FOREWORD

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to the manager of the Standards Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

FOREWORD

Suggested revisions are invited and should be submitted to the manager of the Standards Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

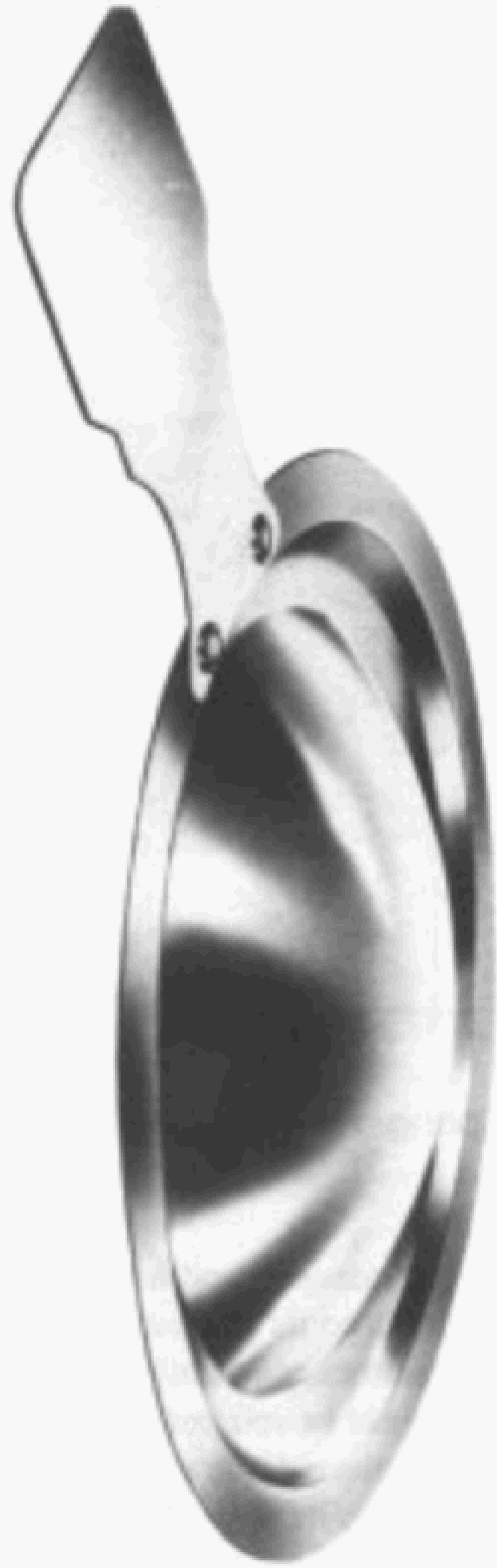


Figure 13—Conventional Domed Rupture Disk

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.
g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.

g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

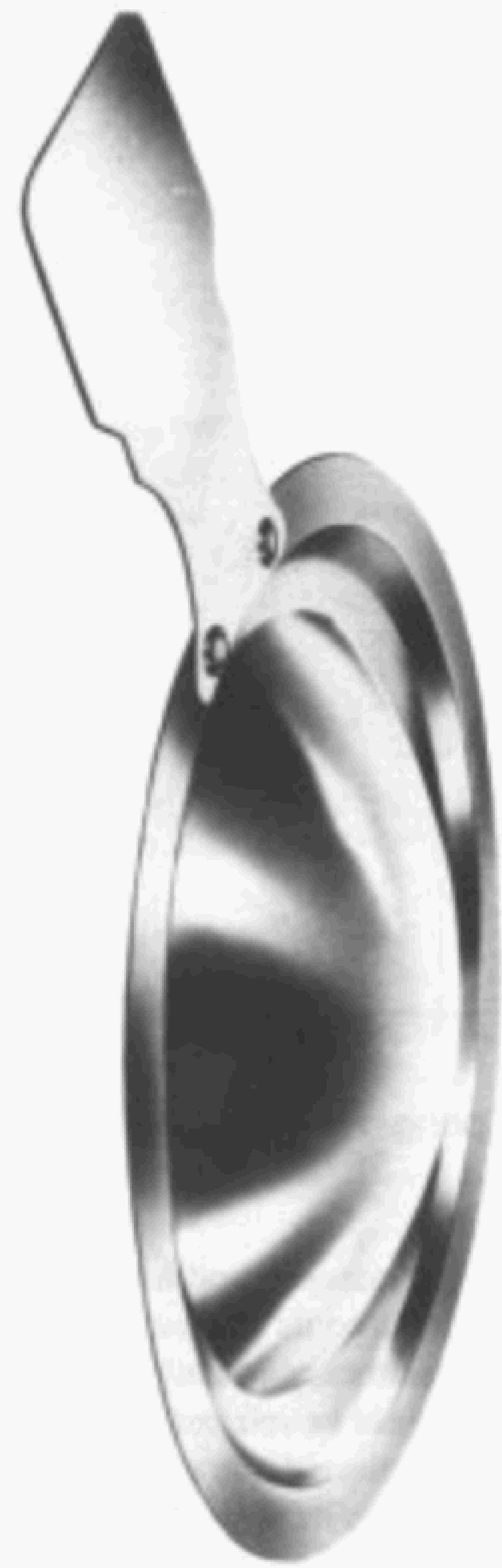


Figure 13—Conventional Domed Rupture Disk

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.
g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

