show only those piping codes for which the MDB is having the material properties (i.e. Material properties for all the four tables should be filled). User has to input the details in both “MaterialE” and “MdetailE” for English units and “MaterialS” and “MdetailS” for Metric unit for using the same with PD2CAEPIPE Translator.

If the “Piping Code for Analysis” is not specified or specified as “Default” in the neutral file, then the software will transfer the “Piping Code” into CAEPIPE as the value specified in the field “KpCode” corresponding to the value “Default” in the field “PdCode” of the table named “code” in “Codedb.mdb”.

For e.g., If you wish to define the “Piping Code” in CAEPIPE as “B31.3” by default, then change the value corresponding to “Default” in the field “PdCode” as “B31.3” in the filed “KpCode”. You can also modify the name of the material table and the standard schedule table to be used during the transfer by modifying the values in the field “KpMat” and “KpSect”.

Modification of “Config.ini” File

Material Mapping DB’s and Support Mapping DB’s are stored in the Application directory of the Product. The customized Material Mapping DB’s and Support Mapping DB’s can be shared among the users of the product by copying these files in a shared location and modifying the “config.ini” file to point to the new path.

For clarity, “config.ini” file contains the path of the Material Mapping DB’s and Support Mapping DB’s. By default, this will point to the application directory. Copying these files to a shared location and modifying the path in the “config.ini” to reflect the new location will help users to share the customized DB’s. The content of the file is listed below for reference.

[Config]

Product Name=Plant Design-to-CAEPIPE Translator
Product Type=Server Version
Materials_DB=
Code_DB=
Support_DB=
leaving the above fields empty will use the default path

Assuming the Material Mapping DB’s, Code DB and Support DB are stored in the shared location DBS of machine “InfoP025”, modify the Materials_DB, Code_DB and Support_DB as follows.

[Config]

Product Name=Plant Design-to-CAEPIPE Translator
Product Type=Server Version
Materials_DB=\\InfoP025\DBS
Code_DB=\\InfoP025\DBS
Support_DB=\\InfoP025\DBS
MinAnchorNode=10
leaving the above fields empty will use the default path and default value

Warning: Care should be taken while entering the fields of the CodeDb.mdb and the Material Mapping DB as the wrong entry or leaving the field empty may lead to malfunction of the software.

Appendix C

Schedule Table

The table “code” in Codedb.mdb contains a field named “KpSect” to specify the schedule to be used during transfer. Incase of unavailability of OD and/or thickness values in neutral file, translator reads the OD and/or thickness from the standard schedule table and transfers the same to CAEPIPE. In case the value of the field “KpSect” is not defined or left empty in the table, then the program will use the “Standard Schedule (STD)” for ANSI standard by default.

Schedule Table Creation / Modification

The procedure for creating the user defined Standard Schedule Table is listed below

1. Copy the table “STDsch” and then paste it as new table in the same “Codedb.mdb” by specifying a new name for the table.
2. Modify the contents of the table with the new values.
3. Open the table “Code” and then enter the “KpSect” field with the name of the table created above corresponding to the “PdCode”. For e.g. assuming the name of the new Standard Schedule table created as “Sch40” corresponding to “B31.1” PdCode, change the value of field “STDsch” as “Sch40”.

PdCode	KpCode	kpMat	Kpsect
B31.1	B311	B311	STDsch

Sample Schedule Table

NPD_E	NPD_M	OD	THK
0.125	4	10.287	1.7272
0.25	8	13.716	2.2352
0.375	10	17.145	2.3114
0.5	15	21.336	2.7686
0.75	20	26.67	2.8702
1	25	33.401	3.3782
1.25	32	42.164	3.556
1.5	40	48.26	3.683
2	50	60.325	3.9116

Fields in standard schedule table and their descriptions are given below in detail.

NPD_E - Nominal Piping Diameter in Inches

NPD_M - Nominal Piping Diameter in Millimeters

OD - Outside Diameter in mm

THK - Wall thickness in mm

Warning: Care should be taken while filling the fields of the Schedule DB as the wrong entry may lead to malfunction of the software.

