SECTION 22 15 14

GENERAL SERVICE COMPRESSED-AIR SYSTEMS, LOW PRESSURE
02/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360	(2005) Specification for Structural Steel Buildings, with Commentary

AMERICAN WELDING SOCIETY (AWS)

AWS WHB-2.9	(2004) Welding Handbook; Volume Two - Welding Processes
AWS-03	(2001) Welding Handbook, Volumes 1 thru 4

ASME INTERNATIONAL (ASME)

ASME A112.18.1	(2005) Standard for Plumbing Fixture Fittings
ASME B16.1	(2005) Standard for Gray Iron Threaded Fittings; Classes 125 and 250
ASME B16.22	(2001; R 2005) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.3	(2006) Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B18.2.2	(1987; R 2005) Standard for Square and Hex Nuts
ASME B19.3	(1991; Addenda A 1994; Addenda B 1995) Safety Standard for Compressors for Process Industries
ASME B31.1	(2007; Addenda 2008) Power Piping
ASME B31.3	(2008) Process Piping
ASME B40.100	(2005) Pressure Gauges and Gauge Attachments
ASME BPVC	(2007) Boiler and Pressure Vessel Codes

ASME BPVC SEC VIII D1	(2007; Addenda 2008) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage

ASTM INTERNATIONAL (ASTM)

ASTM A 126	(2004) Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 183	(2003) Standard Specification for Carbon Steel Track Bolts and Nuts
ASTM A 197/A 197M	(2000; R 2006) Standard Specification for Cupola Malleable Iron
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 666	(2003) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM B 280	(2008) Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
ASTM B 370	(2003) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM B 62	(2002) Standard Specification for Composition Bronze or Ounce Metal Castings
ASTM B 749	(2003) Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products
ASTM C 592	(2008a) Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM D 2000	(2008) Standard Classification System for Rubber Products in Automotive Applications
ASTM F 104	(2003) Standard Classification System for Nonmetallic Gasket Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2002) Standard for Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(2003; R 2004) Standard for Pipe Hangers and Supports - Selection and Application
MSS SP-70	(2006) Standard for Cast Iron Gate Valves, Flanged and Threaded Ends
MSS SP-72	(1999) Standard for Ball Valves with Flanged or Butt-Welding Ends for General Service
MSS SP-80	(2008) Bronze Gate, Globe, Angle and Check Valves

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-S-325	(Int Amd 3) Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

1.2 GENERAL REQUIREMENTS

Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS applies to work specified in this section.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Submit Equipment and Performance Data for piping systems.

Submit manufacturer's catalog data for the following items:

Aboveground Piping Materials
Piping Specialties
Air Compressors
Valves
Accessories

SD-05 Design Data

Equipment and Performance Data submitted for piping systems shall show conformance with ASME Code.

SD-06 Test Reports

Submit test reports for the following items in accordance with paragraph entitled, "Compressed Air Systems Testing," of this section.

Compressed Air Systems Testing
Pneumatic Testing

Each acceptance test shall require the signature of the Contracting Officer and two record copies shall be delivered to the Contracting Officer after acceptance.

SD-10 Operation and Maintenance Data

Submit Operation and Maintenance Manuals in accordance with paragraph entitled, "Operation and Maintenance," of this section.

1.4 GENERAL REQUIREMENTS

Equipment and Performance Data submitted for piping systems shall show conformance with ASME Code.

1.5 OPERATION AND MAINTENANCE

Contractor shall submit 6 copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the low-pressure compressed air System. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

1.6 DRAWINGS

In lieu of separate hangers, the Contractor may submit for approval a shop drawing of trapeze hangers with a solid or split-ring clamp which he proposes to furnish.

PART 2 PRODUCTS

2.1 ABOVEGROUND PIPING MATERIALS

2.1.1 Compressed Air Systems 125 Psig and Less

2.1.1.1 Type GCS Galvanized Carbon Steel

Pipe 1/2 through 10 inches shall be Schedule 40, seamless, galvanized steel, conforming to ASTM A 53/A 53M, Grade B, Type E or S. Type F is acceptable for sizes less than 2 inches.

Fittings 2 inches and under shall be 150-psig wsp, banded, galvanized, malleable iron, screwed, conforming to ASTM A 197/A 197M, ASME B16.3.

Unions 2 inches and under shall be 300-psig wsp, female, screwed, galvanized, malleable iron with brass-to-iron seat and ground joint.

2.1.2 Control and Instrumentation Tubing, to 30 Psig

2.1.2.1 Copper

Tubing all sizes with 1/4 inch minimum outside diameter shall be hard-drawn seamless copper, conforming to ASTM B 280.

Fittings shall be solder joint wrought copper conforming to ASME B16.22.

Solder shall be 95-5 tin-antimony, alloy Sb 5, conforming to AWS WHB-2.9.

Copper tubing systems may be installed using mechanical pipe couplings of a bolted type with a central cavity design pressure responsive gasket. Groove copper pipe and fittings in accordance with the coupling manufacturer's recommendations.

2.2 PIPING SPECIALTIES

2.2.1 Air Pressure Reducing Stations

Install pressure reducing station complete with relieving type pressure reducing valve, valved bypass, particle filter, pressure indicator upstream of station, pressure indicator downstream of station, and regulated air pressure relief valve.

Construct pressure regulator body of zinc or aluminum die castings, rated for the service. Diaphragm shall be reinforced air-, oil-, and water-resistant elastomer. All components, exposed to fluid stream being controlled, shall be of [nonferrous] [suitable nonmetallic materials]. Valves shall be of a balanced construction relieving type to automatically prevent excess pressure buildup.

Construct filters of zinc or aluminum die castings, rated for the service, and furnished with ips connections. Bowl materials shall be aluminum. Filter shall be serviceable by bowl quick-disconnect devices. Equip bowl with manual drain cock. Separate liquid particles by centrifugal and quiet zone action. Remove solid particles to 15-micrometer size by filter elements of sintered bronze or corrosion-resistant steel mesh.

[Combination manual drain filter-regulator units conforming to the above requirements will be acceptable in lieu of separate units.]

Pressure relief valves shall be rated for the pressure of the high-pressure side and sized for the full installed capacity of the pressure regulating station at the pressure of the low-pressure side. Set valve at not more than 20 percent more than the correct low side pressure. Rate and label valve. Seat material shall be suitable for the service.

2.2.2 Air Line Lubricators

Air line lubricators shall be of the pulse-type with pickup tube, polycarbonate resin bowl, large fill opening, metering rod flow adjuster, sight ball, and drain cock.

Lubricators shall be suitable for 200 psig at 165 degrees F.