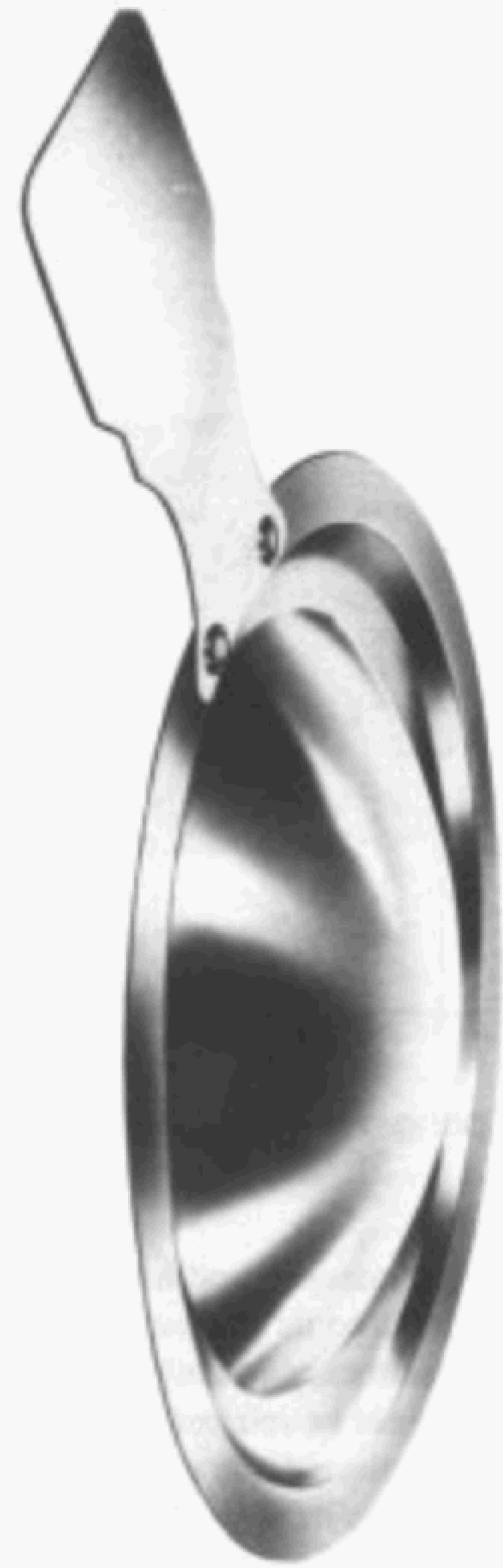


Figure 13—Conventional Domed Rupture Disk

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.

g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

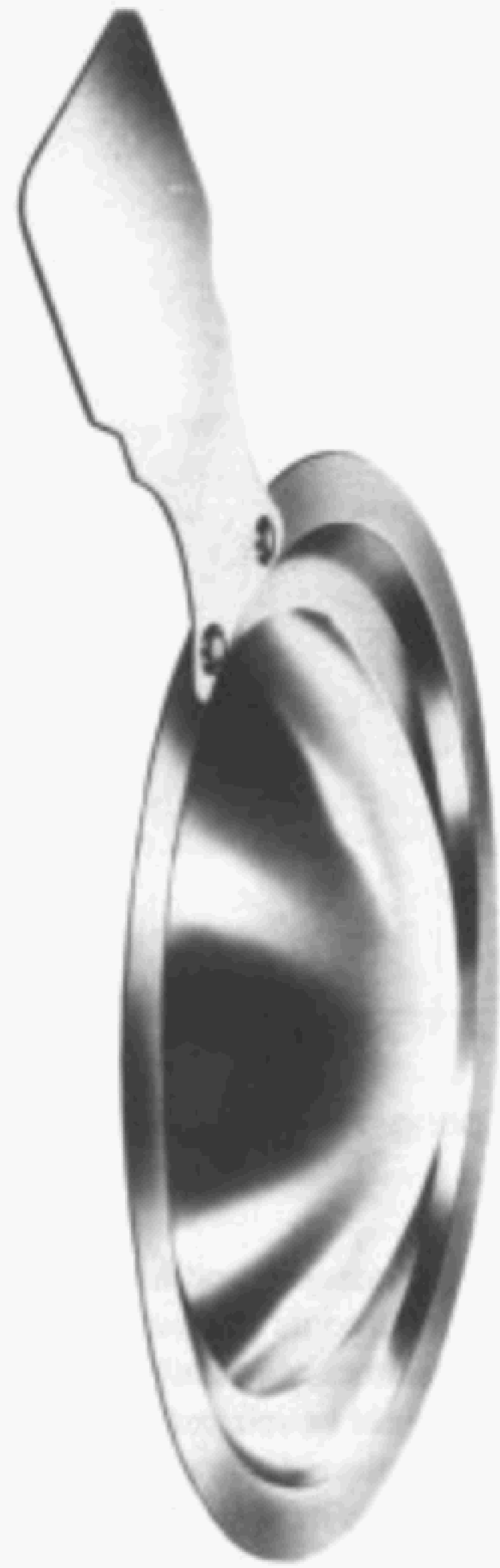


Figure 13—Conventional Domed Rupture Disk

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.
g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

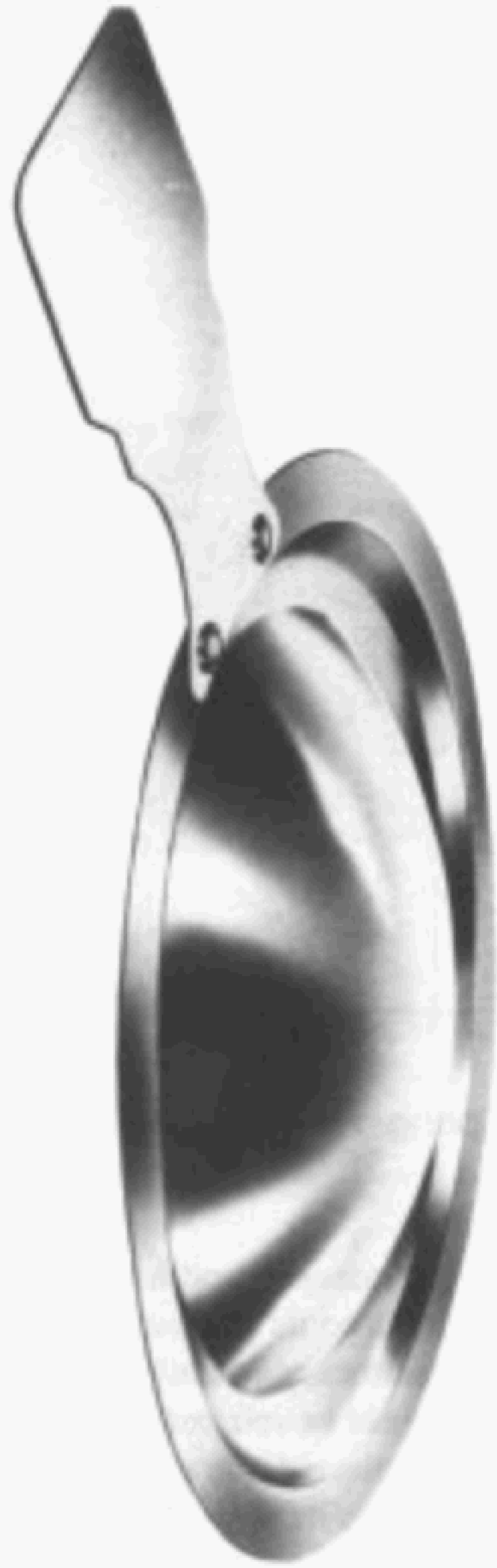


Figure 13—Conventional Domed Rupture Disk

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.
g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