Appendix D

Supports

Support information (Location and its type) from Plant Design software can be transferred to CAEPIPE in two ways viz.

1. With the use of mapping DB
2. Without using Mapping DB

With the use of mapping DB

In many large organizations, the Plant Design Engineer is responsible only for generating the Piping Layout and the Stress Engineer will be responsible for carrying out the detailed Stress Analysis. Hence, the Plant Design Engineer may not have details on mathematical supports equivalent to Plant Design physical support configurations. In such cases, the Stress Engineer can define the mathematical supports equivalent to Plant Design software using the “SupportType.mdb” file and can instruct the Plant Design Engineer on filling such information in the Plant Design software at Support locations. The Plant Design Engineer can then produce the Neutral file from the Plant Design software and convert the same to CAEPIPE using the translator. The details on entering the information and transferring the same to CAEPIPE are listed below.

Transfer of Supports

The support details (entered via attributes) and its location specified in the Plant Design software are transferred to CAEPIPE. The values of the attributes filled at support locations shall be in accordance with the values specified in the field #1 of tables “Zvertical” and “Yvertical” of “SupportType.mdb” built into this software. The values from field #1 of table “Zvertical” shall be referred and entered at the support locations (via attributes), if the Global Vertical Axis to be used in the Stress Model is “Z”. On the other hand, values from field #1 of table “Yvertical” shall be referred and entered at the support locations (via attributes), if the Global Vertical Axis to be used in the Stress Model is “Y”.

Fortunately, the values entered/available in the field #1 of tables “Zvertical” and “Yvertical” are kept identical, because most Plant Design software always consider the vertical direction as Z-axis. On the other hand, pipe stress engineers in different parts of the world use either Z-axis as vertical or Y-axis as Vertical. So, the values entered in the field “KpSupport” are different for “Zvertical” and “Yvertical”. Program always uses the value entered in the field “KpSupport” corresponding to the value entered in field “PdSupport”, for its stress model file generations. For details on filling the field “KpSupport”, refer the section “Without using Mapping DB” described below.

User can modify the values available in the field “PdSupport” of tables “Zvertical” and “Yvertical” to suit their requirements. It is recommended to keep the values entered in the filed “PDSupport” of tables “Zvertical” and “Yvertical” identical as much as possible. This will help to avoid the user in reentering/changing the values at support locations for different Global Vertical Axis.

In case, the CAEPIPE support information corresponding to the attribute value entered in the Plant Design is not available/defined in the mapping DB, then the translator skips that support at the location.

Note: Refer the Plant Design Readme supplied along with the product for filling the Support Information in Plant Design software. For example, refer the file PDMS.hlp for details on filling the Support Information at support location in PDMS.

Without using Mapping DB

In smaller organizations, the Plant Design Engineer would be responsible for carrying out the Stress Analysis and hence, he would be familiar with the usage of CAEPIPE software and the customs followed in generating the Stress Models. He also would be familiar in arriving at the mathematical model equivalent to the geometric model from Plant Design Software. i.e., can define the support conditions (boundary conditions) in CAEPIPE equivalent to the Physical Support configurations from Plant Design software. In such cases, the Plant Design Engineer can transfer the support details (locations and types) by entering them at the support locations directly and transfer the same to CAEPIPE without using the mapping DB. Refer the sections listed below for details.

Transfer of Supports

The support details (entered via attributes) and their locations specified in the Plant Design software are transferred to CAEPIPE. Refer .hlp file for details on attributes to be filled. The values of the attributes that can be filled at support locations shall be in the format as listed below.

Hangers

Hangers can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

Hanger(Type of Hanger:Number of Hangers:Allowable Travel Limit[in or mm]:Load Variation[%]:Short Range)

Example:

Hanger(Grinell:2: :20:1)

Note: Allowable Travel Limit option is not enabled at this time. Please skip that field while entering the values.

