When you install an Adasco Meter you know that it will stay accurate, because careful testing has proved its reliability before it was shipped to you.

Ten different times, 500 pounds of water is run through the meter with accuracy checked at every hundred pounds. At each of these points the recording on the meter dial must coincide with the weight shown on the scale.

In these tests, first cold water then hot water is used, run through at 25, 50, 75, 100 and 125% of meter capacity speed. Any error beyond the most minute tolerance means that the meter is rejected and must be recalibrated.

That's why you can depend on Adasco Meters. That's why in hundreds of user tests, these meters have shown a sustained accuracy within plus or minus 1% of absolute.

Write for complete specifications and prices.
BE GUIDED BY THIS CHART

<table>
<thead>
<tr>
<th>PRESSURE CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>125 lbs. Pressure</td>
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<tr>
<td>250 lbs. Pressure</td>
</tr>
<tr>
<td>High Pressure</td>
</tr>
<tr>
<td>S-1</td>
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<tr>
<td>S-2</td>
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<tr>
<td>S-3</td>
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<td>S-4</td>
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<td>S-8</td>
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<td>S-9</td>
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<tr>
<td>S-10</td>
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</tbody>
</table>

Select the service and pressure conditions for which you require expansion joints by referring to the above chart. Then find the joint which corresponds to the number you select. From the dotted lines you can visualize the appearance of the joint with exact features you desire.

Adasco also make packless expansion joints and variants for all pressures from 50 to 400 lbs. Write for complete catalog.

AMERICAN DISTRICT STEAM COMPANY
North Tonawanda, N.Y.

Over 50 Years in Business

ADAMCO Semi-Guided Joints in 125-Lb. and 250-Lb. Designs
125 lbs.: S-1, S-2, S-3, S-4, D-2, D-3
250 lbs.: S-5, S-6, S-7, S-8, D-6, D-8

ADAMCO Semi-Guided Tri Rod Joints in 125-Lb. and 250-Lb. Designs
125 lbs.: S-1, S-2, S-3, S-4, D-2, D-3
250 lbs.: S-5, S-6, S-7, S-8, D-6, D-8

EXTERNALY GUIDED

ADAMCO Duplex-Sleeve Guided (Air-Cooled) Joints for Pressures Up to 400 Lb. and Temperatures To 700° F.
L-6, L-7, L-11

B-1, all brass screwed end joint
R-1, internally guided for roots
H-1, even body, screwed end joint

ONE BOILER PLANT
for the Whole Job

These are days of consolidation. Railroads combine to form larger systems. All plant operations of a similar nature in separate plants are brought together under one roof. Products are standardized. All of these things are done with the same ideas in mind—to produce better results, reduce costs, or both.

The same conditions prevail in general in regard to boiler plants. Many industrial plants do not house under one roof all of the work done, but the various operations are in separate buildings. In a new plant each may be in a building adapted for the particular work in question. In all probability high pressure process steam, or high or low pressure steam for heating, is needed in each of these buildings. How shall it be provided? By a plant in each building, or a central plant for all?

Quite often plants have been started on a small scale, in one building. As the business grew, additional space was required, more property acquired, and other buildings erected. As each of these additions was added, no thought was given to the best plan to follow. Due to the rush of business "something" was installed to take care of the immediate needs. Whether or not such a policy is in keeping with economy and efficiency, can best be determined from the following analysis which gives some of the reasons why industria
plants, railroads, process industries and institutions have replaced their individual heating units with one boiler plant to take care of all buildings.

Advantages Of One Main Boiler Plant

1. More efficient boilers may be used. Experience has shown that much better efficiency is obtainable in large units than in small, particularly where the load is quite constant, as is usually the case in industrial work. The unavoidable losses are reduced to a minimum.

2. The fuel can be burned more economically. In a large plant it is not only possible, but entirely practical, to install such apparatus for the handling of the fuel, coal or oil, which will enable the operating engineer to get the very best combustion conditions. Such apparatus is not so well adapted to small units, and the results never as satisfactory.

