

## 1. **General information**

### 1.1 **General information**

- .1 This section of the project specifications contains general provisions for mechanical trades. This section is supplemental to the general clauses of the contract prepared by the Owner, in addition to the general clauses prepared by the architects.

Sections of the specification that are part of the work
Plumbing
Ventilation
Insulation
Regulation (HVAC)

#### .2 Scope of work

- .1 See section 20 00 01 of the specification
- .3 The scope of work defined in each section is not exhaustive and is intended only to inform each subcontractor of the scope of their work. All work defined in the other sections of the specification regarding their own work must be considered.

### 1.2 **Aim**

- .1 The overall intent of the plans and project specification is to define a comprehensive scope of work with the necessary and mandatory tests, in addition to commissioning the various systems.

### 1.3 Abbreviations

Abbreviations	Definitions
CSA:	Canadian Standards Association
ANSI:	American National Standards Institute
ASHRAE:	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME:	American Society of Mechanical Engineers
ASTM:	American Society for Testing and Materials
AWWA:	American Water Works Association
BNQ:	<i>Bureau de Normalisation du Québec</i>
CCDG:	<i>Cahiers des Charges et Devis Généraux, Gouvernement du Québec</i>
EEMAC:	Electrical and Electronic Manufacturers Association of Canada (see EEMAC)
FC:	Fire Commissioner of Canada
CGA:	Canadian Gas Association
NBC:	National Building Code of Canada
GSG:	Galvanized Sheet Gauge
NBS:	National Bureau of Standards
NFPA:	National Fire Protection Association
CGSB:	Canadian General Standards Board (CGSB)
SAP:	<i>Service d'Approbation des Plans du Ministère de l'Habitation.</i>
SMACNA:	Sheet Metal and Air Conditioning Contractors' National Association
ULC:	Underwriters Laboratories of Canada

### 1.4 Codes and standards

- .1 Perform work in accordance with the National Building Code of Canada (NBC) and any applicable provincial or local codes.
- .2 The work must meet or exceed the requirements of standards, codes and documents referenced, latest edition.
- .3 In addition, the contractor must follow the standards of recognized organizations such as ASHRAE, SMACNA, CGSB, ASME, AMCA, CSA, ARI, IES, ACG, NFPA, ULC, etc.
- .4 If the drawings or specifications indicate higher requirements than the regulations, codes, laws or standards, they must be respected. No directive in this specification may be construed as an order or permission to violate any applicable codes, regulations or laws.
- .5 The contractor must also perform the work according to the particular requirements of the utility companies such as electricity, gas, telephone, etc.

## **1.5 Site inspection**

- .1 Before sending a bid, the contractor must carefully examine the site, since no claim due to ignorance of local conditions such as the dimensions and elevations of existing ventilation ducts and piping, existing structures or any other architectural, electrical or mechanical element will be accepted at a later date. The Contractor must anticipate the offsets of new items to bypass the bid elements. Inform ministerial representative of any problem, uncertainty or discrepancy during the bidding process.

## **1.6 Documents required at the construction site**

- .1 Keep a copy of each of the following documents on the construction site:
  - .1 Drawings issued for construction.
  - .2 Specification.
  - .3 Addendum.
  - .4 Revised workshop drawings
  - .5 Change orders.
  - .6 Reports of other modifications to the contract.
  - .7 Reports of tests performed on-site.
  - .8 Implementation schedule
  - .9 Installation and implementation instructions from the manufacturers.

## **1.7 Permits and inspections**

- .1 The Contractor must pay the permits and inspection fees for their work by the appropriate authorities. They must, in due course, inform the inspectors and file plans and other documents requested by the appropriate authorities.
- .2 The work must be approved by the federal, provincial and municipal authorities.

## **1.8 Minor details**

- .1 Minor details are essential for acceptable installation and system operation; however, they may not be mentioned in the illustrations and project specifications. For example, even though the drawings show the conduit dimensions, the start and end points and suggested course, they do not necessarily indicate all the changes in direction or all deviations.

- .2 The contractor must, if essential, include this work in their price. They must, at no additional cost to the ministerial Representative, organize their work within the frame, avoid obstructions, respect the free heights and avoid passageways and openings (doors, windows, etc.).

#### **1.9 Additional details**

- .1 The engineering drawings are usually schematic. They indicate the approximate location of the devices and the piping connections. Under no circumstances, unless otherwise indicated, are they to be used as building drawings. It's the contractor's responsibility to prepare these drawings. For the proper execution of the work, the contractor must refer to the current building conditions, if applicable.