2.2.3 Compressed Air Receivers

Compressed air receivers shall conform to the sizes and capacities specified. Design such vessels for the applicable working pressures and service in accordance with the ASME BPVC SEC VIII D1, and label.

Vessels shall be complete with connections for drain, supports, and other required Accessories.

2.2.4 Pressure Gages

Pressure gages shall conform to ASME B40.100. Pressure gages shall be Type I, Class 1, (pressure) for pressures indicated. Pressure gage size shall be 3-1/2 inches nominal diameter. Case shall be corrosion-resistant steel conforming to [the AISI 300 series] [ASTM A 666] with an ASM No. 4 standard commercial polish or better. Equip gages with damper screw adjustment in inlet connection.

2.3 AIR COMPRESSORS

Provide an air compressor of the rotary type complete with air tank, air dryer, and other appurtenances. Compressor and installation shall conform to ASME B19.3. Air dryers shall be of the mass refrigerated dryer type and shall maintain the air in the system with a dew point low enough to prevent condensation 13 degrees F at 18 psi main pressure. Locate air dryer at the outlet of the tank.

2.4 VALVES

2.4.1 Ball Valves (BAV)

Ball valves shall conform to MSS SP-72. Valves shall be Style [1] [3].

Grooved end ball valves may be used provided that the manufacturer certifies valve performance in accordance with MSS SP-72.

Rate valves for service at not less than 175 psi at 200 degrees F.

Valve bodies in sizes 2 inch ips and smaller shall be screwed end connection type constructed of Class A copper alloy.

Valve bodies in sizes 2-1/2 inch ips and larger shall be flanged-end connection type constructed of Class [D] [E] [F] material.

Balls and stems of valves 2 inch ips and smaller shall be [manufacturer's standard Class A copper alloy with 900 Brinell hard chrome plating finish] [Class C corrosion-resistant steel alloy with hard chrome plate]. Electroless nickel plating is acceptable.

Balls and stems of valves 2-1/2 inch ips and larger shall be manufacturer's standard Class C corrosion-resistant steel alloy with hard chrome plate. In valves 6 inch ips and larger, balls shall be Class D with 900 Brinell hard chrome plate. Electroless nickel plating is acceptable.

Design valves for flow from either direction and seal equally tight in either direction.

Valves shall have full pipe size flow areas.

Valves with ball seals kept in place by spring washers are not acceptable. All valves shall have adjustable packing glands. Seats and seals shall be tetrafluoroethylene.

Valve body construction shall be such that torque from a pipe with valve in installed condition shall not tend to disassemble the valve by stripping setscrews or by loosening body end inserts or coupling nuts. Torque from a pipe shall be resisted by a one-piece body between end connections or by bolts in shear where body is of mating flange or surface-bolted

construction.

2.4.2 Gage Cocks (GC)

Gage cocks shall be T-head or lever handle ground key type with washer and screw, constructed of polished ASTM B 62 bronze, and rated for 125 psi saturated steam service. End connections shall suit the service, with or without union and nipple.

2.4.3 Globe and Angle Valves (GLV and ANV)

Globe and angle valves 2 inches and smaller shall conform to MSS SP-80. Valves located in tunnels, equipment rooms, or factory-assembled equipment, shall be union-ring bonnet, screwed-end type. Disk shall be free to swivel on the stem in all valve sizes. Composition seating surface disk construction may be substituted for all metal disk construction. Packing shall be a woven material impregnated with not less than 25 percent, by weight, tetrafluoroethylene resin.

Globe and angle valves 2-1/2 inches and larger shall conform to MSS SP-80. Valve bodies shall be cast iron conforming to ASTM A 126, Class A, as specified for Class 1 valves under MSS SP-70. Flange valve ends in conformance with ASME B16.1, and valve construction shall be OS&Y type. Packing shall be a woven material impregnated with not less than 25 percent, by weight, tetrafluoroethylene resin.

2.5 MISCELLANEOUS MATERIALS

2.5.1 Bolting

Flange and general-purpose bolting shall be hex-head and shall conform to ASTM A 307, Grade B. Heavy hex-nuts shall conform to ASME B18.2.2. Square-head bolts shall not be acceptable.

Grooved couplings shall utilize bolts and nuts of heat treated carbon steel conforming to ASTM A 183.

2.5.2 Elastomer Calk

[Polysulfide] [polyurethane base] elastomer calking material shall be a two-component type conforming to ASTM C 920.

2.5.3 Escutcheons

Escutcheons shall be manufactured from nonferrous metals and [chrome plated] [hot-dipped galvanized] except when AISI 300 series corrosion-resistant steel is provided. Metals and finish shall be in accordance with ASME A112.18.1.

Escutcheons shall be [one-piece] [split-pattern] type. Escutcheons shall maintain a fixed position against a surface by means of internal spring tension devices or setscrews.

2.5.4 Flashing

Sheet lead shall conform to ASTM B 749, Grade [B] [C] [D] and weigh not less than 4 pounds per square foot.

Sheet copper shall conform to ASTM B 370 and weigh not less than 16 ounces per square foot.

2.5.5 Flange Gaskets

Compressed non-asbestos sheet shall conform to ASTM F 104, Type 1, and be coated on both sides with graphite.

Grooved flange adapters gasketing shall be a pressure responsive elastomer conforming to ASTM D 2000.

2.5.6 Pipe Thread Compounds

Use tetrafluorethylene tape not less than [2] [3] mils thick in compressed air systems for pipe sizes to and including 1 inch ips. Tetrafluoroethylene dispersions and other suitable compounds may be used for other applications upon approval by the Contracting Officer.

2.6 SUPPORTING ELEMENTS

Contractor shall provide all necessary piping system components and miscellaneous required supporting elements. Supporting elements shall be suitable for stresses imposed by system pressures and temperatures, and natural and other external forces.

Supporting elements shall be [FM-approved] [UL-listed] and conform to requirements of ASME B31.3, MSS SP-58, and MSS SP-69, except as otherwise noted. Type devices specified herein are defined in MSS standards unless otherwise noted.

2.6.1 Building Structure Attachments

Concrete and masonry anchor devices shall conform to requirements of FS FF-S-325 Group [I] [II], Type 2, Class 2, Style [1] [2]; Group [III] [VIII].

Cast-in floor-mounted equipment anchor devices shall provide adjustable positions.

Masonry anchor devices shall be built-in, unless otherwise approved by the Contracting Officer.

Do not use power actuated anchoring devices to support mechanical systems components.

Use clamps to support piping sizes 1-1/2 inches and smaller. C-clamps shall be FM approved and UL listed with hardened cup tip, setscrew, locknut, and retaining strap. Retaining strap section shall be not less than 1/8 by 1 inch. Beam flange thickness to which clamps are attached shall not exceed 0.60 inch.