3. Smoke can be reduced to a minimum. There is no known practical method of entirely eliminating smoke, but with proper equipment this may be reduced to so small an amount that it will not be objectionable. It is customary for municipalities to have smoke ordinances, and many so-called "smoke eliminators" can produce a result which is within the legal requirements, and still be objectionable. There is nothing to prevent citizens from complaining that the smoke and soot is objectionable, and starting legal action, even though the smoke ordinance has been complied with. It thus becomes imperative to install equipment suitable for proper smoke elimination, and this is infinitely better in larger units.

4. Fuel can be handled economically. The problem of coal handling and ash removal is a serious one unless it can be done by mechanical means. In a central plant the coal may be brought in, and ash removed without labor. The coal can be stored in one bin, no further hauling is necessary for distribution. The ash is collected at one point for easy removal.

5. Plant labor is reduced to a minimum. In a large plant, with large units, and with mechanical equipment, the labor charge per unit of steam delivered is least; the saving of labor will justify a considerable increase in investment and still produce a substantial return.

6. Valuable space is released for manufacturing purposes. All of the space in each building is available for production. Also, the removal of the individual plants results in cleanliness, the value of which, in many industries, is of prime importance.

7. Centralization of operations. If the boilers are located in one plant, each piece of apparatus is constantly under the eye of the operating engineer, who can keep things always under proper control, and make adjustments from time to time, so as to keep the plant at the peak of efficiency. With separate boiler plants, each would receive care perhaps several times a day; but between these visits it would be left more or less to run itself. This generally would result in uneven operation — underheating or overheating — or irregular supply of steam for process work. With centralization a high class man can be in charge, and made responsible for results. It would be obviously expensive to have such a man in charge at each small plant, and consequently cheaper men are generally employed, with resulting inefficiency.

Asco Casing for low pressure steam lines has a proved efficiency of over 90% — a life of 25 to 30 years without attention.
It is of course an engineering problem to determine accurately the exact savings from operating one main boiler plant instead of several individual units. It has been done so many times, however, that there is no doubt of the advantage of the main plant. The only question in each case is “How great is the advantage?” This often depends on the way the installation is planned and the equipment used.

There are two recognized standards of construction for the efficient distribution of steam: Aosco Red Diamond Brand Wood Casing for steam lines carrying up to fifty pounds steam pressure and Aosco Muticell Tile for high pressure. Often both types of construction can be used in the same layout.

In a very large number of cases, higher pressure steam is used solely to get more power out of steam before it goes to the condenser or process. The only very high pressure piping used, therefore, is that between the boilers and the engines which are usually housed in the same building. The steam that is carried around the manufacturing plant for heating buildings and for process is generally low pressure steam from 5 to 50 pounds, exhausted from the engines and turbines.

To secure the greatest efficiency the steam lines must be carried underground in well insulated mains. It is a mistake to distribute steam through wasteful overhead lines or underground lines just buried in the ground or run in poorly constructed wooden boxes or cinder fill.

This statement is best illustrated in a negative way by the practice in the railroad field. Inefficient underground piping is used by some of the railroads. One engineer of a large Class A road recently estimated that properly insulated piping would pay for itself on his road in two years. He pointed out that every winter high pressure steam is used solely to get more power out of steam before, it goes to the condenser or process. The only very high pressure piping used, therefore, is that between the boilers and the engines which are usually housed in the same building. The steam that is carried around the manufacturing plant for heating buildings and for process is generally low pressure steam from 5 to 50 pounds, exhausted from the engines and turbines.

For such purposes the ideal construction is Aosco Red Diamond Brand Casing which combines long life, low first cost and an efficiency of over 90%. Under average soil and climatic conditions, Aosco Red Diamond Brand Casing will retain its high efficiency for 25 years and longer without attention.

Whether Aosco Red Diamond Brand Casing is used for low pressure or Aosco Muticell Tile conduit for high pressure, various specialties are required for controlling the expansion, anchoring, etc. As the pioneer builders of equipment for underground steam lines, Aosco will be pleased to mail descriptive literature to you or to consult you regarding any contemplated changes in your steam distribution layout.