#### **1.10 Detailed drawings**

- .1 The Contractor must produce detailed drawings to show the required changes, either due to the small size of the site, the regulations or codes in force, or to settle a conflict with another trade or for any other valid reason.

#### **1.11 Device location**

- .1 The contractor must respect, from the point of view of symmetry, etc., the requirements of the drawings. They must therefore refer to the general plans to ensure the device location and height, in addition to coordinating their work with the installation of the other building components.
- .2 The space required for the maintenance, disassembly and removal of equipment and components must be provided in accordance with the manufacturer's recommendations and instructions.
- .3 Install all skid mounted equipment on a 100 mm high slab or as indicated in the plan, with beveled edge, to facilitate cleaning and at least 100 mm around devices to facilitate their cleaning.
- .4 Install all equipment, piping and ventilation ducts according to the manufacturer's requirements in regards to acoustics and vibrations.

#### **1.12 Building or workshop drawings**

- .1 The Contractor must prepare shop drawings or building drawings when necessary for proper work performance or equipment manufacturing. They are required to submit these drawings to the ministerial Representative before the work is performed or the devices are delivered.

- .2 One (1) .PDF copy of the workshop drawings must be submitted for the equipment, appliances and accessories provided for the project. A copy of the drawings will be sent electronically to the ministerial Representative and the Engineer for approval. Once approved, the copy will be electronically sent to the attention of the contractor, who will prepare the copies required for the worksite and the Operations and Maintenance Manual.
- .3 Along with these drawings, a specification sheet must be provided that includes, but is not limited to, characteristic curves, noise levels, electrical characteristics, certified physical dimensions, weight, maintenance and repair clearance, catalog numbers, manufacturer's name, operation and maintenance instructions, a certificate of compliance with the relevant codes, etc. On each workshop drawing, the project and equipment reference number as indicated in the plan must be identified.
- .4 Documents must be submitted in advance to allow time for verification. The Contractor is responsible for any delays when devices are rejected.
- .5 The verification of the workshop drawings by the Engineer is an intermediate step in quality control and will not constitute a change order to the contract documents.
- .6 The Engineer verifies the drawings submitted by the Contractor in respect to the quality and general layout of the equipment only. The verification by the Engineer does not relieve the Contractor of their responsibility for the execution of the plans and specifications and does not relieve the Contractor of errors or omissions committed by them or by the shop drawings' Manufacturer. In addition, the annotations made by the Engineer on the drawings are not exhaustive.
- .7 When the documents are submitted, notify the ministerial Representative in writing, of discrepancies in the submitted documentation compared to the specifications.

#### **1.13 Manufacturer's recommendations**

- .1 All devices will be, unless otherwise stated, installed, connected and installed in accordance with the manufacturer's instructions and recommendations.
- .2 When the plans do not show the details of the required accessories or the connections to be made for installing a device, it's the device manufacturer's recommendations that apply.
- .3 These accessories and connections are part of the contract as if they were mentioned specifically, either in the plan or project specifications.

#### **1.14 Contradiction**

- .1 In the event that there is a contradiction between the plans and specifications, or clauses in the specifications concerning the materials to be supplied, the quantities, qualities, etc., the contractor must base their bid on the quantities, qualities,

materials, etc. the highest or the most expensive until written otherwise by the ministerial Representative.

#### **1.15 Coordination**

- .1 The work described in this section must be coordinated with the other sections. To this end, the Contractor, in addition to the Superintendent of Work, must review the plans to determine which work will be given priority.
- .2 No supplement will be accepted to undo and redo work for granting priority to another trade.
- .3 Work in general is executed with reliability and in accordance with the rules of the trade. The layout and appearance will be tidy and clean.

#### **1.16 Minor modifications**

- .1 The contractor will make the minor modifications required on the worksite regarding the exact location of services and exits at no additional charge.
- .2 In locating these exits, the contractor must consider pipes or appliances for heating, ventilation, plumbing, air, electricity, etc., in addition to structural elements such as beams, columns, walls, etc. If the Contractor fails to comply with this clause and errors occur, the Contractor will be required to correct them at no additional charge.
- .3 If, during the course of the work, a device or terminals such as gates, diffusers, controls or similar needs to be moved, the contractor is required to do so at no additional charge provided that the displacement does not exceed 5 m and that the request is done before installation. This request can be done by the ministerial Representative.