Rod Hanger

Rod Hangers can also be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

Hanger(ROD:Number of Hangers)

Example:

Hanger(ROD:1)

Constant Support

Constant Support can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

Hanger(CONSTSUPPORT:Number of Hangers)

Example:

Hanger(CONSTSUPPORT:3)

User Hanger

User specified Hangers could also be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

USERHANGER(Number of Hangers:Spring Rate[ib/in or N/m]:Cold Load:Hot Load)

Example:

For example one number of user hanger with spring rate of 1E8N/m, and hot load 1000 can be specified as follows,

USERHANGER (1:1E8: :1000)

Guide

Guide Restraint can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

GUI(Stiffness[ib/in or N/mm]:Gap[in or mm]:Friction Coefficient)

Example:

Guide with Rigid stiffness, 50mm gap between guide and pipe and 0.3-friction coefficient can be specified as follows,

GUI(R:50:0.3)

Skewed Restraints

Skewed restraint(s) with different directional vectors can be transferred from 3D Plant Design software to CAEPIPE by specifying vector details with the following at support locations.

Syntax:

SKEW(VecX:VecY:VecZ:Stiffness[ib/in or N/mm]:Gap[in or mm]:Friction Coefficient: Type)

Type can defined as “R” (Rotational) or “T” (Translational)

Example:

SKEW(0.707:0.707:0.707:1E10: : :R)

Note: Gap and Friction Coefficient options are not enabled at this time. Please leave those fields blank while entering the values.

Skewed Restraints in Local Axes

Skewed restraint(s) in Axial, Shear X and Shear Y can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations. For definition on Local Coordinates, refer to Section titled “Local Coordinates” in CAEPIPE Technical Reference Manual.

Syntax:

SKEWA(Stiffness[ib/in or N/mm]:Gap[in or mm]:Friction Coefficient:Type) – Skewed Restraint in Local Axial direction of element

SKEWY(Stiffness[ib/in or N/mm]:Gap[in or mm]:Friction Coefficient:Type) – Skewed Restraint in Local Shear Y direction of element

SKEWZ(Stiffness[ib/in or N/mm]:Gap[in or mm]:Friction Coefficient:Type) – Skewed Restraint in Local Shear Z direction of element

Type can defined as “R” (Rotational) or “T” (Translational)

Example:

SKEWA/SKEWY/SKEWZ(1E10::R) or SKEWA(Rigid::R)

Double acting Translational Restraints

Double acting Translational restraint(s) can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

If Double acting Translational restraint(s) with both Stiffness and Gap are specified at a location, then the program will transfer the same as “Anchor” in that direction with Gap as equal to Anchor Displacement in that direction. Refer examples for details.

If Double acting Translational restraints are specified with Stiffness and without Gap, then the program will transfer the same as “Anchor” in that direction with stiffness value as defined in the attribute.

Lastly, if Double acting Translational restraints are specified without Stiffness and without Gap then the program will transfer the same as Restraint in that direction.

Syntax:

Translational Restraint Type(Stiffness[ib/in or N/mm]:Gap[in or mm)

Example:

X(1E6,10) will be Transferred as Anchor with X stiffness as “1E6” and Displacement in X as 10 mm.

X(1E6);Y(1E6) will be transferred as Anchor with X and Y Translational stiffnesses as “1E6”.

X;Y will be transferred as Restraint in X and Y (i.e., X and Y Restraints)

Double acting Rotational Restraints

Double acting Rotational restraint(s) can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

If Double acting Rotational restraint(s) with both Stiffness and Gap specified at a location, then the program will transfer the same as “Anchor” with flexible stiffness in that direction with Gap as equal to Anchor Rotational Displacement in that direction. Refer examples for details.

If Double acting Rotational restraint(s) are specified with Stiffness and without Gap, then the program will transfer the same as “Anchor” with flexible stiffness in that rotational direction.

Lastly, if Double acting rotational restraint(s) are specified without Stiffness and without Gap, then the program will transfer the same as Skewed Restraint with stiffness as “Rigid” in that direction.

Syntax:

Rotational Restraint Type(Stiffness[lb/in or N/mm]:Gap[in or mm])

Example:

RX(1E6,10) will be Transferred as Anchor with RX stiffness as “1E6” and Displacement in XX as 10 mm.