Construct concrete inserts in accordance with the requirements of MSS SP-58, for Type 18 and MSS SP-69. When applied to piping in sizes 2 inch ips and larger and where otherwise required by imposed loads, a 1-foot length of 1/2 inch reinforcing rod shall be inserted and wired through wing slots. Approved proprietary-type continuous inserts may be similarly used upon approval by the Contracting Officer.]

2.6.2 Horizontal Pipe Attachments

Piping in sizes to and including 2 inch ips shall be supported by Type 6 solid malleable-iron pipe rings except that split-band-type rings may be used in sizes up to 1 inch ips.

Trapeze hangers fabricated from approved structural steel shapes, with U-bolts, shall be used in congested areas and where multiple pipe runs occur. Structural steel shapes shall conform to supplementary steel requirements or be a commercially available, proprietary-design, rolled steel.

2.6.3 Vertical Pipe Attachments

Vertical pipe attachments shall be Type 8.

2.6.4 Hanger Rods and Fixtures

Use only circular cross-section rod hangers to connect building structure attachments to pipe support devices. Pipe, straps, or bars of equivalent strength may be used for hangers only where approved by the Contracting Officer.

Provide turnbuckles, swing eyes, and clevises as required by support system to accommodate pipe accessibility and adjustment for load and pitch.

2.6.5 Supplementary Steel

Where it is necessary to frame structural members between existing members or where structural members are used in lieu of commercially rated supports, such supplementary steel shall be designed and fabricated in accordance with AISC 360.

PART 3 EXECUTION

3.1 ABOVE GROUND PIPING SYSTEM INSTALLATION

3.1.1 Piping Systems

Fabricate and install piping systems in accordance with ASME B31.3, MSS SP-69, ASME BPVC, and applicable AWS requirements.

Fabricate pipe to measurements established on the job and carefully work into place without springing or forcing.

Pipe, tubing, fittings, valves, equipment, and Accessories shall be clean and free of all foreign material before being installed in their respective systems. Clean pipe by a method approved by the Contracting Officer. Purge lines with dry, oil-free compressed air after erection, but purging shall not be relied upon for removing all foreign matter. Purge lines at a velocity equal to 1-1/2 times maximum normal flow velocity. During the progress of construction, protect open ends of pipe, fittings, and valves at all times to prevent the admission of foreign matter. Except when connections are actually underway, install plugs or caps on all pipe and component openings. Plugs or caps shall be commercially manufactured products.

Install piping straight and true, with approved offsets around obstructions and with necessary expansion bends or fitting offsets essential to a satisfactory installation and as may be necessary to increase headroom or to avoid interference with the building construction, electric conduit, or facilities equipment.

Use standard long sweep pipe fittings for changes in direction. No mitered joints or unapproved pipe bends shall be permitted.

Pipe bends in seamless pipe may be made with hydraulic benders in the field for pipe sizes to 4 inch ips, upon approval of the Contracting Officer. Radius of pipe bends shall be not less than five nominal pipe diameters.

Tee connections shall be made with screwed tee fittings or grooved tee fittings, or, where pipe is being welded, branch connections shall be made with either welding tees or forged branch outlet fittings, either being acceptable without size limitations. Branch outlet fittings shall be forged, flared for improved flow where attached to the run, reinforced against external strains, and designed to withstand full burst-pressure strength requirements. Provide tool space between parallel piping runs whenever threaded unions or couplings are installed.

Horizontal piping shall have a grade of 1 inch per 100 feet.

Use eccentric reducers where required to permit proper drainage of pipe lines. Do not permit bushings for this purpose. Provide drain valves in piping systems at low points. Pipe drains shall consist of 1/2 inch globe valves with renewable disks and 3/4 inch hose adapter.

Perform installation of piping in a manner that will prevent stresses and strains from being imposed on connected equipment.

Make expansion bends in steel pipe from pipe sections and long-radius welding elbows in sizes 1 inch and larger. Expansion U-bends shall be cold sprung and welded into the line. Anchor line before removing the spreader from the expansion U-bend.

3.1.2 Joints

Ream pipe ends before joint connections are made.

Make up screwed joints with joint compound.

Apply joint compounds to the male thread only, and exercise care to prevent compound from reaching the interior of the pipe.

Provide screwed unions, welded unions, or bolted flanges wherever required to permit convenient removal of equipment, valves, and piping Accessories from the piping system.

Assemble flanged joints with appropriate flanges, gaskets, and bolting. Clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system. Flange faces shall be parallel and the bores concentric. Center gaskets on the flange faces without projecting into the bore. Lubricate bolting with oil and graphite before assembly to ensure uniform bolt stressing. Draw up and tighten flange bolts in staggered sequence to

prevent unequal gasket compression and deformation of the flanges. Wherever a flange with a raised face is joined to a companion flange with a flat face, the raised face shall be machined to a smooth matching surface, and a full facegasket shall be used. After the piping system has been tested and is in service at its maximum temperature, bolting shall be retightened. Only use hex-head nuts and bolts. Gasket material shall be fresh stock, 1/16 inch thick.

Field welded joints shall conform to the requirements of the AWS-03 and ASME B31.3.

Copper tubing for solder joints shall be cut square, and burrs shall be removed with approved cutting and reaming tools. Clean inside surfaces of fittings and outside surfaces of tubes in joint area before assembly of joint. Apply joint flux, solder, and heat source in accordance with the manufacturer's instructions to provide proper capillary action to fill the socket space and to achieve 100 percent of shear-line strength capability. Valves in copper piping shall have screwed ends with end adapters to suit mechanical connections, unless solder joining is specified for a given application. Remake copper joints that fail pressure tests with new materials, including pipe or tubing fittings and filler metal.

Tubing for mechanical joints shall be cut square, and burrs shall be removed. Exercise care to avoid work-hardened copper surfaces and cut off or anneal tube ends. Heating temperature and air-cooling shall be in accordance with the manufacturer's instructions.

3.1.3 Control and Instrument Air Tubing

Conceal tubing, except in mechanical rooms or areas where other piping is exposed.

Use hard-drawn copper tubing in exposed areas. Do not use anneal copper in concealed locations.

Fittings for supply system copper tubing shall be wrought copper solder joint-type, except at connection to apparatus where specified brass mechanical and ips thread adapter fittings shall be used. Tool-made bends in lieu of fittings are acceptable. Neatly nest multiple tube runs.

When the tubing run is less than 12 inches, plastic tubing may be used. Otherwise, terminal single line shall be hard-drawn copper tubing.]