#### **1.17 Public utility services**

- .1 The Contractor must ensure that the supply point indicated in the plans is suitable for public utility services (gas, telephone, waterworks, sewers, etc.), which serve the construction site. They must make arrangements with the authorities so that public utility service connections are made in a timely manner.
- .2 The contractor must also verify the actual sewer and water service levels and compare them with the final building installation levels. If an incompatibility in elevation does not permit connection to services as planned, the Contractor must notify the ministerial Representative prior to starting work.
- .3 Submit the schedule of work to the ministerial Representative and obtain its approval for temporary cut-offs to existing networks or services. Temporarily disconnect according to the approved schedule and give prior notice to those affected.
- .4 In the event that unidentified facilities are discovered during the work, notify the

ministerial Representative immediately and send them a written report on the findings.

- .5 Keep a record of the location of underground utility networks that are maintained in service, diverted or abandoned.
- .6 As not to impede the use of the existing building, the contractor must provide and install all temporary connections required to provide continuous service in the trade affected. When permanent services are installed, the contractor will remove temporary connections and repair any damage.

#### **1.18 Start-up**

- .1 The Contractor is responsible for the start-up and proper operation of the equipment provided.
- .2 They must then take the usual precautions such as oiling, greasing, checking the rotation direction, verify for obstructions, proper operation, etc. They must ensure that the manufacturer's instructions are followed and respected.
- .3 Each system must be turned on to ensure that it operates as indicated in the drawings and specifications.
- .4 System testing involves simulating the operating conditions of the systems. These tests are carried out in the presence of the contractors involved and include, for example, proof of:
  - .1 Electric locking.
  - .2 Operation of control devices, high and low limits, motorized flaps, etc.
  - .3 How the equipment reacts.
  - .4 Correct electrical connections.
  - .5 Operation of protection, etc.

#### **1.19 Operation and maintenance manual**

- .1 Three weeks after the workshop drawings have been accepted, provide the ministerial representative with three copies of the operation and maintenance data in French prepared as follows:
  - .1 Record data on 215 mm x 280 mm sheets bound in a hardcover vinyl three-ring notebook.

- .2 Enter the name of the facility, the date and the table of contents on the title page "Usage Data and Maintenance Guide".
  - .3 List the subcontractors and suppliers and their contact information.
  - .4 Divide the content into sections according to the sections in this specification. Mark each section with a labeled tab, covered with celluloid attached to the rigid paper divider.
- .2 Include the following information in addition to the approved workshop drawings:
- .1 Manufacturer's instructions on the equipment installation, operation and maintenance.
  - .2 A copy of the hardware and paint list.
  - .3 Description including the manufacturer's function, construction features, use and maintenance guidelines for equipment and networks, including a complete list of equipment and component parts. Provide nameplate information such as the make, model, dimensions, capacity, power, etc., and serial number. Add performance curves.
  - .4 Information such as bulletins, illustrations and expanded views of the component parts, technical descriptions or parts lists.
  - .5 The various warranties and guarantees indicating:
    - .1 The name and the address of the works
    - .2 The warranty's effective date
    - .3 Warranty period
    - .4 The purpose of the warranty and the corrective measure offered by the warranty
    - .5 The contractor's signature and seal
  - .6 The list of additional equipment used as spare parts and mentioned in the various sections, in addition to the manufacturer's name and supply source.
- .3 Correctly type the lists and comments. Ensure that the drawings, diagrams or manufacturer's publications are clear.
- .4 Add a complete set of workshop drawings that include corrections and changes made during manufacturing and installation attached separately.
- .5 Provide a CD with .PDF files of all maintenance and operating manuals for the installed systems when the work is complete.



## **1.20 Warranty**

- .1 The contractor guarantees their work in accordance with the law. The warranties mentioned in the specifications and the resulting responsibilities must not be interpreted as limiting or contrary to the law. The law takes precedence over the requirements of the specifications, unless the requirements of the latter are greater than those of the law.
- .2 The Contractor must correct any defects in their work or the devices they have supplied, current wear is an exception, within one year after the date of the provisional acceptance of the Work, either by repair or replacement, as decided by the ministerial Representative. Any damage caused by such a defect and any expense directly caused by the repairs are at the expense of the contractor.

## **1.21 Temporary supply**

- .1 Unless otherwise specified, temporary services are the responsibility of the general contractor. See the general clauses.