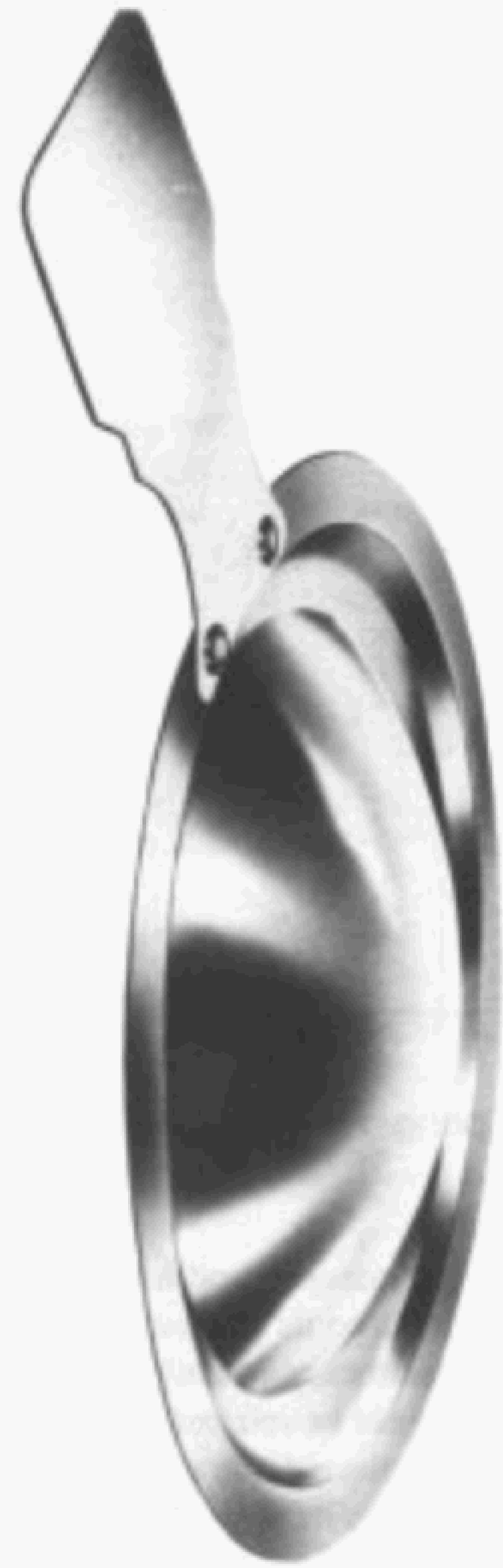


Figure 13—Conventional Domed Rupture Disk

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

Figure 12—Rupture Disk Device—Rupture Disk in a Typical Holder

f. To protect the downstream sides of pressure relief valves against downstream corrosion from headers or against atmospheric corrosion.
g. To minimize process/product leakage and reduce fugitive emissions.

The proper receipt, storage, handling, and installation of a rupture disk are critical to its successful performance. Refer to the manufacturer's installation instructions, especially those concerning limits on bolt torque.

Some rupture disks using knife blades to open have failed to open properly. Consultation with the manufacturer concerning proper installation and maintenance of these kinds of rupture disks may be beneficial.

A pressure gauge, a try cock, a free vent, or a suitable tell-tale indicator must be inserted between a rupture disk device installed at the inlet of a pressure relief valve and the valve (see Figure 18), permitting the detection of disk rupture or leakage.Since rupture disks are designed to burst at a specified differential pressure, pressure build up on the downstream side of the disk may inhibit the disk's ability to provide overpressure protection. A rupture disk device must have full pipe area and must not fragment into the pressure relief valve inlet after the disk bursts. When a rupture disk device is used with a pressure relief valve, consult the ASME Code for the capacity reduction and installation details.

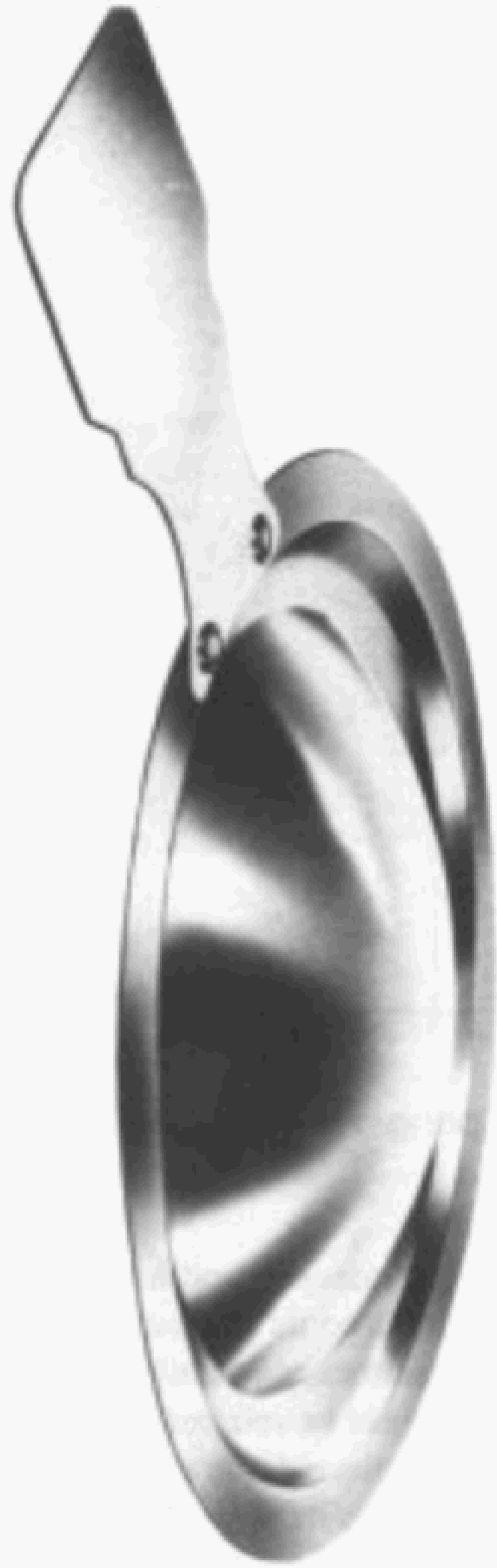


Figure 13—Conventional Domed Rupture Disk

4.9.3 Limitations

For prebulged metal rupture disks installed so that pressure acts against the concave side and for flat metal rupture disks, the operating pressure of the protected system is usually limited to 65-85% of the disk's predetermined bursting pressure. The exact percentage depends on the type of disk used.

The service life of prebulged metal rupture disks under normal operating conditions is usually one year. They are subject to relatively rapid creep stress failure, especially at high operating temperatures. If not replaced periodically, they may fail without warning at normal operating pressures.