Mechanically attach tubing to supporting surfaces. Supports using adhesives shall not be acceptable.

Copper tubing horizontal supports for less than 3 tubes shall be rigid 1-by 3/8 inch metal channel and shall be proprietary metal tube race for 3 or more tubes.

Systematically purge tubing with dry, oil-free compressed air or nitrogen to rid system of impurities generated during joint-making and installation and atmospheric moisture before connection to control instruments.

3.1.4 General Service Valve Locations

Provide valves to permit isolation of branch piping and each equipment item

from the balance of the system, to allow safe and convenient access without moving equipment, and to require a minimum of piping and equipment disassembly.

Provide valves in piping mains and branches at equipment and equipment items.

Provide riser and downcomer drains above piping shutoff valves in piping 2-1/2 inches and larger. Tap and fit shutoff valve body with a 1/2 inch plugged globe valve.

Provide three-valve bypass around each pressure-regulating valve.

Provide valves unavoidably located in furred or other normally inaccessible places with access panels.

3.1.5 Bypass Throttling Valves

Valves shall be globe type with composition disc.

3.1.6 Supporting Elements Installation

Provide support elements in accordance with the requirements of ASME B31.1, MSS SP-58, MSS SP-69. Hang piping from building construction. No piping shall be hung from roof deck or from other pipe.

Attachment to building construction concrete shall be by approved cast-in concrete inserts wherever possible. Attachment to building construction solid masonry shall be by built-in anchors. Where attachment by either of above methods is not possible, specified masonry anchor devices may be used upon receipt of written approval from the Contracting Officer.

Embed fish plates in the concrete to transmit hanger loads to the reinforcing steel where hanger rods exceed 7/8 inch diameter.

Construct masonry anchors selected for overhead applications of ferrous materials only.

Size inserts and anchors for the total stress to be applied with a safety factor as required by applicable codes but in no case less than 4.

Insert anchor devices into concrete sections not less than twice the overall length of the device and locate them not less than the following applicable distance from any side or end edge or centerline of adjacent anchor service:

Anchor Bolt Length (Inches)	Minimum Edge Space (Inches)
1/4	3-1/2
5/16	3-3/4
3/8	4
1/2	5
5/8	6
3/4	7
7/8	8

In special circumstances, upon prior written approval of the Contracting Officer, center-to-center distance may be reduced to 50 percent of given distance provided the load on the device is reduced in direct proportion to reduced distance.

Piping shall run parallel with the lines of the building. Space and install piping and components so that a threaded pipe fitting may be removed between adjacent pipes and so that there will be not less than 1/2 inch of clear space between the finished surface and other work and between the finished surface and parallel adjacent piping. Hangers on different adjacent service lines running parallel with each other shall be arranged to be in line with each other and parallel to the lines of the building.

Place identical service systems piping, where practical, at same elevation and hung on trapeze hangers adjusted for proper pitch.

Spacing of trapeze hangers where piping is grouped in parallel runs shall be the closest interval required for any size pipe supported.

Where it is necessary to avoid any transfer of load from support to support or onto connecting equipment, pipe hangers shall be constant support type.

Provide approved pipe alignment guides, attached in an approved manner to the building structure, to control pipe movement in true alignment in the piping adjacent to and on each side of all pipe expansion loops.

Anchors incorporated in piping systems for the purpose of maintaining permanent pipe positions shall be welded to the piping and attached to the building structure in a manner approved by the Contracting Officer.

Suitably brace piping against sway and vibration. Bracing shall consist of brackets, anchor chairs, rods, and structural steel for Vibration Isolation.

Install hangers and supports for piping at intervals specified herein at locations not more than 3 feet from the ends of each runout and not over 25 percent of the specified interval from each change in direction of piping.

Load rating for all pipe hanger supports shall be based on weight and forces imposed on all lines. Deflection per span shall not exceed slope gradient of pipe. Schedule 40 and heavier pipe supports shall be in accordance with the following minimum rod size. Maximum allowable hanger spacing and concentrated loads will reduce allowable span proportionately:

PIPE SIZE INCHES	ROD SIZE INCHES	STEEL PIPE FEET
Up to 1	3/8	8
1-1/4 to 1-1/2	3/8	10
2	3/8	12
2-1/2 to 3-1/2	1/2	12
4 to 5	5/8	16
6	3/4	16

PIPE SIZE INCHES	ROD SIZE INCHES	STEEL PIPE FEET
8 to 12	7/8	20

Where possible, support vertical risers at the base at intervals specified and guide for lateral stability. Place clamps under fittings wherever possible. Support carbon steel pipe at each floor at not more than 15-foot intervals for pipe 2 inches and smaller and at not more than 20-foot intervals for pipe 2-1/2 inches and larger.

After the piping systems have been installed, tested, and placed in satisfactory operation, the Contractor shall firmly tighten hanger rod nuts and jam nuts to prevent any movement.

3.1.7 Sleeves

Sleeves are required where piping passes through roofs, through masonry or concrete walls, or through floor.

Lay out and set sleeve work before placement of slabs or construction of walls and roof. Furnish sleeves necessary to complete the work.

Where pipe sleeves are required after slabs and masonry are installed, holes to accommodate these sleeves shall be made with core drills. Set sleeves in place with a two-component epoxy adhesive system approved by the Contracting Officer. Carry no load by such sleeves unless approved by the Contracting Officer.

Sleeves shall be flush with all ceilings.

Sleeves passing through steel decks shall be continuously welded brazed to the deck.

Space between a pipe, bare or insulated, and the inside of a pipe sleeve or a construction surface penetration shall be packed solid with a mineral fiber conforming to ASTM C 592, Form B, Class 8. Wherever the piping passes through firewalls, equipment room walls, floors and ceilings connected to occupied spaces, and other locations where sleeves or construction surface penetrations occur between occupied spaces, similar packing shall be provided. Where sleeves or construction surface penetrations occur between conditioned and unconditioned spaces, the space between a pipe, bare or insulated, and the inside of a pipe sleeve or construction surface penetration shall be filled with an elastomer calk to a depth of 1/2 inch. Surfaces to be calked shall be oil- and grease-free.

3.1.8 Escutcheons

Provide escutcheons at penetrations of piping into finished areas. Where finished areas are separated by partitions through which piping passes, provide escutcheons on both sides of the partition. Provide plates at the underside only of such ceilings, where suspended ceilings are installed. Plates shall be large enough to fit around the insulation, for insulated pipes. Escutcheons shall be chrome-plated in occupied spaces and shall be of sufficient size to conceal openings in building construction. Firmly attach escutcheons with setscrews.