## **1.22 Existing materials**

- .1 Unless otherwise specified, existing materials removed, but not specifically requested to be relocated, remain the property of the Contractor.
- .2 However, this clause does not apply to specialized appliances, or any appliance considered as equipment or as part of furniture.
- .3 If, during construction, the Owner decides to re-use or retain certain appliances that, according to the first paragraph, were to remain the property of the Contractor, the Contractor must be able to do so without any supplement or credit.
- .4 If there is doubt as to the interpretation of this clause, the contractor must, before appropriating the device, submit the case to the ministerial representative, who will make the final decision.
- .5 When plans indicate to reuse certain materials, they must be cleaned. The Contractor must carefully remove these materials and store them in a way to prevent damage. During the relocation, the contractor must take the necessary precautions, in order to safeguard the aesthetic appearance, e.g.: do not install an old appliance next to a new one, etc.
- .6 The contractor must plan to replace any equipment that requires replacement on a regular basis such as filters, oil, etc.
- .7 When it's not specifically mentioned that existing materials will be reused and if the contractor wishes to do so, they must first obtain the approval of the ministerial representative.

### **1.23 Dismantling of existing structures**

- .1 All tenderers should carefully review the inventory to assess and include the dismantling of existing structures in their costs.
- .2 This section includes all the work that is necessary to carry out all construction activities according to the plans and specifications and to the satisfaction of the ministerial Representative.
- .3 Example: Removal of all conduits, cables and appliances that are not required in the mechanical room, between ceilings, crawl spaces, roofing, walls, etc.
- .4 This clause applies only in the said existing structures, whether or not they are indicated in the plans, no matter if they are visible or concealed. However, if during the work, the ministerial representative decided to keep some of these facilities intact, the latter reserves the privilege to do so.

### **1.24 Service interruptions**

- .1 In the case of major changes to the building that requires a temporary shutdown (ventilation, heating, fire protection and other), the Contractor must provide the ministerial Representative with sufficient advance notice of the work schedule that they intend to follow for planning and coordination, with all the parties involved and the ministerial representative, of any service interruption.
- .2 The Contractor must provide all staff and equipment required to ensure that interruptions are as short as possible.
- .3 The Contractor must also provide, in their bid, the transfer of services during evenings, nights or weekends, depending on the importance of the work to be performed or the ministerial representative's requirements. No additional time will be paid to the contractor to perform work outside normal working hours.
- .4 If, at the request of the ministerial Representative, certain services are to be maintained, the Contractor shall make the connections and provide the necessary equipment and accessories to ensure the continuity of these services.

### **1.25 Final inspection**

- .1 Before making a request for final inspection, the contractor must complete the following work:
  - .1 Cleaning the appliances
    - .1 The contractor will clean all installed or relocated equipment under their responsibility. They must perform a complete verification (lubrication, oil levels, etc.) and replace all filters with new filters.

.2 Preparation of the instruction manual (in three copies)

- .1 Each of the manuals will include the following and will be submitted for approval to the ministerial Representative one month prior to the final inspection request. The following list is not exhaustive. Ministerial representative may require other documents if they deem necessary.
  - .1 All test reports identified in the section "List of specific tests and requested documents".
  - .2 All workshop drawings of the main appliances, in addition to the characteristic curves, electrical characteristics, etc.
  - .3 A list of spare parts with the suppliers' names and addresses.
  - .4 Complete instructions for installation, maintenance and operation of the equipment, including a complete list of equipment and component parts. Provide nameplate information such as the make, model, dimensions, capacity, power, etc., and serial number.
  - .5 The instruction sheets for each type of automatic control, in addition to the control system diagrams.
  - .6 The aforementioned documents will be bound in hardcover ring binders. Each handbook will be written in French, have a table of contents and tabs.
  - .7 Enter the name of the facility, the date and the table of contents on the title page "Usage Data and Maintenance Guide".
  - .8 List the subcontractors and suppliers and their contact information.
  - .9 Divide the content into sections according to the sections in this specification. Mark each section with a labeled tab, covered with celluloid attached to the rigid paper divider.
  - .10 The various warranties and guarantees indicating:
    - .1 The name and the address of the works
    - .2 The guarantee's effective date
    - .3 Warranty period
    - .4 The purpose of the warranty and the corrective measure offered by the warranty

.5 The contractor's signature and seal. Asbestos control

- .2 If the contractor detects the presence of an asbestos product on-site, they must first notify the ministerial representative, who will determine whether the next steps will be taken by the contractor or the ministerial representative.

## **1.26 Tunneling, sleeves and excavation**

Existing buildings

- .1 The Contractor is responsible for tunneling all openings up to and including 150 mm in diameter. A rotary drill must be used for all of these openings. For openings greater than 150 mm, refer to the general conditions suggested by structural engineers. These are the responsibility of the general contractor.