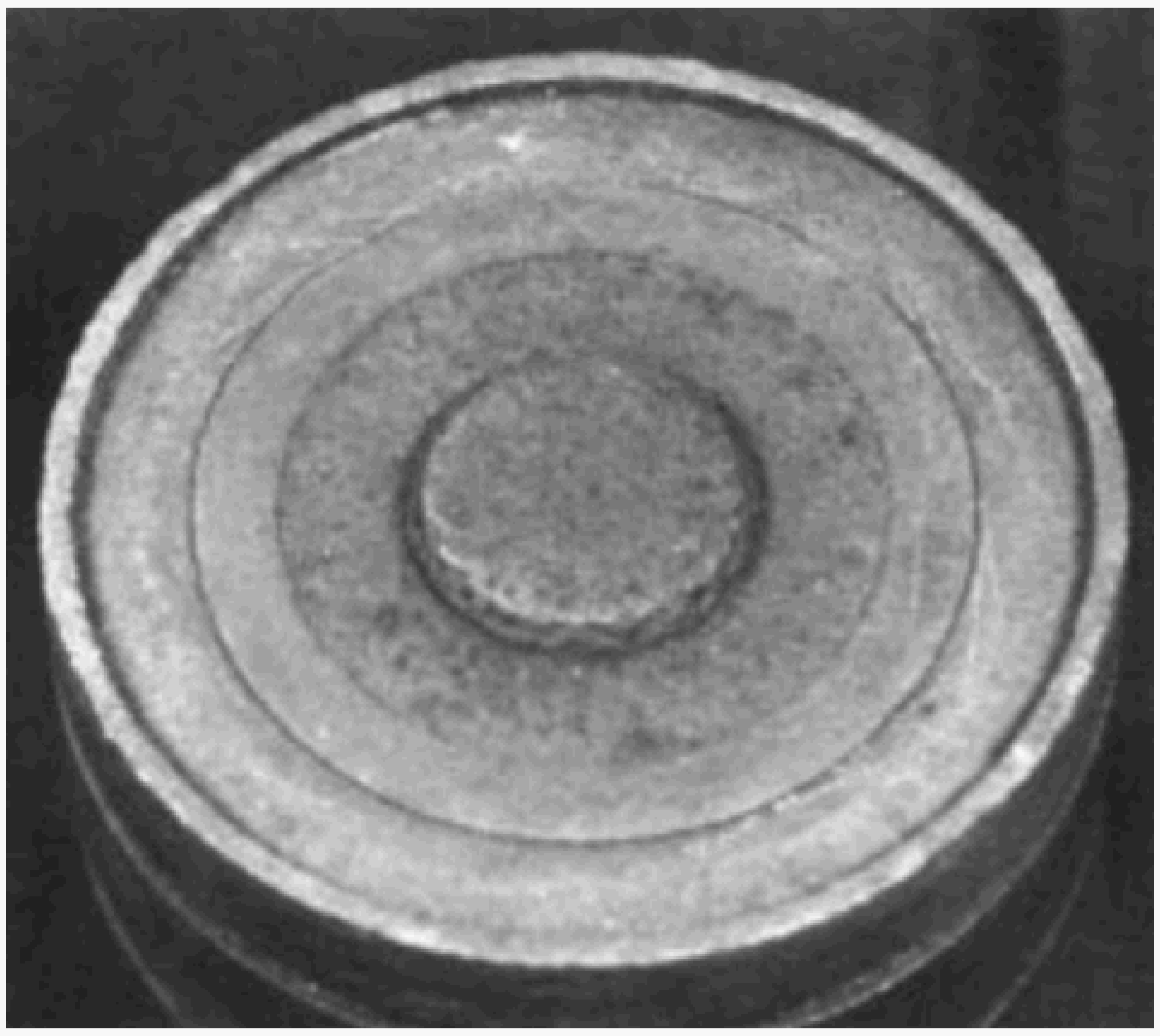


Figure 22—Sulfide Corrosion on Carbon-Steel Disk From Crude-Oil Distillation Unit

the set pressure and the reseating pressure—or valve blowdown and simmer, depending on the design of the valve being tested. Because the density and expansion characteristics of material handled through pressure relief valves are variable and the volume of testing facilities is limited, it is usually impractical to adjust the valve rings on a maintenance shop test block. The rings should therefore be adjusted to obtain a pop on the valve test drum and then inspected and readjusted for proper blowdown according to the manufacturer's recommendation. This should permit the best average performance characteristics of the valve when installed. For liquid or vapor service, the relief valve manufacturer should be contacted regarding the proper blowdown ring settings. Full understanding of terminology is important (see ASME PTC 25).

5.5 PLUGGING AND STICKING

In refinery and petrochemical services, process solids such as coke or solidified products can sometimes plug various parts of the valve and connected piping. Additionally monomer service can lead to polymer formation and plugging. Extreme cases of fouling are illustrated by Figure 31, which shows the inlet nozzle of a valve plugged solid by a mixture of coke and catalyst, and Figure 32, which shows the outlet nozzle of a valve plugged with deposits from other valves that discharge into a common discharge header. Fouling of a lesser degree, as shown in Figures 33 and 34, is also likely to impede valve operation. All valve parts, particularly guiding surfaces, should be checked thoroughly for any type of fouling. Lubricate all load bearing surfaces such as spindle to disk holder, spring buttons to spindle, disk to disk holder and threads with a lubricant that is compatible with the process materials and service temperatures.