Aosco Casing is made of 4" steams, kiln-dried, white pine or cedar, firmly bound into a cylinder of great strength. It is then covered with 150/0 linen and surfaced with sawdust. Furnished with or without tin lining.

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How to Make Cities Cleaner and Healthier

This agitation for cleaner, healthier cities is no recent development. According to authorities the need for relief from air pollution was originally discussed sometime in the twelfth century in England, when smoke and soot caused by “sea-coal”—coal mined near the coast—became so annoying that special corrective ordinances were passed to stop the nuisance.

Apparently the citizens of the land thumbed their noses at the ordinance, for we learn that in 1307, conditions had become so serious that a commission was appointed by the Crown to study ways and means for relief. After investigation, the commission ruled that “any artificer who burned sea coal within the city of London be subject, on first offence, to great fine; on second, the demolition of all his furniture; and on third, by death.” According to the records, a certain artificer, presumably a coppersmith, was thrice found guilty of burning “sea coal”; he was hanged. They didn’t fool in those days!

How far have we gone in six hundred twenty-four years? Most of our cities may rightfully shrink from the stigma of an honest answer. The evil of smoke and soot is no secret. Half a billion dollars is its estimated yearly damage in the United States alone. In one eastern city over 1500 tons of soot settle out of the air per square mile per year. The toll of this stupendous precipitation is visible in the soot stained buildings. Ever sale of soiled merchandise is an indictment—every dirty window sill a proof of the litter of the land.

But, however serious the dollars amount to, that is only secondary to a greater danger—the menace to health. Legislative measures are constantly being enacted to insure pure food and water; yet, far too often, only the most elementary regulations guard the inhabitants of our great cities from the perils of air pollution.

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"Abolish the smoke clouds and let the sunshine in"... is the formula for cleaner, more beautiful cities and a healthier, happier citizenry.
This is the Packless Expansion Joint for your Heavy Duty Steam Lines

ADSCO Multiple Diaphragm Variators are designed for the engineer who wants permanently efficient packless expansion control for his high pressure, high temperature steam lines.

Like Adasco's low pressure variators, once installed, they can be completely forgotten. They go on serving year after year without attention of any kind.

Per inch of traverse they cost little, if any, more than equipment much less efficient. Per year of care-free service, they are the least costly expansion joints you can buy. Elimination of expansion joint manholes and maintenance saves district heating companies thousands of dollars. Send for complete literature.

American District Steam Company
North Tonawanda, N.Y.
OVER FIFTY YEARS IN BUSINESS

ADSCO Multiple Diaphragm Variator
for any
Pressures
Up to 250 Lbs.
Temperatures
Up to 750° F
In discussing this subject, "Good Health" points out that the tarry matter and sulphuric acids deposited from the smoke produce catarrh of the respiratory tract, bronchi tis, emphysema and heart failure. The healthy lungs of the country dweller are pink; the lungs of the citizens of industrial cities are black from deposited carbon. Referring to a great industrial city, "Good Health" states: "This center received only 55 per cent of the light enjoyed by the surrounding country. Deprivation of light brings on anemia, rickets and tuberculosis. Smoke may also be a factor in the production of thoracic cancer."

Doctor Francis E. Fronczak, Health Commissioner of the City of Buffalo, looks forward, hopefully, to the time when the smoke nuisance in our cities will be eliminated. In a paper, prepared on this subject, Dr. Fronczak says, "We pollute the air—the air which we inhale at the rate of about eighteen times or so a minute in order to revivify our blood stream, in order to obtain the necessary oxygen. And in that air we inhale particles of coal, various kinds of gases, vapors of all kinds; and we believe that this polluted, contaminated air will do exactly what nature wanted the pure unpolluted air to do."

"I do not care to speak on the cost of dirty air . . . . I am interested solely in the matter of public health."

"If we come into a city from the country at a distance, we see a cloud hanging over the city. We can always tell where the industrial centers are; and where cities are. It is the place where you see the permanent, eternal cloud of smoke through which the sun can hardly penetrate and the ultra-violet rays are in a great part removed."