3.1.9 Flashings

Provide required flashings at mechanical systems penetrations of building boundaries.

3.2 COMPRESSED AIR SYSTEMS TESTING

Prior to acceptance of the work, pressure-test completed systems in the presence of the Contracting Officer.

3.2.1 Preliminary Stage Tests

[Tests shall be pneumatic and shall use dry, oil-free compressed air. Use carbon dioxide or nitrogen in metallic systems.]

[Testing of any system for any purpose shall include preliminary testing by swabbing joints under test with standard high-strength film soap solution and observing for bubbles at internal pressures not in excess of 5 psi.]

When testing reveals that leakage exceeds specified limits, isolate and repair the leaks, replace defective materials where necessary, and retest the system until specified limits are met. Remake leaking gaskets with new gaskets and new flange bolting, and discard used bolting and gaskets.

Other than standard piping flanges, plugs, caps and valves, only use commercially manufactured expandable elastomer plugs for sealing off piping for test purposes. Published safe test pressure rating of any plug used shall be not less than three times the actual test pressure being applied. During pneumatic testing or hydrostatic testing, evacuate personnel from areas where plugs are used.

Remove components that could be damaged by test pressure from piping systems to be tested.

Perform Valve-Operating Tests and Drainage Tests according to referenced standards.

Check piping system components, such as valves, for proper operation under system test pressure.

No test media shall be added to a system during a test for a period specified or determined by the Contracting Officer.

Duration of a test will be determined by the Contracting Officer and will be for a minimum of 15 minutes with a maximum of 24 hours. Test may be terminated by direction of the Contracting Officer at any point after it has been determined that the leakage rate is within limits.

Prepare and maintain test records of all piping systems tests. Records shall show Governmental and Contractor test personnel responsibilities, dates, test gage identification numbers, ambient temperatures, pressure ranges, rates of pressure drop, and leakage rates.

To preclude injury and damage, take necessary precautions by venting the expansive force of compressed air trapped during high-pressure Hydrostatic Testing. When purging or vent valves are not provided, the Contracting Officer may require the removal of any system component such as plugs or

caps to verify that the water has reached all parts of the system.

Irrespective of the amount of measured leakage, immediately repair visible leaks or defects in the pipeline.

3.2.2 Test Gages

Contractor's test gages shall conform to ASME B40.100 and have a dial size of 4 inches or larger. Maximum permissible scale range for a given test shall be such that the pointer during a test shall have a starting position at midpoint of the dial or within the middle third of the scale range. Certification of accuracy and correction table shall bear a date within 90 calendar days prior to test use, test gage number, and the project number, unless otherwise approved by the Contracting Officer.

3.2.3 Acceptance Pressure Testing

Testing shall take place during steady-state ambient temperature conditions.

Test ferrous piping systems at 1-1/2 times maximum operating pressure. Maintain test pressure for a period of not less than 2 hours with an allowable pressure drop of 2 psi during that time unless otherwise approved by the Contracting Officer.

3.3 COMPRESSED AIR SYSTEM CLEANING

Remove rust and dirt from the bore and exterior surface of all piping and equipment. Clean pipeline strainers, temporary and permanent, during purging operations, after startup, and immediately prior to final acceptance by the Government.

Flush and clean new steel piping with a suitable degreasing agent, until visible, grease, dirt, and other contaminants have been removed. Degreased waste material including the degreaser itself shall be disposed of in accordance with written instructions received from the Environmental authority having jurisdiction through the Contracting Officer and in accordance with all Local, State and Federal Regulations.

3.4 COMPRESSED AIR SYSTEMS IDENTIFICATION

Identification plates shall be protected and kept clean. Replace damaged and illegible identification plates at no additional expense.

Label and arrow piping at each point of entry and exit of piping passing through walls; at each change in direction, such as at elbows and tees; and in congested or hidden areas, at each point required to clarify service or indicate a hazard. Also label each riser.

In long straight runs, locate labels at distances visible to each other, but in no case shall the distance between labels exceed 75 feet. Labels shall be legible from the primary service and operating area.

-- End of Section --

ENGINEERING MANUAL

SSR

Small UP - Total Air System

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Date: 16 July 2008
Cancels: 10 August 2006

Point of Manufacture - Campbellsville, USA

60 HERTZ ENGINEERING DATA

Model		UP6-7TAS-125	UP6-7TAS-150	UP6-7TAS-210
GENERAL COMPRESSOR DATA				
Capacity (Ref. Intake Condition.) FAD (1)	m³/min (cfm)	0.79 (28)	0.71 (25)	0.48 (17)
Maximum & Rated Operating Pressure	barg (psig)	8.6 (125)	10.3 (150)	14.5 (210)
Rated package discharge Pressure (13)	barg (psig)	8.0 (116)	9.9 (143)	14.1 (205)
Minimum Operating Pressure	barg (psig)	4.5 (65)	4.5 (65)	4.5 (65)
Maximum Operating Temperature	ºC (ºF)	40 (105)	40 (105)	40 (105)
Minimum Operating Temperature	ºC (ºF)	2 (36)	2 (36)	2 (36)
SOUND LEVEL (2)				
Base mounted Enclosed	dB(A)	65	65	65
COOLING DATA				
Air-cooled (Ambient Temperature 40°C/104°F)				
Coolant Discharge temperature	°C(°F)	87 (189)	86 (187)	90 (194)
A/E Injection Temperature	°C(°F)	79 (174)	79 (174)	79 (174)
(3) Aftercooler - Inlet	°C(°F)	79 (174)	79 (174)	79 (174)
Aftercooler - Outlet	°C(°F)	51 (124)	51 (124)	51 (124)
Heat Removal Oil Cooler	kW (1000 Btu/hr)	5.5 (18.8)	5.5 (18.8)	5.5 (18.8)
Heat Removal Oil and Aftercooler	kW (1000 Btu/hr)	6.1 (20.8)	6.1 (20.8)	6.1 (20.8)
Heat Removal Dryer Condenser (Max)	kW (1000 Btu/hr)	1.4 (4.8)	1.4 (4.8)	1.4 (4.8)
Coolant Flow	lpm (UK gpm)	17.0 (3.7)	21.0 (4.6)	32.0 (7.0)
Cooling Air				
Main Cooling Air Flow	m³/min (cfm)	20.0 (700)	20.0 (700)	16.0 (565)
Dryer Cooling Airflow	m³/min (cfm)	Included	Included	
Cooling Air CTD	ºC (ºF)	35 (63)	35 (63)	35 (63)
Aftercooler CTD (3)	ºC (ºF)	11 (20)	11 (20)	11 (20)
CONSTRUCTION FOUNDATION AND				
PIPING CONNECTIONS				
Air Discharge Base Mount	Inches BSPT (9)	0.75		
Air Discharge from ASME Receiver	Inches NPT	0.75		
Package Automatic Condensate Drain	Inches NPT	0.25		
Coolant Drain	Drain Plug	9/16"-SAE		
Power Inlet (Main)	Inch	1"		
Power Inlet (Dryer)	Inch	1/2"		
COOLANT LUBRICATION DATA				
Coolant Sump Capacity	litres (US gal)	3 (.8)		
Total coolant fill capacity	litres (US gal)	4.5 (1.2)		
DIMENSIONS		**Basemount**	**80 gal**	**120 gal**
length, width, height	mm	1042/734/914	1362/734/1541	1897/734/1541
	Inches	41/28.9/36	53.6/28.9/60.7	74.7/28.9/60.7
GA Drawing Numbers		22431811	22431829	22469191
SHIPPING DATA - NET WEIGHTS		**Basemount**	**80 gal**	**120 gal**
Total **A**ir **S**ystem package	kg (lb.)	330 (725)	455 (1000)	470 (1035)

