SPECIFYING VAPOUR COMPRESSION CYCLE PLANT

INTRODUCTION

This TECHnote describes ways in which the *0715 Vapour compression cycle plant* worksection can be used to create specifications for a wide variety of plant using the vapour compression cycle. The worksection consists of a kit of parts that can be used to assemble a specification to suit the required plant item including air-cooled or water-cooled chillers, air-to-water or water-to-water water heaters and 4-pipe chillers.

While *0715 Vapour compression cycle plant* could be used to specify common configurations of plant such as straightforward chillers, most specifiers will find it simpler to use the following preconfigured NATSPEC worksections which are tailored to the respective plant items and contain a minimum of options for the specifier to deal with:

- *0711 Water heaters - air-to-water.*
- *0716 Chillers – water-cooled centrifugal.*
- *0717 Chillers - water-cooled screw.*
- *0718 Chillers - air-cooled.*

EDITING THE WORKSECTION

The following is suggested as an approach to editing *0715 Vapour compression cycle plant* for a specific plant type:

- Edit the GENERAL, **RESPONSIBILITIES**, **General** subclause to insert the type of plant being specified. For example, insert 'water-to-water water heaters' if that is what is being specified.
- Consider also changing the worksection title to match, for example it could be changed to *0715 Water heaters - water-to-water* to assist the user / reader of the specification.
- Using the **PLANT CONFIGURATION TABLE** overleaf as a guide, delete unwanted clauses from the worksection. Make sure that the resulting assembly of components retained in the worksection all relate to the plant item being specified. Without doing this it would be possible to specify an item of plant that is not functional and possibly cannot be made.
- Check that *0715 Vapour compression cycle plant* includes all necessary components. Add clauses if needed.
- Check EXECUTION clauses against plant manufacturers' information. Add clauses if needed.
- Again, using the **PLANT CONFIGURATION TABLE** overleaf as a guide, select the appropriate schedule in SELECTIONS and delete the others from the worksection.
- Edit the worksection in the normal way, adding and deleting text to suit the project and plant being specified.
- The worksection includes some *Optional* style text provisions. If these are to be included, convert to *Normal* style text.
- Complete the retained schedule in SELECTIONS to suit the plant and project.

PLANT CONFIGURATION TABLE

The **PLANT CONFIGURATION TABLE** overleaf nominates relevant clauses for some potential vapour compression plant that may be specified using this worksection. It is not exhaustive but rather is intended to illustrate the process.

Table key:

R Required clause.

\- Delete clause.

S Select one of the respective component types e.g. compressor. Make sure the corresponding controls and other clauses are also included and redundant alternatives deleted.

Note: The first (shaded) plant item in the table (a water-cooled centrifugal chiller using sub-atmospheric refrigerant) has been completed as an example to illustrate the approach.

Related worksections

- *0711 Water heaters - air-to-water.*
- *0715 Vapour compression cycle plant.*
- *0716 Chillers – water-cooled centrifugal.*
- *0717 Chillers - water-cooled screw.*
- *0718 Chillers - air-cooled.*