RX(1E6);RY(1E6) will be transferred as two Skewed Rotational Restraints one in X direction and other in Y direction with stiffness as “1E6”.

RX;RY will be transferred as Skewed Rotational Restraints with Stiffness as “Rigid” in X and Y (i.e., X and Y Rotational Restraints)

Double Acting Limit Stop

Limit stop can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations. Directional components are must while specifying limit stop.

Syntax:

LIM(Stiffness[lb/in or N/mm]:Gap[in or mm]:Friction Coefficient:Xcomp:Ycomp:Zcomp)

LIM(Stiffness[lb/in or N/mm]:Lower Gap/Upper Gap[in or mm]:Friction Coefficient:Xcomp:Ycomp:Zcomp)

Example:

1. Limit stop in Y direction with Rigid stiffness and equal lower and upper gap of 50 mm (i.e., lower limit = -50 mm and upper limit = 50 mm) with coefficient of friction 0.2 can be transferred by specifying the support attribute as LIM(RIGID:50:0.2:0:1:0).

2. Limit stop in Y direction with Rigid stiffness and Lower gap of -50 mm and Upper Gap of 25 mm with coefficient of friction 0.2 can be transferred by specifying the support attribute as LIM(RIGID:-50/20:0.2:0:1:0).

Please note, Rigid stiffness means 1E+12 lb/in will be assigned internally in CAEPIPE software.

Single / Double Limit Stop in Local Axes

Limit stop in Local Axial, Shear Y and Shear Z directions can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations. For definition on Local Coordinates, refer to Section titled "Local Coordinates" in CAEPIPE Technical Reference Manual.

Syntax:

LIMA/LIMY/LIMZ(Stiffness[lb/in or N/mm]:Gap[in or mm]:Friction Coefficient]

LIMA/LIMY/LIMZ(Stiffness[lb/in or N/mm]:Lower Gap/Upper Gap[in or mm]:Friction Coefficient]

LIMA – Limit Stop in local Axial direction of element

LIMY– Limit Stop in local Shear Y direction of element

LIMZ – Limit Stop in local Shear Z direction of element

Example:

Single Acting Local Limit Stops

1. Single Acting Limit stop in Local Axial direction with Rigid stiffness and gap of 50 mm and coefficient of friction 0.2 can be transferred by specifying the support attribute as LIMA(RIGID:-50/None:0.2).

2. Single Acting Limit stop in Local Axial direction with Rigid stiffness and gap of 0 mm and coefficient of friction 0.2 can be transferred by specifying the support attribute as LIMA(RIGID:0/None:0.2).

Double Acting Local Limit Stops

1. Double Acting Limit stop in Local Shear Y direction with stiffness of 1E+05 N/mm and equal lower and upper gap of 50 mm (lower limit = -50 mm and upper limit = 50 mm) and coefficient of friction 0.2 can be transferred by specifying the support attribute as LIMY(RIGID:50:0.2).

2. Double Acting Limit stop in Local Shear Y direction with stiffness of 1E+08 N/mm and lower gap of 0 mm, upper gap of 20 mm and coefficient of friction 0.2 can be transferred by specifying the support attribute as LIMA(RIGID:0/None:0.2).

Please note, Rigid stiffness means 1E+12 lb/in will be assigned in CAEPIPE.

Single acting Translational Restraints

Single acting Translational Restraints are transferred as Limit Stop to CAEPIPE. If the user specifies single acting restraints with “+” and “-“ in the same axis (direction), then the program will transfer it as “Limit Stop” with direction of restraint as equal to axis positive direction and Gap specified in positive direction as “Lower Limit” and Gap entered in negative axis direction as “Upper Limit:.

If positive directional restraint is specified with Gap, then the program will transfer the same as Limit Stop with Gap value as “Lower Limit”.

Similarly, if negative directional restraint is specified with Gap, then the program will transfer the same as Limit Stop with Gap value as “Upper Limit”.