ENGINEERING MANUAL

SSR

Small UP - Total Air System

Ingersoll Rand Industrial Technologies

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Date: 16 July 2008
Cancels: 10 August 2006

Point of Manufacture - Campbellsville, USA

60 HERTZ ENGINEERING DATA

Model		UP6-7TAS-125	UP6-7TAS-150	UP6-7TAS-210
Compressor Module Data				
Rotor Diameter (male)	mm	74.25	74.25	74.25
Male Rotor Speed	rpm	3200	2850	2375
Tip Speed	m/sec	12.44	11.08	9.23
Power Data				
Applied main motor power [8]	HP	8.2	8.2	8.2
Applied Power - Fan	HP	Included	Included	Included
Applied Power - Dryer compressor	HP	0.6	0.6	0.6
Applied Power - Dryer Fan	HP	Included	Included	Included
Applied Power - Full Package [8]	HP	8.8	8.8	8.8

ELECTRICAL DATA - ALL UNITS SSR UP6-7 *** NOTE BLUE SHADE DENOTES SINGLE PHASE ***		115-1-60	230-1-60	200v	230v	380v	460v	575v
Nominal Current - Main Drive Motor [8] ODP/TEFC	Amps		31.0	20.6/20.2	17.9/17.5	10.8/10.6	9/8.8	7.2/7
Maximum Applied Power - TAS Package [10] ODP/TEFC	Amps		34.1	22.7/22.2	19.7/19.3	11.9/11.7	9.9/9.7	7.9/7.7
Starting current -- Direct on Line	Amps		217.0	155.0	135.0	82.0	67.0	54.0
Starting current -- Star Delta Start	Amps		N/A	N/A	N/A	N/A	N/A	N/A
Main Motor Data								
Nominal Power - Main Driver	HP		7.5	7.5	7.5	7.5	7.5	7.5
Drive Motor enclosure Protection			TEFC	ODP / TEFC	ODP/TEFC	ODP/TEFC	ODP/TEFC	ODP/TEFC
Drive Motor RPM			3495	3475	3475	3475	3475	3475
Drive Motor Frame			184T	184TZ	184TZ	184TZ	184TZ	184TZ
Drive Motor Locked Rotor DOL/(S/D) [5]	Amps		217.0	155.0	135.0	82.0	67.0	54.0
Drive Motor Efficiency [8]			84	87.5/88.5	87.5/88.5	87.5/88.5	87.5/88.5	87.5/88.5
Drive Motor Power Factor [8]			0.92	.88/.89	.88/.89	.88/.89	.88/.89	.88/.89
Test Certificate Number [4]			BL650710				AT43040 BK85519	
Dryer Electrical Data								
Full Load Current	Amps	5						
Starting Current	Amps	30						
Electrical Installation -- Total Air System								
Recommended wire size - Main motor - [6]	Awg		6	8	10	12	14	14
Suggested Fuse Rating [7]	Amps		50	35	35	20	15	12
Recommended wire size - Dryer - [6]	Awg	18						

Refrigerated Dryer Data		ISO Class	
Pressure Dew Point ISO Class [11]	°C (°F)	5	lower than 7°C (44°F)
Refrigerant weight of R-134a	Grams / (Oz)		350/(12.7)

		Particulate		Liquid	
Filter Data	**Model**	**ISO Class**	**Filtration**	**ISO Class**	**Filtration**
Primary filter detail - at 21°C (70°F)	IR GP 64	3	1 micron	3	0.6 mg/m³ (0.5 ppm)
Final filter detail - at 21°C (70°F)	IR HE 64	2	0.01 micron	1	0,01 mg/m³ (0.1 ppm)

Pressure Drop data by operating pressure		barG	psig	barG	psig	barG	psig
	barG / (psig)	**8.6**	**125**	**10.3**	**150**	**14.5**	**210**
Dryer Pressure Drop	barG / (psig)	0.28	4	0.21	3	0.14	2
Primary filter wet pressure drop	barG / (psig)	0.14	2	0.10	1.5	0.07	1
Final filter wet pressure drop	barG / (psig)	0.21	3	0.14	2	0.10	1.5
Total Pressure Drop [10] For ISO Class 2.5.1 air	barG / (psig)	0.62	9	0.45	6.5	0.31	4.5

Notes :

(1) FAD (Free Air Delivery) is full package performance including all losses. Tested in accordance with ISO 1217 : 1996 Annex C.
(2) Measured in free field conditions in accordance with PNEUROP/CAGI test codes PN8NTC2.3, with +/- 3 dB(A) tolerance.
(3) 40% Relative Humidity Inlet Air (For alternate conditions refer to SSR toolbox or contact IR)
(4) Motor test certificate
(5) Inrush amps
(6) This is a minimum requirement based on 90°C wire - It may be necessary to use larger cables to comply with local regulations or if the voltage drop exceeds 5% of the nominal voltage.
(7) Recommended Time delay Fuse. Refer to local code for proper fuse sizing
(8) Measured at rated compressor duty
(9) Installation kit will provide flexible connection to NPT or BSPT
(10) Total Air System package including compressor, integral dryer with pre and final compressed air filters
(11) Dew point measured In accordance with ISO 8573-1:2001. With inlet air to package of 25°C (77 °F) and RH at 60%

(13) Discharge pressure when operating at compressor rated pressure, with clean wetted filters

Ref: 9902
Sheet 510
Date: 1st October 2004
Cancels: First Issue

SSR® UP Series Total Air System

Point of Manufacture – Campbellsville KY

SSR® UP6-5, 7.5, 10, & 15c TAS
60 Hz DETAIL DESCRIPTION

PACKAGE

The "***Total-Air-System***" **(TAS)** is a unique compressor package, comprising a fully integrated rotary screw compressor with a high efficiency, cycling, air dryer, general purpose and high efficiency air filters. This is all mounted on to a horizontal air storage receiver. The TAS package occupies less space, costs less to install, and delivers high quality compressed air to maximize operating efficiency and reduce costs.