"As we get closer to the city, our eyes begin to water from the gases floating in the air, from the particles of coal; we often begin to have spasmodic coughs—all due to the fact that through our chimneys of all kinds, we permit these vapors, these particles of coal, these gases to be ejected. We know very well from experience that people living in communities where the atmosphere is constantly smoke-laden, suffer from irritation of the mucous membranes."

"The question is 'What can we do about it?' " . . .

After discussing other means for improvement, Dr. Fronczak answers his own question.

"I believe that a central heating plant, properly constructed, properly run, with proper fuel, by experienced firemen or engineers, will reduce in a great measure this nuisance that is so detrimental to health."

And Dr. Fronczak is unquestionably right. District Heating provides the only effective means of affording relief.

With the adoption of District Heating comes the abandonment of hundreds of individual heating plants with their carelessly operated boilers and belching chimneys. The dust and dirt incident to coal deliveries and ash removal are likewise eliminated.

The modern District Heating plant itself could be installed in the heart of the finest residential district, without annoyance from coal, fumes or soot. This statement gains credence when one examines such records as the one recently published in Domestic Engineering, discussing the new Edison Steam Plant at Boston. Among other things, the editorial points out: "The boilers will be fired by pulverized semi-bituminous coal, blown into the fire boxes. Every known precaution is taken for cleansing the gases of combustion before they are discharged into the atmosphere, and it is confidently believed that the equipment installed will thoroughly remove all dust from chimney gases."

The District Heating utility not only brings to its city modern efficiency in the heating of large and small buildings; but by its reduction of smoke and soot, it contributes measurably to the physical well-being of that city's people.
The Present Status of District Heating in America

Excerpts from an article of J. H. Walker and A. R. Mumford, prepared in collaboration with the Educational Committee of the National District Heating Association, and printed in the official bulletin of that organization.

DURING the past decade, the position of district heating has improved considerably. There are at present district heating systems of all sizes in operation in America, nearly all of which are in the United States. In Canada there has been less attention paid to the subject, the system in the City of Winnipeg being the only one of any considerable size. The following table illustrates some features of the industry at the present time.

**District Heating Statistics**

Number of companies reporting...26
Amount of Capital Invested...$80,000,000
Revenue (one year)...$17,000,000
Number of Consumers Served...9,322
Steam Sold, Pounds...18,900,000,000

The rate at which the industry is growing is well illustrated by the chart on page 13 which shows the increase in number of consumers, boiler capacity and steam sold for twenty-two companies. The average growth for these companies has been approximately 11 per cent per year on a compound basis, but the growth in certain cases, notably in New York City, is even more rapid. The indicated average rate of growth is a high rate for a public utility and if maintained will cause district steam service to become in the future of basic importance nationally.

In one year, eight of the larger companies invested a total of $9,361,000 for extensions to their distribution systems and boiler plants.

The improvement in the status of district heating has been due principally to two causes. First there is the increased value or cost of the space occupied by the individual heating plant in large buildings. The increasing congestion of the central districts in large cities has caused the value of space, even in basements to become very high. The unproductive space occupied by the boiler plant in the basement and by the chimney on each floor may be freed for rental purposes through the purchase of district steam service or a combination of steam and electrical service. The annual rental value of space released by the elimination of the boiler plant may equal the entire cost of district heating service for the building.

The second cause is a greater appreciation, on the part of the public, of the luxury value of steam service. The freedom from the dirt, smoke and annoyance which accompany the operation of the individual heating plant is attractive to the building owner. Incidentally there is a real civic advantage, in the elimination of smoke, and of the dirt and traffic obstructions caused by the handling of the fuel and ashes of the individual plant.