Figure 23—Chloride Attack on 18Cr-8Ni Steel Disk

Figure 24—Pit-Type Corrosion on 18Cr-8Ni Steel (Type 316) Bellows

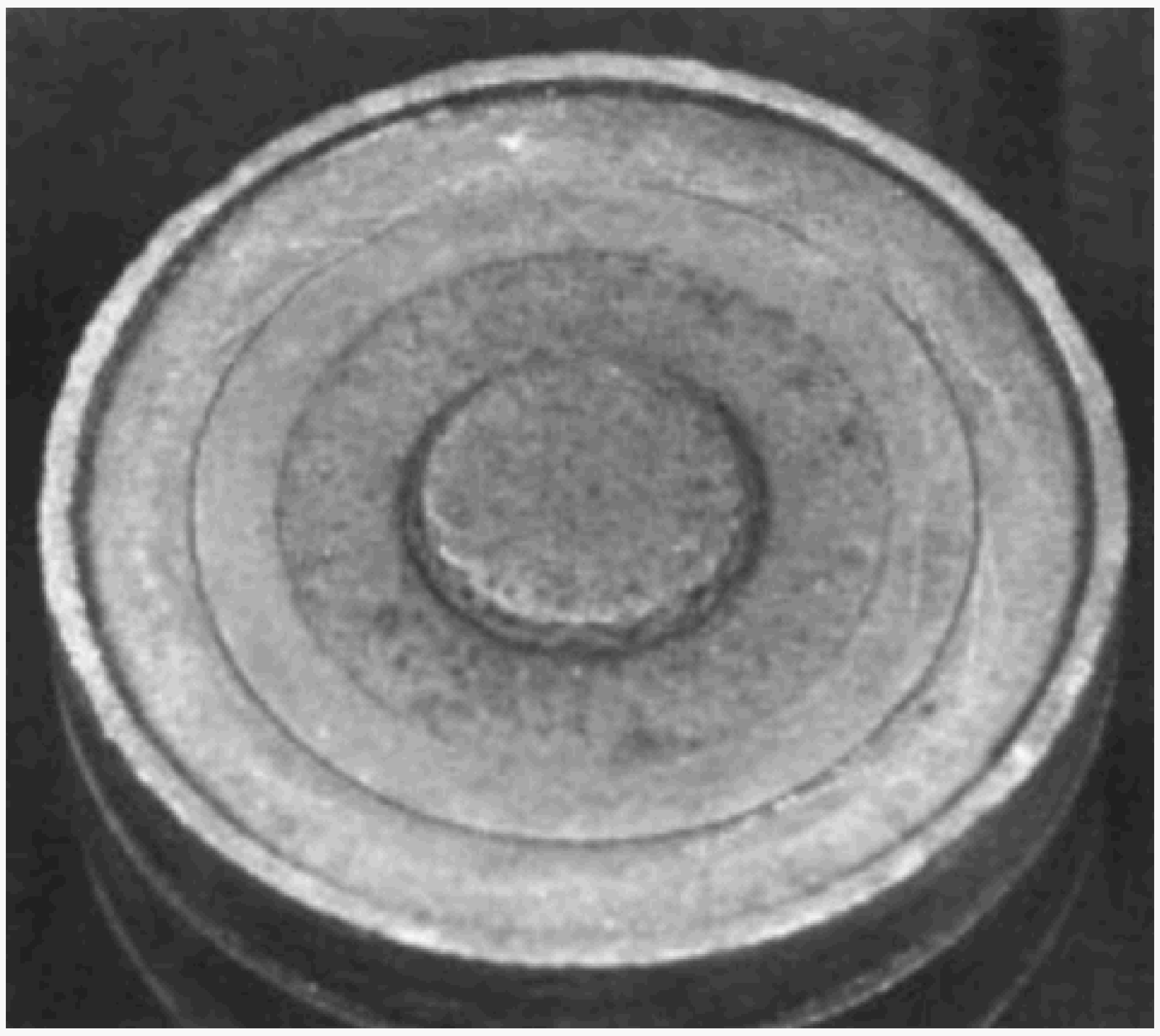


Figure 22—Sulfide Corrosion on Carbon-Steel Disk From Crude-Oil Distillation Unit

the set pressure and the reseating pressure—or valve blowdown and simmer, depending on the design of the valve being tested. Because the density and expansion characteristics of material handled through pressure relief valves are variable and the volume of testing facilities is limited, it is usually impractical to adjust the valve rings on a maintenance shop test block. The rings should therefore be adjusted to obtain a pop on the valve test drum and then inspected and readjusted for proper blowdown according to the manufacturer's recommendation. This should permit the best average performance characteristics of the valve when installed. For liquid or vapor service, the relief valve manufacturer should be contacted regarding the proper blowdown ring settings. Full understanding of terminology is important (see ASME PTC 25).

5.5 PLUGGING AND STICKING

In refinery and petrochemical services, process solids such as coke or solidified products can sometimes plug various parts of the valve and connected piping. Additionally monomer service can lead to polymer formation and plugging. Extreme cases of fouling are illustrated by Figure 31, which shows the inlet nozzle of a valve plugged solid by a mixture of coke and catalyst, and Figure 32, which shows the outlet nozzle of a valve plugged with deposits from other valves that discharge into a common discharge header. Fouling of a lesser degree, as shown in Figures 33 and 34, is also likely to impede valve operation. All valve parts, particularly guiding surfaces, should be checked thoroughly for any type of fouling. Lubricate all load bearing surfaces such as spindle to disk holder, spring buttons to spindle, disk to disk holder and threads with a lubricant that is compatible with the process materials and service temperatures.

Figure 23—Chloride Attack on 18Cr-8Ni Steel Disk

Figure 24—Pit-Type Corrosion on 18Cr-8Ni Steel (Type 316) Bellows

Figure 29—Spring Failure Due to Corrosion

disk on the valve inlet will isolate the valve internals from the upstream process material.

When galling of the metal in the guiding surfaces is not due to corrosion or foreign particles, it is often due to valve chatter or flutter caused by improper piping at the valve inlet or outlet or by severe oversizing of the valve. Correction of improper piping at the valve inlet or outlet will usually stop galling. Improper finishing of the guiding surfaces can also cause galling caused by chatter or flutter. To reduce the chances of galling, they should be polished until they are as smooth as possible. Varying the materials and hardness of the contacting parts until the best combinations are found may minimize galling. Consult valve manufacturer for recommendations.

Sticking of pressure relief valves may also be caused by poor alignment of the valve disk, which is usually due to debris on the contact surface between the guide and the body of the valve, or misalignment of a gasket at assembly (see Part II of API RP 520).

5.6 MISAPPLICATION OF MATERIALS

In general, the temperature, pressure, corrosion resistance requirements and the atmospheric conditions of the service determine the materials required for a pressure-relieving device in a given service. The selection of standard valves that meet those requirements and are appropriate for those conditions is advisable. Occasionally, however, severe corrosion or unusual pressure or temperature conditions in the process require special consideration. Manufacturers can usually supply valve designs and materials that suit special services. Catalogs show a wide choice of special materials and accessory options for various chemical and temperature conditions. Addition of a rupture disk device at the inlet or outlet may help prevent corrosion.