PACKAGE PRE-FILTER

The cooling and intake airflow is pre-filtered through an easy to service electrostatic filter panel, which protects the dryer and main cooler matrix from heavy dirt ingress thus reducing maintenance requirements.

INTAKE AIR FILTER

The compressor intake air filtration for UP SERIES is accomplished through the use of a dry-type air cleaner, which is 99.9% efficient at 3 microns and above.

AIREND

Since the airend is the fundamental component in a rotary screw compressor package, reliability, performance and efficiency are determined by selection of the most effective design, maintenance of close manufacturing tolerances, and precise assembly of the airend itself. All UP Series units, apply proven airends achieving high levels of efficiency and durability.

A high efficiency asymmetrical profile is developed through a unique two-step machining process. The first stage develops the basic wrap angle profile and is a rough-cut. The final stage is a finish grinding process, which ensures a hard, true rotor surface. The rotor shafts are precision ground to tolerances within 12 microns (0.0005 of an inch). The rotor housings are made of high quality, close grain cast Iron.

Bearing configuration used on all Small UP series models is the tapered rollers thrust bearing and parallel roller journal bearing. These roller bearings are able to handle all loads, radial, thrust or a combination of both. With this bearing configuration, the discharge end of the male and female rotors are each equipped with a pair of tapered roller bearings offset at opposing axis for maximum positional stability and absorption of thrust and radial loads. The thrust bearing housing is made of a close grain cast iron.
Cylindrical roller bearings are used to carry the radial loads on the inlet end of the rotors. All bearings, whether thrust or radial, are premium specification, which provide truer, harder running surfaces for both inner and outer bearing races.

A double shaft seal is fitted on the main input shaft.

Coolant dams are machined at the bearing locations. This provides an area for coolant to accumulate when the compressor is shut off. Upon start-up the bearings, which are resting in coolant retained by the coolant dam is immediately lubricated, thereby assuring long life.

COOLANT RESEVOIR

A pre-separator is fully integrated with the airend forming a single module. The highly efficient separation system, combined with suitably sized sump volumes, provides for normal coolant top-up intervals of 500 hours. A pressure relief valve mounted on the housing protects the package. The coolant filler, is designed to prevent overfill the compressor, and a visual coolant level indicator is located on the side of the module. A drain point is provided at the bottom of the sump.

MAIN DRIVE MOTOR-GENERAL

The main drive motor is matched to the requirements of the torque and the load of the compressor and to specific design criteria that enable the motor to develop peak efficiency and power factor at full load.

Double shaft construction with the cooling blower mounted on

Ingersoll-Rand SSR®

UP Series TOTAL AIR SYSTEM Total Air System

Point of Manufacture – Campbellsville KY
SSR® UP6-5, 7.5, 10, & 15c TAS
60 Hz DETAIL DESCRIPTION

main shaft provides assured cooling.

MOTOR FRAME
Standard NEMA frame, 2 pole, E-pact efficiency rated, open-drip proof, three-phase motors are used for UP6 - 5, 7.5, 10 & 15 hp 60Hz applications.. Single-phase motors are also available up to 7.5 hp. TEFC motors are available as an option.

ELECTRICAL DESIGN
Speed, torque and operating characteristics have been designed to match the load of the compressor. Motor efficiency and power factor have been optimized for each size over the entire capacity range of the UP6 - 5, 7.5, 10 & 15 hp. Standard motors are 230/460v 3 Phase 60 cycle and 200, 380, & 575 volt 3 phase motors are available as options. Single-phase motors are optional at 5 & 7,5 hp duties 200 & 230 volt 60Hz.

MOTOR BEARINGS
Ball bearings for the drive and non-drive end provide dependable and reliable service both front and back bearings are permanently lubricated on both ODP and TEFC motors.

MOTOR INSULATION
The selected motor has a minimum of class F insulation as standard, and is specified to operate in ambient conditions up to 104°F (40°C). In addition the motor is specified to operate at maximum load with a temperature rise some 27°F (15°C) below that permitted by the design code. This conservatism is frequently referred to as “Class F with class B temperature rise”.

BELT DRIVE
The power transmission from the drive motor to the airend male rotor is by long life non-stretching poly-vee belt with easy to adjust belt tension control and simple access for maintenance. This assures performance integrity and belt life. The complete drive system is contained within a protective guarding.

COOLING SYSTEM

Coolant Filtration
The full capacity coolant filter is a high capacity 5-micron, replaceable spin-on element with pressure bypass.

Coolant / Lubricant Temperature Control
A thermostatic control valve is mounted downstream of the oil cooler. The temperature sensitive element controls the flow of coolant through the oil cooler. This provides the proper injection temperature and assures fast warm-up.

Coolant Injection
The coolant is injected through ports near the airend inlet and directed back toward the inlet cover. This ensures the best possible pre-sealing of the rotors, and an optimum mix of coolant with air. The differential pressure between the separator tank and the airend inlet induces coolant flow.

COOLANT / AIR SEPARATION
After compression and discharge from the airend, the air is heavily laden with coolant. A separator is used to remove the fluid from the air stream and does so with a three stage separation system. In the first stage, air and coolant mixture from the airend discharge directly enters the separator tank through a nozzle, which directs the mixture flow within the volume. This action forces heavier coolant particles to the periphery of the tank. These particles combine with the main liquid body in the sump. The airflow then passes through the cartridge coalescing element, which combines the second and third stage of separation. The separator cartridge is two-stage with reinforced construction. Coolant, which has collected at bottom of the cartridge is drawn back to the airend inlet through a scavenge system.

The compressed air then passes to the air-cooled aftercooler where coolant vapour carryover will be further removed as it is condensed and drained together with water condensate. On the SSR-UP 5-15 hp compressors, the carryover after the aftercooler is less than 5PPM (5 mg/m^3.)

SSR® UP Series Total Air System

Point of Manufacture – Campbellsville KY

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60 Hz DETAIL DESCRIPTION

Due to the conservative sizing of the air passages and the separator cartridge, there is a minimal pressure drop. This reduces to a minimum, power required to move the air through the compressor system.