Refer the examples for details.

Syntax:

Single Acting Restraint Type(Stiffness[lb/in or N/mm]:Gap[in or mm]:Friction Coefficient)

Example:

+X(1e10:-15:0.25);-X(1e10:10:0.25) will be transferred as “Limit Stop” with Stiffness = 1E10, Lower Limit=-15 mm, Upper limit=10 mm and Direction = 1,0,0.

+Z(1E10:10) will be transferred as “Limit Stop” with Stiffness=1E10; UpperLimit=None, Lower Limit=10 and Direction=0,0,1.

-Y(1E10:10) will be transferred as “Limit Stop” with stiffness=1E10; UpperLimit=10;Lower Limit=None and Direction=0,-1,0.

Snubber

Snubbers can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

Types of Snubber(Stiffness[lb/in or N/mm])

Example:

YSNB(1E10) or ZSNB(1E6)

Skewed Snubber

Skewed Snubbers can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations.

Syntax:

SNB(VecX:VecY:VecZ:Stiffness[lb/in or N/mm])

Example:

Skewed Snubber with stiffness 1E+9 can be specified with directional vectors as follows,

SNB(0.707:0:0.707:1E9)

Snubber in Local Axes

Snubbers in Local Axial, Shear Y and Shear Z directions can be transferred from 3D Plant Design software to CAEPIPE by specifying the following at support locations. For definition on Local Coordinates, refer to Section titled “Local Coordinates” in CAEPIPE Technical Reference Manual.

Syntax:

SNBA(Stiffness[lb/in or N/mm]) – Snubber in Local Axial direction of element

SNBY(Stiffness[lb/in or N/mm]) – Snubber in Shear Y direction of element

SNBZ(Stiffness[lb/in or N/mm]) – Snubber in Shear Z direction of element

Example:

SNBA(1E10) or SNBY or SNBZ(R)

Force / Moment

Force and Moments can be transferred from Plant Design to CAEPIPE by specifying the following at support locations.

Syntax:

FORCE(Fx:Fy:Fz[lb or N])

MOMENT(Mx:My:Mz[lb-in or Nm])

Example:

1000N Force acting in Y direction can be specified as follows

FORCE(0:1000:0)

500Nm Moment acting in Z direction can be specified as follows

MOMENT(0:0:500)

Threaded Joint

Threaded Joint can be assigned to nodes by specifying the following at support locations.

Syntax:

TJOINT

User SIF

User SIF can be assigned for a node by specifying the following at support locations in Plant design software.

Syntax:

UserSIF(Value)

Example:

UserSIF(100)

Appendix E

Possible Restraints Types and Hangers

Particulars	Syntax	Example
Anchor		
Anchor	ANC(Stiffness:Gap)	ANC or ANC(1E12:0.0) or ANC(1E12)
Double Acting Translational Restraints		
X	X(Stiffness:Gap)	X or X(1E12) or X(1E12:25)
Y	Y(Stiffness:Gap)	Y or X(1E10) or Y(R:50)
Z	Z(Stiffness:Gap)	Z or Z(RIGID) or X(RIGID:35)
Double Acting Rotational Restraints		
RX	RX(Stiffness:Gap)	RX or RX(1E12) or RX(1E12:0.0)
RY	RY(Stiffness:Gap)	RY or RY(R) or RY(1E12:25)
RZ	RZ(Stiffness:Gap)	RZ or RZ(RIGID) or RZ(R:50)
Double Acting Snubbers		
XSNB	XSNB(Stiffness)	XSNB or XSNB(1E12)
YSNB	YSNB(Stiffness)	YSNB or YSNB(R)
ZSNB	ZSNB(Stiffness)	ZSNB or ZSNB(RIGID)
Skewed Snubbers	SNB(VecX:VecY:VecZ:Stiffness)	SNB(0.707:0.0:0.707:1e12) or SNB(0:0:0.707:RIGID)
Double Acting Snubbers in Local Axes*		
SNBA	SNBA(Stiffness)	SNBA or SNBA (1E12)
SNBY	SNBY(Stiffness)	SNBY or SNBY(R)
SNBZ	SNBZ(Stiffness)	SNBZ or SNBZ(RIGID)
Single Acting Translational Restraints		
+X and -X	Restraint Type(Stiffness:Gap:Friction Co-efficient)	+X(1E10:35:0.35) or -X(RIGID:25)
+Y and -Y	Restraint Type(Stiffness:Gap:Friction Co-efficient)	+Y(R:50:0.2) or -Y(:15:0.28)
+Z and Z	Restraint Type(Stiffness:Gap:Friction Co-efficient)	+Z(:45) or –Z(RIGID::0.26) or +Z(:25)