.2 General information

- .1 There is always a 13 mm clearance between the conduit and the sleeve. This space will be filled with firmly packed fiberglass.
- .2 All openings in walls, floors or ceilings for the passage of pipes or cables must be sealed.
- .3 Ensure the gaps around the pipelines are well filled.
- .1 In the event of wall or floor feedthroughs, provide the required space for the installation of fireproof material. In the case of hoses or pipes passing through floors, ceilings or partitions with fire resistance ratings, do not weaken the degree of fire resistance of the structures crossed.
- .2 Ensure there is no contact between copper tubes or pipes and ferrous metal sleeves.
- .4 Obtain approval from the engineer before drilling a load bearing element or inserting a sleeve.
- .5 Excavation
- .1 See the notes in the plans of each speciality.

## **1.27 Connections and starters**

- .1 Unless specifically indicated otherwise, electrical connections, wires, conduits, etc., in addition to manual and magnetic starters for electrical appliances are part of the electrical section.

- .2 However, these connections (accuracy, compliance with the needs of the device, etc.) is the responsibility of the contractor who provides the device.

#### **1.28 Noises and vibrations**

- .1 Eliminate all noises or vibrations that, in the opinion of the ministerial representative, are harmful or unpleasant.

#### **1.29 Concealed structures**

- .1 Unless otherwise indicated, conceal pipes, ducts and wiring in floors, walls and ceilings in finished areas. However, no part of the work will be covered without the prior approval of the ministerial representative.

#### **1.30 Delivery and storage**

- .1 Materials and equipment must be delivered and stored in a manner that keeps the manufacturer's seal and label intact.
- .2 Prevent materials and equipment from being damaged, altered or soiled during delivery, handling and storage. Materials and equipment that are rejected must be immediately removed from the site.
- .3 Store materials and equipment in a dry and clean location as directed by the suppliers.
- .4 Retouch any damage to factory finished surfaces to the satisfaction of the ministerial Representative. Use a primer or enamel that matches the original finish. Do not paint the nameplates.

#### **1.31 Liability during temporary testing**

- .1 Obtain written permission to start and test permanent installations and equipment before being accepted by the ministerial Representative.
- .2 Provide the labour, equipment and instruments required for testing the ventilation, air conditioning and heating systems, or any other equipment requested by the ministerial Representative.
- .3 Prevent dust, dirt and other foreign matter from entering the openings of facilities and equipment, ducts and piping during testing.
- .4 Clean and restore the facilities and equipment in use prior to acceptance.

#### **1.32 Painting**

- .1 All exposed plumbing and ventilation ducts must be degreased, ready for painting (even if covered with canvas).
- .2 In unheated areas, clamps, brackets and ferrous metal pieces must be coated with corrosion-resistant primer.

- .3 Touch up damaged pieces of equipment with paint.
- .4 The natural gas piping must be covered for the entire length with a coat of rustproof metal paint.
- .5 All exposed mechanical equipment (such as tanks, grates, diffusers, etc.) must be covered with a coat of corrosion-resistant primer and a factory-applied coat of finish (baked enamel); the finishing color will be selected by the ministerial representative.

### **1.33 Access doors**

- .1 Place access doors in ceilings or furring partitions, to allow for the maintenance of equipment and accessories, or inspection of safety, control or fire-fighting devices; the access doors must respect the type of construction according to the place where they are installed.

### **1.34 Training operational staff**

- .1 Provide the tools, equipment and services of qualified instructors, to train the operating and maintenance staff for the operation, control, adjustment, diagnosing problems and maintenance of the mechanical equipment.
- .2 The instructions must be provided during normal working hours at the location indicated by the ministerial Representative.
- .3 The operation and maintenance manuals must be used for staff training. Provide a copy of the manuals to the ministerial Representative and Engineer for approval before training begins.
- .4 The training courses must be based on the operations and maintenance manual contents, post-production drawings, audio-visual documents and others.
- .5 The ministerial Representative and the Engineer may record the training sessions on video for future reference if so desired.
- .6 Refer to the following sections for the specific requirements of each specialty.
- .7 Demonstrate how to commission, operate, regulate, adjust, maintain and troubleshoot each piece of equipment.
- .8 Explain all phases of operation and maintenance to the staff using the operation and maintenance manuals as guides.

- .9 Prepare and insert any additional data that may have been required during the training in the operations and maintenance manuals.
- .10 Insert a report in the operations manual indicating the course duration and the list of those present during the training sessions. The report is produced by the specialist presenting the course.