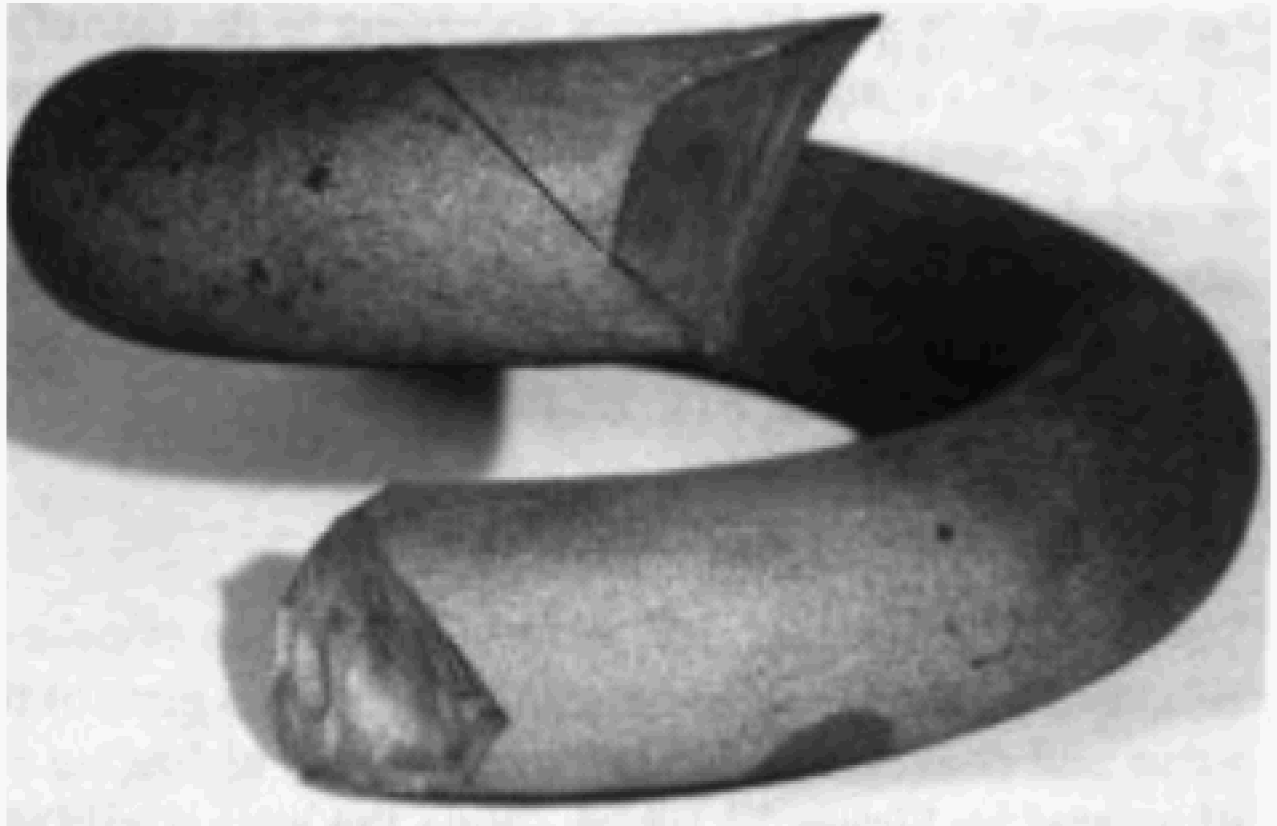


Figure 30—Spring Failure Due to Stress Corrosion

The hydrogen sulfide (H_2S) attack on the carbon steel spring in Figure 22 and the chloride attack on the 18Cr-8Ni steel disk in Figure 23 exemplify the results of the misapplication of materials. Where service experience indicates that a selected valve type or material is not suitable for a given service condition, an immediate correction that will ensure dependable operation should be made. Great care should be taken to record the identity of special materials and the locations requiring them. An adequate system of records should provide the information needed for the repair or reconditioning of valves in special service and for developing optimum purchase specifications.

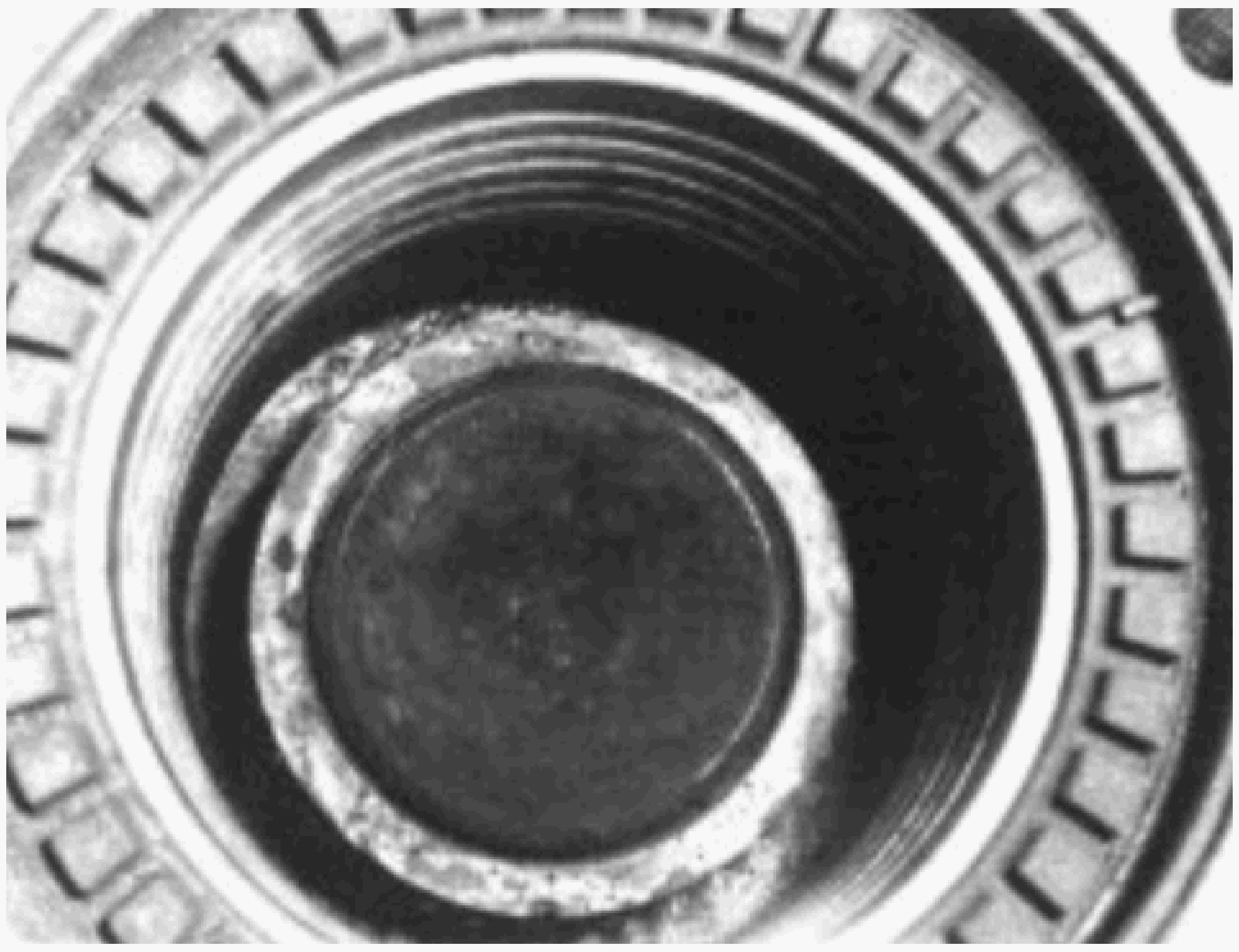


Figure 31—Inlet Nozzle Plugged with Coke and Catalyst After Nine Months in Reactor Vapor Line