Double Acting Limit Stops		
LIM	LIM(Stiffness:Gap:Friction Co-efficient:Xcomp:Ycomp:Zcomp)	LIM(1E12:30::0:1:0) or LIM(RIGID:50:0.4:0.707:0.707:0)
Single Acting Limit Stops in Local Axes*		
Axial	LIMA(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMA(1E12:30/NONE) or LIMA(RIGID:-50/NONE:0.3)
Shear Y	LIMY(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMY(1E12:30/NONE) or LIMY(RIGID:-50/NONE:0.3)
Shear Z	LIMZ(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMZ(1E12:30/NONE) or LIMZ(RIGID:-50/NONE:0.3)
Double Acting Limit Stops in Local Axes*		
Axial	LIMA(Stiffness:Gap:Friction Co-efficient) or LIMA(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMA(1E12:-30/50) or LIMA(RIGID:-50/20:0.3) or LIMA(R::0.2) [Lower Limit = Upper Limit = 0.0]
Shear Y	LIMY(Stiffness:Gap:Friction Co-efficient) or LIMY(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMY(1E12:-20/30) or LIMY(RIGID:20:0.3) [Lower Limit = -20 and Upper Limit = 20] or LIMY(R::0.2) [Upper Limit = Upper Limit = 0.0]
Shear Z	LIMZ(Stiffness:Gap:Friction Co-efficient) or LIMZ(Stiffness:Lower Gap/Upper Gap:Friction Co-efficient)	LIMZ(1E12:-20/30) or LIMZ(RIGID:20:0.3) [Lower Limit = -20 and Upper Limit = 20] or LIMZ(R:0/20:0.2) [Lower Limit = 0.0 and Upper Limit = 20]
Double Acting Skewed Restraints		
Skewed Restraints	Skew(VecX:VecY:VecZ:Stiffness:Gap: Friction coefficient:Type of Restraint)	Skew(0.707:0.707:0.0:1E12: : :R)
Double Acting Skewed Restraints in Local Axes*		
Axial	SKEWA(Stiffness:Gap:Friction Co-efficient:Type)	SKEWA (1E12:::R) or SKEWA (1E12:::T) R = Rotational Restraint T = Translational Restraint
Shear Y	SKEWY(Stiffness:Gap:Friction Co-efficient:Type)	SKEWY (1E12:::R) or SKEWY (1E12:::T) R = Rotational Restraint T = Translational Restraint
Shear Z	SKEWZ(Stiffness:Gap:Friction Co-efficient:Type)	SKEWZ (1E12:::R) or SKEWZ (RIGID:::T) R = Rotational Restraint T = Translational Restraint

Guide		
GUI	GUI(Stiffness:Gap:Friction Co-efficient)	GUI or GUI(1E12) or GUI(R:50) or GUI(RIGID:25:0.25)
Spring Hangers		
Hanger	Hanger(Type:No.of Hangers:All.Travel Limit:Load Variation:Short Range)	Hanger or Hanger(Grinnell :1) or Hanger(Grinnell :1: :25) or Hanger(Grinnell :1: :25:1)
Constant Support Hanger	Hanger(CONSTSUPPORT:No.of Hangers)	Hanger(CONSTSUPPORT) or Hanger(CONSTSUPPORT:2)
Rod Hanger	Hanger(ROD:No. of Hangers)	Hanger(ROD) or Hanger(ROD:1)
User Hangers		
User Hangers	UserHanger(Spring Rate:No.of Hangers: Cold Load:Hot Load)	UserHanger(200:1:1131) or UserHanger(200:1:0.0:1088)
Force / Moment		
Force	Force(Fx:Fy:Fz)	Force(1200:800:0.0)
Moment	Moment(Mx:My:Mz)	Moment(0:500:250)
Threaded Joint		
Threaded Joint	TJOINT	TJOINT
User SIF		
User SIF	UserSIF(Value)	UserSIF(100)
Weldolet**		
Weldolet	OLET	OLET

