

INSTALLATION, OPERATION &
MAINTENANCE INSTRUCTIONS



SPC

COILS

FOR HEATING
& COOLING

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1. GENERAL

1.1. GENERAL DESCRIPTION

Heating and cooling coils comprise a matrix of copper tubes supported in tube end plates and associated casing work. The tube matrix carries thin continuous fins, regularly spaced, at right angles to the tube matrix.

For other than single circuit coils the tubes are fed via headers which distribute the fluid between a number of parallel circuits to give the optimum tube velocity. The flow from the parallel circuits rejoins in the return header. The flow to DX evaporator coils is via distributor and capillary tubes to ensure even distribution.

The fin array is designed to provide an enlarged air side surface and to optimise heat transfer for the design air conditions, whilst minimising the resultant air side pressure drop.

SPC manufacture coils in the types shown below. Available coils styles are: economy heating, standard casing, unitary casing, enclosed casing, end plates only, special configurations. Coils are designed to operate with the appropriate fluid media as listed below. Installation and operation instructions have characteristics which largely dependent on these properties.

All coil blocks are tested to 22-bar air under water unless otherwise agreed, and tagged with a lead seal. Refrigerant coil blocks are subsequently dried, vacuum tested and charged with dry nitrogen.

Coil Types & Fluid Medium	
Heating	Cooling
Low Pressure Hot Water (LPHW)	Chilled Water
Medium Temperature Hot Water (MTHW)	Chilled Water & Glycol Mix
High Temperature Hot Water (HTHW)	Refrigerant (DX)
Steam	
Refrigerant (condensing)	

1.2. RECEIPT AND PREPARATION

The coils are despatched according to customer requirements. On receipt, check that all details are correct to the delivery schedule. Damage should be reported to the Carrier and to SPC Sales Office immediately. It is recommended that packaging is kept in place and the units stored in a safe area until the necessary services are completed, in order to avoid to possibility of damage on site.

2. SAFETY ISSUES

If work is to be carried out on site, before any operational or maintenance work is undertaken, the plant must be in a safe state for work to proceed, and all operations must therefore be covered by local working regulations.

The Health and Safety at Work Act places a duty upon employers to provide such information, instruction, training and supervision as is necessary to ensure, as far as is reasonably practicable, the health and safety at work of their employees. The Act also places a duty upon every employee to co-operate with his employer on matters affecting health and safety and to take reasonable care for the health and safety of himself and others who may be affected by his acts or omissions at work.

All instructions and procedures should comply with all site Health and Safety standards and conform to the following:

- Management of Health and Safety at Work (1992)
- Health and Safety at Work Act (1974)
- The Site Licence
- The Factories Act
- Health and Safety Regulations
- I.E.E. Regulations (16th Edition)
- Electricity at Work Regulations (1989)

Warnings

- Before commencing work, obtain, read and ensure you understand the relevant safety documentation.
- Prior to commencing maintenance work, ensure that the electrical supplies are isolated and cannot be switched on by others. Where the maintenance work or test sequence necessitates live operation, particular care must be exercised.
- Wear a safety harness when working in areas above ground where no handrails or similar safety provisions apply.

Warning notices are to be prominently displayed in the vicinity of operations when maintenance work is in progress. They should be displayed at other locations where inadvertent operation of equipment will place maintenance staff at risk.

3. INSTALLATION

3.1. GENERAL INFORMATION

During installation, lift coil assemblies by holding the casing and not headers or connections. Larger coils may have specific provision for eye bolt or similar lifting arrangements.

It is recommended that the installer check the handing of the coil before installation commences.

Casework should be securely fixed prior to pipework being made up.

Bolting up of the framework should be carried out as required to ensure support and sealing, using the holes provided on the casework. Mastic or similar should be used to ensure proper air sealing of the mating ductwork or AHU flanges. DO NOT support coil on connections whilst this is being carried out.

Sealing with mastic or similar to suit the application is the responsibility of the installer, in accordance with specifications being adhered to.