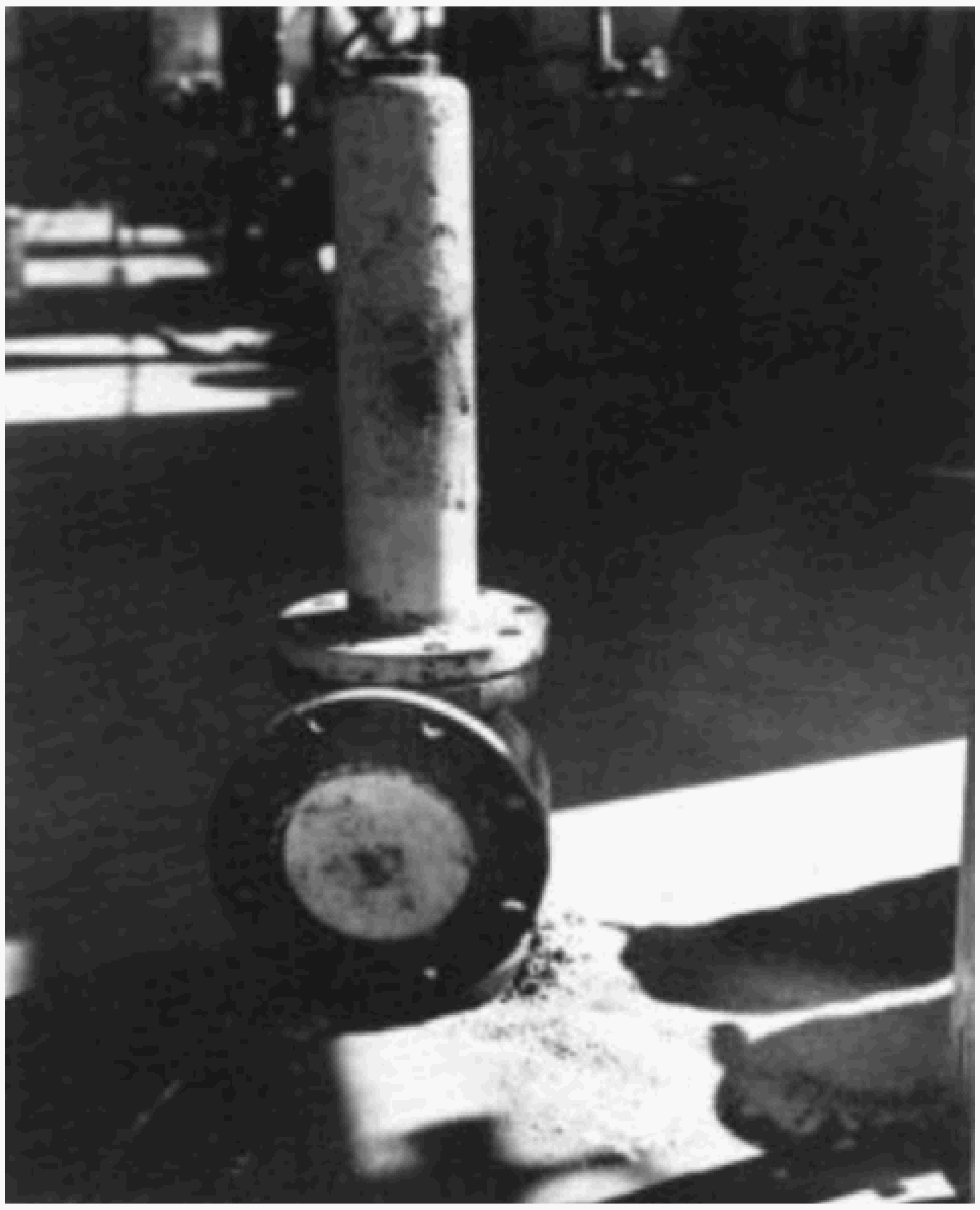


Figure 32—Outlet Valve Plugged with Deposits From Other Valves in Common Discharge Header

Figure 33—Moving Parts of Valve Fouled with Iron Sulfide (FeS_2)

5.7 IMPROPER LOCATION, HISTORY, OR IDENTIFICATION

If not installed at the exact location for which it was intended a pressure relief valve might not provide the proper protection. To assist in the identification of valves and to provide information necessary for correct repairs and installation, a comprehensive set of specification and historical records should be maintained and referred to when valves are removed for inspection and repair. Most pressure relief valves have an identifying serial or shop number placed on the valve by the manufacturer or an identifying number tagged, stamped, or otherwise placed on the valve by the user. Some users also stamp mating pipe flanges with device numbers. This identification specifies the location of the valve and, by reference to the specification record, its limitations and construction (see Section 7).

5.8 ROUGH HANDLING

Because of the difficulty in obtaining absolute tightness in most pressure-relieving devices, valves are manufactured according to a commercial tightness standard (see API Std 527). Valves are checked for tightness in the manufacturer's plant before they are shipped to the user. Valve tightness is sometimes checked by the user in the maintenance shop before initial use and usually checked after subsequent cleaning, repairing, or testing. Subsequent rough handling of the valve, however, can change the set pressure, damage lifting levers, damage tubing and tubing fittings, damage pilot assemblies or cause internal or external leakage when the valve is in service. Rough handling can occur during shipment, maintenance, or installation.

5.8.1 During Shipment

Because of their operation, most pressure relief valves have a sturdy appearance that may obscure the fact that they are delicate instruments with very close tolerances and sensitive dimensions. Accordingly, commercial carriers sometimes subject them to rough handling. This may cause a valve to leak excessively in service or during testing. This rough handling may also expose the valve inlet to dirt or other foreign particles that could damage the valve seating surface the first time the valve opens and cause leakage thereafter.

Pressure relief valves should be shipped in an upright position—this is especially true of large valves and valves with low set pressures. When large, low-pressure valves are allowed to lie on their sides, the springs may not exert the same force all around the seating surfaces.