Water-to-water screw compressor heat pump

Air-cooled centrifugal compressor chiller

Air-cooled scroll compressor 4-pipe chiller

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	Function	CHILLED WATER ONLY			HEAT PUMP ONLY		4-PIPE CHILLER	
	Compressor type	Centrif-ugal	Select	Select	Select	Select	Select	Select
	Heat source/Heat rejection	Water	Air	Water	Air	Water	Air	Water
1	GENERAL	R	R	R	R	R	R	R
1.1	RESPONSIBILITIES	R	R	R	R	R	R	R
1.2	CROSS REFERENCES	R	R	R	R	R	R	R
1.3	STANDARDS	R	R	R	R	R	R	R
1.4	INTERPRETATION	R	R	R	R	R	R	R
1.5	SUBMISSIONS	R	R	R	R	R	R	R
2	PRODUCTS	R	R	R	R	R	R	R
2.1	GENERAL	R	R	R	R	R	R	R
2.2	TESTS	R	R	R	R	R	R	R
2.3	COMPRESSORS - CENTRIFUGAL	R	S	S	S	S	S	S
2.4	COMPRESSORS - RECIPROCATING	-	S	S	S	S	S	S
2.5	COMPRESSORS - SCREW	-	S	S	S	S	S	S
2.6	COMPRESSORS - SCROLL	-	S	S	S	S	S	S
2.7	HEAT EXCHANGERS - PLATE	-	S	S	S	S	S	S
2.8	HEAT EXCHANGERS - REFRIGERANT-TO-AIR	-	R	-	R	-	R	-
2.9	HEAT EXCHANGERS - SHELL AND TUBE	R	S	S	S	S	S	S
2.10	EVAPORATORS	R	R	R	R	R	R	R
2.11	CONDENSERS	R	R	R	R	R	R	R
2.12	REFRIGERANT ECONOMISER	-	-	-	-	-	S	R
2.13	INSULATION	R	R	R	R	R	R	R
2.14	4-PIPE CHILLER - AIR-TO-WATER	-	-	-	-	-	R	-
2.15	4-PIPE CHILLER - WATER-TO-WATER	-	-	-	-	-	-	R
2.16	REFRIGERATION SYSTEM	R	R	R	R	R	R	R
2.17	LOW AMBIENT OPERATION - AIR-TO-WATER HEAT PUMPS AND 4-PIPE CHILLERS	-	-	-	R	-	R	-
2.18	LOW AMBIENT OPERATION - WATER-TO-WATER HEAT PUMPS AND 4-PIPE CHILLERS	-	-	-	-	R	-	R
2.19	CENTRIFUGAL PLANT PURGE SYSTEM	R	S	S	S	S	S	S
2.20	EMISSION ABATEMENT	R	S	S	S	S	S	S
2.21	CONTROL SYSTEM	R	R	R	R	R	R	R
2.22	INDICATION - CENTRIFUGAL COMPRESSORS	R	S	S	S	S	S	S
2.23	INDICATION - RECIPROCATING COMPRESSORS	-	S	S	S	S	S	S
2.24	INDICATION - SCREW COMPRESSORS	-	S	S	S	S	S	S
2.25	INDICATION - SCROLL COMPRESSORS	-	S	S	S	S	S	S
2.26	SAFETY CONTROLS - CENTRIFUGAL COMPRESSORS	R	S	S	S	S	S	S
2.27	SAFETY CONTROLS - RECIPROCATING COMPRESSORS	-	S	S	S	S	S	S
2.28	SAFETY CONTROLS - SCREW COMPRESSORS	-	S	S	S	S	S	S
2.29	SAFETY CONTROLS - SCROLL COMPRESSORS	-	S	S	S	S	S	S
2.30	CAPACITY CONTROL - CENTRIFUGAL COMPRESSORS	R	S	S	S	S	S	S
2.31	CAPACITY CONTROL - RECIPROCATING COMPRESSORS	-	S	S	S	S	S	S
2.32	CAPACITY CONTROL - SCREW COMPRESSORS	-	S	S	S	S	S	S
2.33	CAPACITY CONTROL - SCROLL COMPRESSORS	-	S	S	S	S	S	S
3	EXECUTION	R	R	R	R	R	R	R
3.1	INSTALLATION	R	R	R	R	R	R	R
3.2	COMMISSIONING	R	R	R	R	R	R	R
3.3	MAINTENANCE	R	R	R	R	R	R	R
4	SELECTIONS	R	R	R	R	R	R	R
4.1	CHILLERS	R	R	R	-	-	-	-
	Water-cooled chiller schedule	R	-	R	-	-	-	-
	Air-cooled chiller schedule	-	R	-	-	-	-	-
4.2	WATER HEATERS	-	-	-	R	R	-	-
	Water heaters - water-to-water schedule	-	-	-	-	R	-	-
	Water heaters - air-to-water schedule	-	-	-	R	-	-	-
4.3	4-PIPE CHILLER	-	-	-	-	-	R	R
	4-pipe water-to-water chiller schedule	-	-	-	-	-	-	R
	4-pipe air-to-water chiller schedule	-	-	-	-	-	R	-