3.1.1. RETROFIT INSTALLATIONS

It is the responsibility of the installer to ensure that there is adequate room for installation of the assembly. Existing equipment should be removed, making good as required. The replacement coil can then be introduced in place of the original coil or other equipment. Upon installation the installer must ensure no air bypass occurs within the AHU or ductwork, and that proper sealing is carried out to make good the installation.

3.1.2. NEW INSTALLATIONS

The dimensions of the AHU or ductwork must provide for inclusion of the coil. Upon installation the manufacturer or installer must ensure no air bypass within the cabinet, and proper sealing and insulation to make good the installation

3.2. FEATURES RELATED TO COIL MEDIUM TYPE

3.2.1. WATER COILS

Water flow is into the bottom connection and returns from the top, thus assisting in the venting of the system. The coils are usually handed and should be connected in counter flow i.e. the water flow connection is at the leaving airside of the coil; the return water flow to the entering air side of the coil

When making screwed connections for the coil, hold the header connection with grips or similar. The copper coil tubes may be bent or fractured if excessive strain is put on the headers. Pipe flanges need bolt holes exactly aligned with those on coil flanges if supplied.

Extra care must be taken to ensure damage does not occur when fitting compression nuts to single circuit coils with plain copper tails. The copper connections are brazed to single thin-walled coil tubes and are especially susceptible to damage through twisting.

Supply and return pipework should have adequate flexibility and support to avoid straining the coil.

Adequate provision shall be made for venting and draining of the coil. In cooling, LPHW and MTHW coils, sockets for air venting are normally located at the high point in the circuit to assist with air removal during set-up. Drain plugs are located at low points to assist with drainage if coil removal is necessary. Otherwise all water coils should be capable of venting and draining through connecting

3.2.2. HTHW COILS

These do not have drain and vent points for safety reasons.

3.2.3. STEAM COILS

These do not have drain and vent points for safety reasons.

Correct design of condense systems is necessary to prevent water logging in the coil, which can lead to corrosion in the long term, and serious mechanical damage in the short term. This may occur in one of 3 ways, further details of which can be found in 4. *OPERATION*:

1. Steam or water hammer
2. Work hardening due to condensate being held back
3. Work hardening due to lack of flexibility in pipework

Handing should respect the supply and condense connections, with the condense line at the bottom of the coil. The steam connection will normally be mid-placed on the supply header.

Attached in the APPENDIXES are SPC recommendations for steam coil installation. Further discussion relating to steam coils is covered under 4. *OPERATION* section

3.2.4. COOLING COILS

Casework is normally drained via an appropriately sized side mounted drain socket on the drain pan. However, in many AHU designs, drainage is provided for in regularly spaced holes through the bottom tray (the "Perforated base Plate"). Thereafter, condensate drainage provision is the responsibility of the installer. Appropriate trapping should be provided to match the pressure regime at the drainage point in the region of the cooling coil.

3.2.5. REFRIGERANT COILS

Evaporator coils are supplied with one or more liquid refrigerant distributors connected via capillary tubes to the coil circuitry. These are of equal length for correct refrigerant distribution. Care should be taken to avoid kinking the tubes.

Refrigerant coils are generally supplied with sealed caps, and the coil positively charged with dry Nitrogen. The connections should be cut or sweated off when ready for installation. Capillary or compression fittings should be fitted according to manufacturer's instructions. Care should be taken to avoid the introduction of foreign matter or moisture into the system when piping up, as this may have an adverse effect on the longevity and performance of the system.

The handing convention given to SPC results in the outlet being at the lowest position on the suction header.

3.2.6. ENCLOSED STYLE CASING

Coils are normally excluded from DW-type specifications for pressure testing, as coil end plate design allows thermal movement of the tubes. However, the enclosed style casing is designed to allow their inclusion in ductwork pressurisation tests. Cover box type coils are normally supplied sealed. Some arrangements are supplied with extended faces and sealing plates supplied loose. Mating faces should be sealed using mastic or similar on completion of piping up.