The overall thermal efficiency of district heating compares favorably with other methods of heating and is higher than appears in the case of the gas or electric utilities. The thermal efficiency of well designed district heating plants varies from 75 to 85 per cent. The efficiency of distribution in a system which is in a good state of repair varies from 80 to 90 per cent., depending upon the density of the load. The efficiency of utilization of the heat in the consumer's building is at least 90 per cent even when the condensation, which contains some heat, is wasted and not returned to the boiler plant, and may reach 95 per cent. Assuming an average figure of 80 per cent for the district boiler plant, 85 per cent for the distribution system, and 93 per cent for the efficiency of utilization, the overall efficiency becomes 63 per cent. This exceeds the overall efficiency of an individual building heating plants which averages 50 per cent for a very small building and 60 percent for a large building.

It is interesting to compare the cost of supplying heat to a city district by means of the three methods which might be used, namely, district steam heating, gas or electricity. The price at which 1,000 B.t.u. are furnished to the consumer affords a basis of comparison of the economics of the production and distribution of heat by the three methods. In New York City the amounts of heat in B.t.u. which the consumer obtains for one cent in each case are as follows:

<table>
<thead>
<tr>
<th>B.T.U. for one cent</th>
<th>Cost</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam $0.97 per thousand pounds</td>
<td>11,400</td>
<td>1.00</td>
</tr>
<tr>
<td>Gas 1.15 per thousand cu. ft.</td>
<td>4,280</td>
<td>2.34</td>
</tr>
<tr>
<td>Electricity 0.05 per kilowatt hour</td>
<td>660</td>
<td>16.36</td>
</tr>
</tbody>
</table>

**Three Fields Of Service**

There are now three rather distinct fields in which district heating is employed, each involving different economic and engineering considerations. These are as follows: (a) service to congested business and residential districts, (b) service to districts of indi-
individual family residences, (c) service to grouped industries.

District steam service in the congested business and residential districts of cities is by far the most important when considering the amount of capital invested and the amount of building space heated. These districts constitute a particularly favorable field, first because of the high density of the load, making it possible to deliver large quantities of steam with a relatively small investment in distribution pipes and, second, because the service is in great demand. There are a number of district heating systems supplying detached residences in America and the service is much in demand where it is available.

The supply of steam to industries for manufacturing uses as well as for heating is a service of rather recent growth but which gives promise of a great future development. Many industries have need for large quantities of heat in manufacturing processes and it often appears economically correct that their steam requirements as well as their electrical requirements be purchased from the public service companies.

District Heating has its most profitable and most popular field in the business districts of large cities and there is an increasing demand for the service. It depends for its success upon certain climatic, economic and physical conditions which are to some extent peculiar to America.

The supply of steam to manufacturing industries for heating and for manufacturing processes affords a promising field for future development.

The district heating industry is on a sound basis and its future expansion in the fields in which it is profitable is assured.

As the photographs show, our operations are not confined to any one state or section. No matter where you are located you can avail yourself of fifty years experience in steam line construction underground or overhead. If you are contemplating any change in your steam distribution layout, ask to have us send one of our nearby resident engineers, for preliminary consultations.

NORTHEASTERN PIPING & CONSTRUCTION CORP.
NORTH TONAWANDA, N. Y.

Branches or Agencies in Principal Cities
Hair Line ACCURACY

When you install an Adsco Meter you know that it will stay accurate, because careful testing has proved its reliability before it was shipped to you.

Ten different times, 500 pounds of water is run through the meter with accuracy checked at every hundred pounds. At each of these points the recording on the meter dial must coincide with the weight shown on the scale. In these tests, first cold water then hot water is used, run through at 25, 50, 75, 100 and 125% of meter capacity speed. Any error beyond the most minute tolerance means that the meter is rejected and must be recalibrated.

That's why you can depend on Adsco Meters. That's why in hundreds of user tests, these meters have shown a sustained accuracy within plus or minus 1% of absolute.

Write for complete specifications and prices.

AMERICAN DISTRICT STEAM COMPANY

Over 50 Years in Business

ADSCO Rotary Condensation Motor

must point to the same numeral—otherwise the Meter is rejected. This is your assurance of Adsco accuracy.

When the hand on the scale dial reaches 200 or any other figure—the hand on the meter dial

"The Meters that Tell the Truth"