### **1.35 Suspension clamps and piping supports**

- .1 Manufacture clamps, brackets, and bracing in accordance with the ANSI B31-1 standard. Brackets and anchor bolts must meet the requirements indicated in Section 23 05 49 01 - Earthquake-proof protection systems – Type p2 buildings.
- .2 Install the expansion sleeve anchors before placing the concrete.
- .3 Attach them to the structural elements. If there are no structural elements or the expansion sleeves are not in the correct location, suspend the brackets to U-bend or steel angles. Supply and install additional structural elements. Obtain permission before using vertical expansion sleeves. Use at least two sleeves to hold each clamp or support. Do not suspend them on the steel decking. Fasten piping and equipment pieces according to the manufacturer's recommendations. In the case of a heavy load, have the anchoring verified by the engineer.
- .4 Use adjustable suspension shackles for pipes with a nominal diameter of 50 mm or less and "U" brackets for pipes with a nominal diameter of 65 mm or more. Use pipe hangers if required.
  - .1 Use rigid hose clamps when the ratio of hose expansion to collar rod length is not greater than 25/600 when supporting piping for hot water, steam, condensation, domestic hot water, recirculation of hot water and cold water. The minimal length of the rod must be 300 mm.
  - .2 Use mobile hose clamps when the ratio of hose expansion to collar rod length is not greater than 100/600 when supporting piping for hot water, steam, condensation, domestic hot water, recirculation of hot water and cold water. The minimal length of the rod must be 300 mm.
  - .3 Use pipe hangers with storm bracing in the following cases:
    - .1 When the reports indicated in 18.4.1 and 18.4.2 cannot be obtained.
    - .2 When suspension brackets cannot be attached to the top of a structural steel frame.
  - .4 The minimum length of the suspension rods must be 150 mm for all piping, except as indicated above.

- .5 Supply and install spring clamps when it's required to compensate for the expansion of horizontal lines connected to long risers.
- .6 The spacing between the grouped supporting pipes will be determined by the dimension of the smaller pipe.
- .7 Refer to the table below for the diameter of the rods and the spacing of the supports except in the following cases.
  - .1 Piping for a plumbing system in accordance with the most stringent requirements of the competent authorities, the *Code de Construction du Québec*, or as indicated in the specifications.
  - .2 Gas pipe nominal diameter DN ½ or less: 1 support/suspension every 1.8 m.
  - .3 Copper pipe nominal diameter DN ½ or less: 1 support/suspension every 1.5 m.
  - .4 End pipe grooved by rolling, with flexible joints: According to the table below, with at least 1 bracket/suspension at each joint.
  - .5 Support pipes made of special materials (plastic, glass, Duriron) as recommended by the manufacturer.



Pipe size ø nominal mm	Rod diameter mm	Maximum spacing m	
		steel	copper
12 or less	10	1.8	1.5
19 and 25	10	2.1	1.8
32	10	2.1	1.8
38	10	2.7	2.4
50	10	3.0	2.7
63 and 75	10	3.6	3.0
100	16	4.2	3.6
125	16	4.8	
150	22	5.1	
200	22	5.7	
250	22	6.6	
300 and more	22	6.9	

- .8 Ensure that the arrangement, bracket type and wall hooks are verified.
  - .1 Place the bracket within 300 mm from each of the horizontal elbows.
  - .2 All supports must have at least the following three parts: anchor sleeve, suspension rod, collar or clamp.
  - .3 Use soft steel wall hooks to support non-expandable pipes. Leave a space of at least 25 mm to allow for insulation. Provide and install riser support collars as indicated.
- .9 For non-insulated copper pipes, use copper brackets between pipes and brackets

made of carbon steel with a copper finish in accordance with the MSS-SP-58 standard.

- .10 Install insulated mounting plates on heat-insulated pipes and prefabricated insulating sheathing made of high-density insulating material, in addition to vapour barriers in the case of cold water pipes.
- .11 The suspension collar and anchors must be offset so that the rod is vertical when the piping is hot.
- .12 Adjust the height of the suspension rods according to evenly distributing the load.

### **1.36 Dielectric unions**

- .1 Provide dielectric unions to connect pipes or equipment made from different metals.
- .2 Provide unions-fittings for pipes up to 50 mm in diameter and flanges for pipes greater than 50 mm in diameter.
- .3 Provide and install felt or rubber linings to prevent contact between elements made from different metals.

**END OF SECTION**