4. OPERATION

4.1. WATER COILS

Use of a proprietary corrosion inhibitor should be considered in the water, remembering that the coils are primarily made of copper on the fluid side.

It is normal when checking for drainage on cooling coils to ensure that this occurs when the system is running, in addition to static tests.

4.2. STEAM COILS

Operation of steam coils may give rise to a number of problems. These may be avoided by proper installation, but in the event of difficulties, the following helps identify symptoms and causes.

1. Steam or water hammer: Caused by condensate in the steam supply. If the steam is not properly dry, or if condensate not collected at regular intervals, then condensate may form a slug, which at velocities of around 100 km/hr, can cause damage to tubes and headers. Classic signs are belled out surfaces. Clicks or bangs in the system are a sure sign of the symptom.
2. Work hardening due to condensate being held back: Causes uneven expansion and contraction of adjacent parts of the coil. Usually provoked by part closed modulating control in the steam line allowing a vacuum to form, and because of lack of positive condensate drainage. The top part of the coil is at steam temperature, and the lower part at chilled condensate temperature. This can be affected by sub-zero temperatures if there is a fresh air supply.
3. Work hardening due to lack of flexibility in supply or drain pipework: Leads to rupture of coil connections or tubes to headers. Connections should be designed to flex, with expansion and contraction not being taken up by the coil. When multiple coil sections are involved, each section should have its own separate flexible steam supply connections and condensate connections, the latter each having a trap.

5. MAINTENANCE

Sockets for air venting are at the high point in the circuit to assist with air removal during set-up and if necessary during maintenance. Drain plugs are located at low points to assist with drainage if coil removal is necessary. Otherwise all water coils should be capable of venting and draining through connecting pipework.

Preventative maintenance is generally required to ensure that the coils are maintained in a clean condition. This has three purposes:

1. Ensures that there is no marked increase in air side pressure drop.
2. Ensures that there is no significant impairment in air side heat transfer capability.
3. Ensures that drainage from wet coils is not impaired over time.

Coils are virtually maintenance free, but in the event of build up of atmospheric dust or fluff on the fin surface, can be removed by vacuum or air blast, taking care that all loosened debris is removed and not carried into the distribution ductwork. In the event of fins being pressed in, relieve with a thin blade. Minor fin-damage has little or no effect on coil performance.

It is normal when checking for drainage to ensure that this occurs when the system is running, in addition to static tests.

5.1. MAINTENANCE SCHEDULE

Description	Frequency
Visual inspection of headers and tube joints	During commissioning
Visual inspection of coil faces	Annually
Air blast/ Vacuuming of fin face	If required after visual inspection
Visual inspection of cooling coil drainage arrangements	During commissioning
Drain pan cleansing (Cooling coils)	Annually at beginning of cooling season

5.2. RECOVERY

There is no special recovery equipment for the coils.

In the event of significant failure, the complete coil should be removed for maintenance purposes.

The most common type of failure to occur is a tube leak. Whilst it is sometimes practical to carry out repairs on site, removal of the complete coil is recommended in order to ensure subsequent integrity if repaired, or for replacement.

In the event of coil removal being necessary, the following procedure should be followed.

- The coil should be isolated by means of in-line isolating valves and drained down
- Disconnect connections
- Support coil as required for subsequent dismantling, and unbolt casework flanges
- Remove coil

5.3. CORRECTIVE MAINTENANCE

Copper coil tubes between coil block and headers may be bent or fractured if excessive strain is put on headers.

During installation or removal coils should be lifted by means of the casing and NOT the headers or connections.

Screwed pipe connections should be tightened or undone whilst holding the header connections with grips to avoid undue stressing of coil tubing. Pipe flanges should be fitted using a proprietary jointing compound.

Casework should be securely fixed prior to pipework flanges being made up.