* Valid and available for checkSTRESS, checkSTRESS II & checkSTRESS Nuke Version 9.40 or later, CAEPIPE & CAEPIPE 3D+ Version 10.50 or later, Plant Design to CAEPIPE version 9.30 or later.

** Valid and available for checkSTRESS PCF, checkSTRESS II PCF & checkSTRESS Nuke PCF Version 9.40 or later, CAEPIPE 3D+ for PCF Version 10.50 or later, AutoPlant to CAEPIPE, CATIA to CAEPIPE and PCF to CAEPIPE version 9.30 or later.

Note:

1. Stiffness, Gap and Friction Coefficient are optional values. If not defined, then it will be transferred as 1E12 lb/in i.e. RIGID, 0.0 in, and 0.0 respectively to CAEPIPE.

2. For SI units, the Stiffness and Gap should be specified in N/mm and mm respectively.

3. The Hanger Type, Number of hanger, Allowable Travel Limit (not applicable at this time), Load variation and Short range are optional value. If the above information are not defined, then the program will assume the following

    a. Hanger Type = Hanger Type is selected/Specified in the Plant Design to CAEPIPE dialog box during transfer. Refer the Chapter 4.0 on “Working procedure”.

    b. Number of Hanger = 1

c. Allowable Travel Limit = 0.00 (not applicable at this time)

d. Load Variation = 25 %

e. Short range = 1 (Use short range)

4. For SI units, the Spring Rate, Cold Load and Hot Load should be specified in N/mm, Kg and Kg respectively.

5. For defining more than one support at each support location use ";" in between support definitions. Example, +X(1e12:0.25);-X(1e12:0.25).

Hanger Types		
ABB-PBS	Fee & Mason	Nordon
Basic Engineers	Flexider (30-60-120)	NPS Industries
Berger-Paterson	Flexider (50-100-200)	Piping Services
Bergen-Paterson (L)	Fronek	Piping Tech & Products
BHEL Hyderabad	Grinell	Power Piping
BHEL Trichy	Hydra	Sanwa Tekki(30-60-120)
Borrello	Lisega	Sanwa Tekki(85-170)
Carpenter & Paterson	Mitsubishi (30-60-120)	Sarathi
Comet	Mitsubishi (80-160)	Spring Supports
Corner & Lada	Myricks	SSG
Dynax	NHK (30-60-120)	
Elcen	NHK (80-160)	

Appendix F

Errors and Descriptions

This Appendix presents the list of errors, their descriptions and the necessary actions to be taken.

1. **"Select Plant Design Neutral File and Proceed..."**

   No Plant Design Neutral file is selected for transfer. User needs to select any Plant Design neutral file.

2. **"Enter CAEPIPE Model Batch File and Proceed... "**

   No CAEPIPE Model Batch File is specified or selected for transfer. User needs to specify or select any CAEPIPE .mbf file.

3. **"Plant Design Neutral File does not exist"**

   Selected Plant Design Neutral file does not exist in the path specified in text box. User needs to check the path and specify the correct location of Neutral file.

4. **"CAEPIPE Model Batch File Path does not exist"**

   The path Specified to create CAEPIPE mbf file does not exist. User needs to check the path and specify the exact location to create the mbf file.

5. **"Invalid Entry. Starting Node number should be a Numeric value."**

   Starting Node number specified is not a numeric value. Please enter only numeric value.

6. **"Invalid Entry. Node Increment should be a Numeric value."**

   Node Increment specified is not a numeric value. Please enter only numeric value.