A combined minimum pressure / check valve regulates the air discharge from the separator. This ensures that when the unit unloaded sufficient pressure is maintained in the tank to propel the coolant through the system. SSR UP series compressors are supplied with an inclusive factory fill of SSR UltraPlus Coolant that provides extended operating life.

SSR UltraPlus Coolant is a Polyol Ester synthetic lubricant, providing better cooling characteristics and a longer life than other synthetic lubricants. The life of UltraPlus Coolant is two (2) years or 9,000 hours (whichever occurs first). Condensate containing traces of the coolant fluid should be processed to meet local environmental requirements before disposal in an approved manner.

COOLERS

SSR UP Series compressors come with integrally mounted air-cooled combination heat exchanger that cools both the coolant and compressed air and is of tube and fin design. Constructed from aluminium, it is designed to operate in ambient temperatures from 35°F (2°C) up to 104°F (40°C) The after cooler cools the compressed air to 18°F (10°C) above ambient air temperature at 104°F (40°C) and 60% RH. Centrifugal cooling fan is mounted in an internal segregated cooling compartment. Cooling air is forced across the cooler with even velocity over the full surface area of the cooler matrix.

The cooler assembly is accessed through a single opening, providing access to both sides of the cooler, for quick and effective cleaning.

PIPING

The compressor utilizes flexible SAE hoses with JIC fittings, rigid steel piping, Bundy weld tubing, flexible connectors and nylon tubing as appropriate to provide vibration free operation. SAE "O" Ring fittings are applied on all lubricant connections. Each compressor system, after manufacturing and assembly, will be 100% inspected and tested to provide a piping system with minimum potential for leaks, which is easy for maintenance.

COMPRESSED AIR FILTERATION

Two stages of filtration are standard within the ***Total Air System***. These are selected to balance the load between two duty-matched filters with performance characteristic to share the load, reduce total pressure losses, operating costs and extend effective life.

A first filter removes particles down to 1 micron, and coalesced liquids to 0.6 mg/m^3 (0.5 ppm). This is followed by a High Efficiency filter, which removes particles down to 0.1 micron including coalesced liquids, providing a maximum remaining aerosol content of 0.01 mg/m^3 (0.01 ppm).

CYCLING REFRIGERATED AIR DRYER

Totally integrated within the package and using the same cooling air flow, as the compressor package. The refrigerant air dryer which cycles on and off with the compressor, uses a unique single high efficiency welded stainless steel plate heat exchanger to perform the multiple duties of pre-cooler, refrigerant evaporator, and compressed air re-heater. The environmentally sound R-134a refrigeration cycle utilizes a high efficiency “micro channel” condenser and thermal control is provided with a quick acting hot gas bypass. Condensed water is removed from the airflow directly after the evaporator part of the heat exchanger, by a high efficiency, external cyclone separator. This condensate is discharged by solenoid drain from a manifold in parallel with other drain points.

CONTROL PANEL – GENERAL

SSR® UP Series TOTAL AIR SYSTEM Total Air System

Point of Manufacture – Campbellsville KY

SSR® UP6-5, 7.5, 10, & 15c TAS
60 Hz DETAIL DESCRIPTION

The SSR UP Series compressor includes a standard control module, which provides starting, stopping, capacity and pressure control, together with operating and safety control for the package.

Operation of the compressor is very simple and user friendly. The instrument panel is mounted on the front of the compressor, directly above the starter for good visibility when either floor or receiver mounted. The control panel includes: - Run/Stop selector switch and reset button, "lock off" emergency stop button, pressure gauge, dryer condition indicator, running hour meter. Signal lights indicate: - power on (green), auto restart (amber).

COMPRESSOR/CAPACITY CONTROLS
As standard, SSR UP 5-15 hp is provided with automatic start / stop control with constant running control regulator, which allows the compressor to operate online / offline. In addition a simple to apply, range adjustable auxiliary control valve provides a constant running mode of operation and should be selected when load conditions require.

STARTER
Two input power supplies are facilitated into the starter enclosure for main motor and dryer operation. A transformer provides 120V 60 Hertz, fuse protected control voltage. Motor overload protection is designed and sized to match the specific characteristics of the motor. The single-phase dryer compressor is separately fuse protected

TEMPERATURE PROTECTION
Should the compressed air temperature exceed 228°F (109°C) at the airend discharge, a switch will shut down the compressor, and when provided with optional maintenance indicator will display the fault symbol.

BASEPLATE
A one-piece folded mild steel, base-plate protected from corrosion with a high grade of powder coated paint finish, supports all of the components within the package The base-plate is provided with fork truck slots to enable easy handling from front or end of the package. The compressor unit and drive motor are mounted on a secondary sub-base which is supported on vibration isolating mounts, which reduces operating sound emissions to a very low level.

ENCLOSURE

The package enclosure is carefully designed to provide effective sound emission control and suppression, while retaining easy access for maintenance and access to major components.
The front door lifts off if required to provide easy access to all routine maintenance points. This door provides easy access to carry out the following maintenance procedures

- Check and top up coolant
- Check intake filter condition
- Change intake filter
- Change coolant filter
- Change separator cartridge
- Service Intake valve
- Check or adjust constant running valve
- Check shuttle valve
- Drain & refill coolant
- Adjust belt tension
- Set and adjust load and unload operating pressures

Starter
The starter is accessed through a single front panel, which provides access to all starter components.

Drive System
The drive belt system is accessed by removal of the end panel.

Cooler cleaning
Cooler cleaning operations are simplified by removing the rear panel, which provides easy access to the inside face of the cooler.

Coalescing Filter Maintenance

Access to the twin filters is easy through a simple access panel on the end of the machine

Ducting

Ingersoll-Rand SSR®

UP Series Total Air System

Point of Manufacture – Campbellsville KY

SSR® UP6-5, 7.5, 10, & 15c TAS

60 Hz DETAIL DESCRIPTION

Inlet Duct and or discharge duct can easily be connected to the machine to single point connections.
Back pressure provision available for cooling airflow is ¼" (6 mm) water gauge

HIGH AMBIENT PACKAGE (Optional)

Rated for operation in ambient conditions up to 122°F (50°C) and as low as 35°F (2°C) The High Ambient units are available in power sizes of 5. 7.5 10 hp with capacities from 16 through 38 CFM and pressures 125, 150 and 210 PSIG

SERVICE/MAINTENANCE INDICATOR (Optional)

Advanced but simple indicator, that is highly visual and includes the following -

- Hour meter
- Maintenance indicator - bar graph continuously indicates remaining service life
- Indicator of Fault condition
- Real time clock
- Back light
- Service due warning
- Service overdue

TEFC MAIN MOTOR (Optional)

This option is intended for those installations that require TEFC motors by specification.