Sockets for air venting are at the high point in the circuit to assist with air removal during set-up or subsequently. Drain plugs are located at low points to assist with drainage if coil removal is necessary. Otherwise all coils should be capable of venting and draining through connecting pipework

In order for work to be carried out on the fluid side of the coils, the coil should be isolated by means of isolating valves located in the service supply and return to the coil.

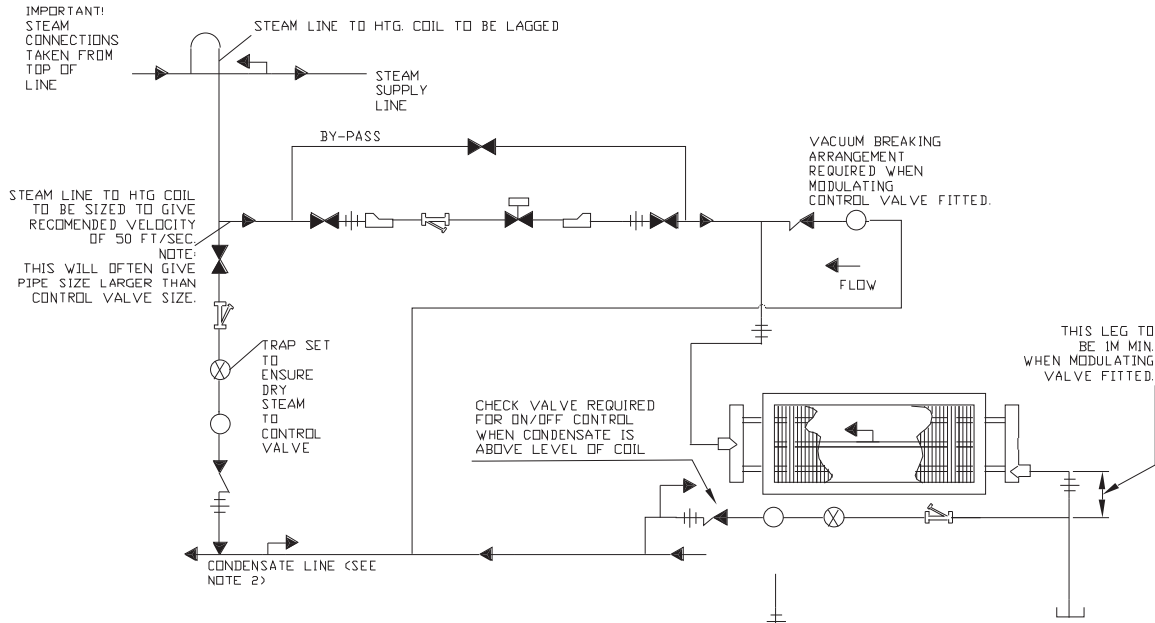
In order for work to be carried out on the air side faces of the coil or within the ductwork, the system fan should be isolated

5.4. SPARES LIST

Not applicable - Full replacement if necessary.

Appendix 1.

STEAM COIL INSTALLATION RECOMMENDATIONS



PREFERRED ALTERNATIVE WITH COIL HAVING VERTICAL TUBES

	DIRECTION OF RISE
	DIRECTION OF FLOW
	UNION
	DIRT POCKET
	STRAINER
	STEAM CONTROL VALVE
	CHECK VALVE
	ISOLATING VALVE
	SIGHT GLASS
	STEAM TRAP
	ECCENTRIC REDUCER

NOTES

- 1) COILS SHOWN, TERMINATING IN MALE B.S.P. CONNECTIONS
- 2) WITH MODULATING STEAM VALVE, CONDENSE MUST FALL TO RECEIVER. IF LIFT REQUIRED, A PUMP TRAP MUST BE INSTALED.
- 3) ALLOW SUFFICIENT BENDS BETWEEN MAINS AND COIL TO TAKE UP EXPANSION WITHOUT STRAIN ON THE HEATING COIL.
- 4) USE FLOAT STEAM TRAP WHEREVER POSSIBLE.



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