7. **"Invalid Entry. Staring Node number should be < 10000."**

   Node number cannot be more than or equal to 10000. Please reenter the starting Number below 10000.

8. **"Invalid Entry. Node Increment should be < 10000."**

   Node Increment value is too high. Node number cannot be more than or equal to 10000. Please reduce the Node Increment value.

9. **"Cannot determine product. Contact Program vendor for details"**

   Some of the files required for the translator either moved or deleted. Please reinstall the product or contact program vendor for details.

10. "Not a valid PDMS2CAEPIPE (for example) Neutral file"

The License available only for PDMS2CAEPIPE (for example) but user trying to translate other than PDMS neutral file. Please contact program vendor for details.

11. "Cannot initialize application. Contact Program vendor for details."

Contact program vendor immediately.

12. " Selected Plant Design Neutral File is Empty. Check the Neutral File."

The selected Plant Design Neutral file does not have any content to transfer. User needs to check the neutral file.

13. "Invalid Data Type. Expected = 'Real' Available = 'String'"

When reading the Plant Design neutral file, one of the field values in a line is expected to be Real number format. But the field is filled with string format. Hence, translator cannot convert the String to Real.

For example, Outer Diameter of a pipe is expected in Real Number format like "4", But in neutral file it may be like "4inch". In this case translator will give the above error message. User needs to remove "inch" from that field and save that neutral file then need to transfer.

14. "Improper Bore or Weight Units. Check the Neutral File."

Bore and Weight units entered in neutral file are invalid. Translator will expect Bore Unit as either "IN" or "MM" and Weight unit as either "KG" or "LB". If any value other than the above is specified, the translator will show error message containing the line number, Entire line and the above message. User needs to check unit used then needs to transfer.

15. "Wrong Neutral File. No Piping Elements available to Read..."

Translator expects at least any one piping component present in the Neutral file. If not, it will show the above error message. User needs to check the Plant Design Neutral file.

16. "Number of Fields available in the above Line < The Required Fields."

Translator expects some of the fields in a line from the Plant Design Neutral file. If not available, it will show the above said message with Line number and that particular line. User needs to check and correct that line and then need to transfer or contact program vendor for more details.

17. "Error in Mapping Data Base. Check the Data Bases."

If user did any change in mapping DB, which is not proper, then translator will show the above error message. User needs to check the change made in the database. Refer PD2CAEPIPE user's manual for details on modification of database.

18. "Wrong Plant Design Neutral File. No Load available to Read..."

Load details are not specified in the Plant Design Neutral file. User needs to check the Neutral file and then need to transfer.

19. **"Wrong Plant Design Neutral File. No Node coordinates available to Read..."**

    Node Coordinates are not specified in the Plant Design Neutral file. User needs to check the Neutral file and then need to transfer.

20. **"Node number 50 (for example) is defined twice in the Neutral file. Check the neutral file and proceed."**

    The node number specified above is defined two times i.e., for the same node number X, Y and Z coordinate values specified in two places in the Plant Design Neutral file. User needs to check the neutral file.

21. **"Piping Code B31.0 (for example) is not available. Select Piping Code and Proceed."**

    The Piping code specified in the Plant Design Neutral file is not available in the “Codedb.mdb”. User needs to select piping code from the Plant design to CAEPIPE dialog box and then needs to transfer the file.

22. **"Select Piping Code and Proceed."**

    Piping code is not selected from the Plant design to CAEPIPE dialog box. Please select the piping code and continue the transfer.

23. **"The Node number exceeded 10000. Check the 'Start Node' and 'Node Increment'."**

    During rearrange of node number, the new node is crossing 10000, which is not correct. Please reduce the “Start Node number” and “Node number Increment” values and try again.

24. **"Problem during processing the Neutral file. Check the Neutral file and proceed."**

    Some problem occurs during conversion. Please try again or contact program vendor for details.

25. **"Problem during writing the CAEPIPE Model Batch File."**

    Some problem occurs during creation of mbf file. Please try again or contact program vendor for details.