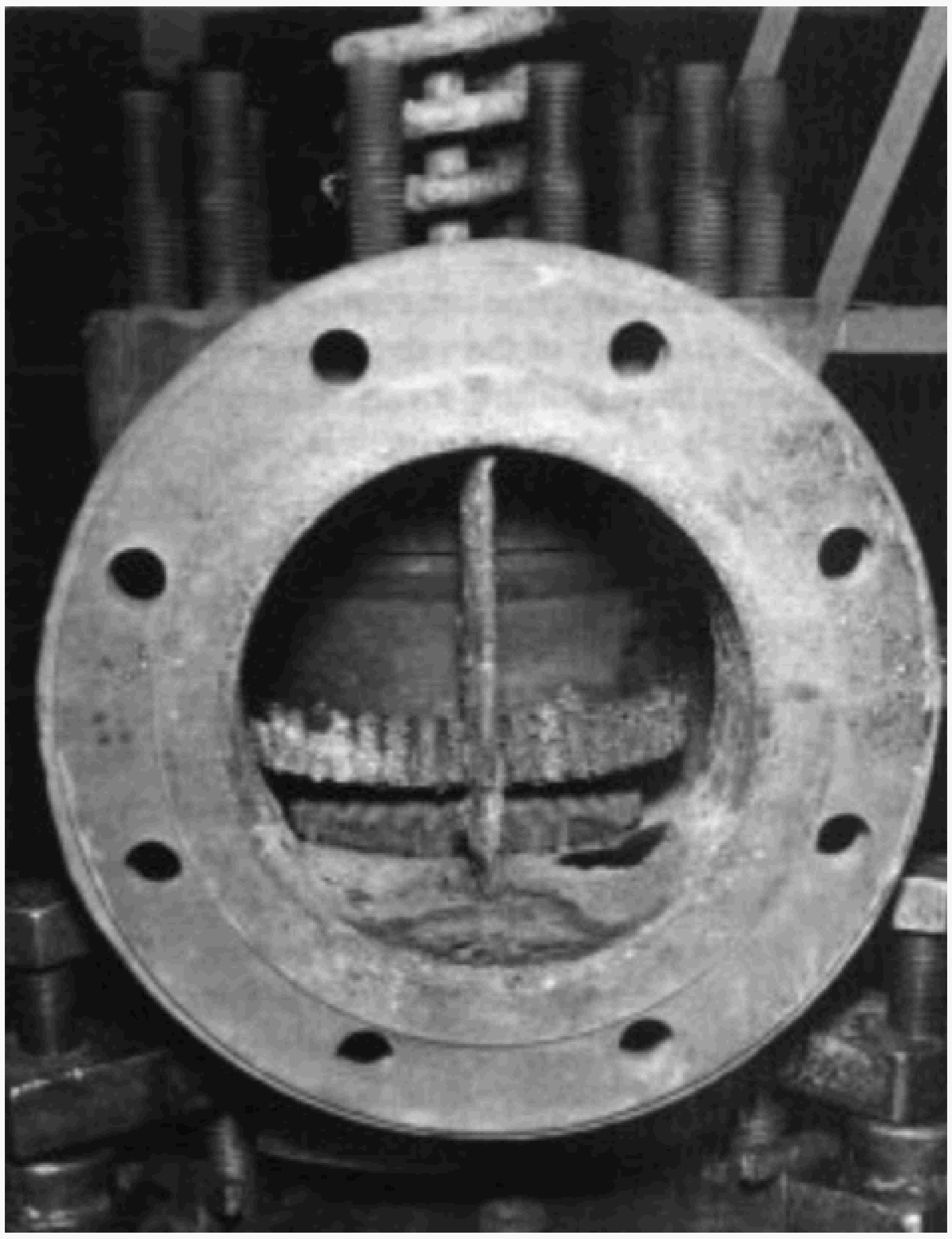


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

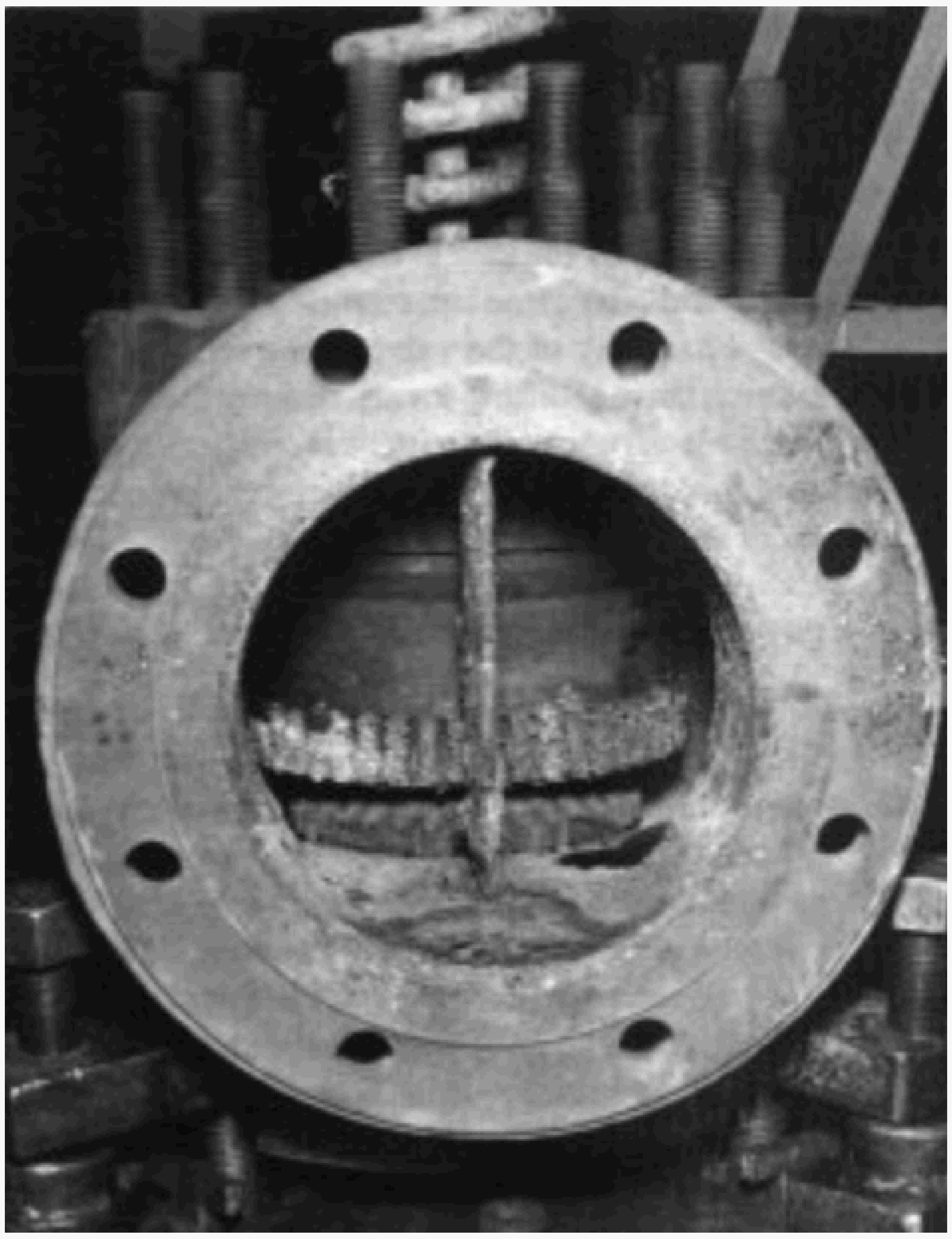


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

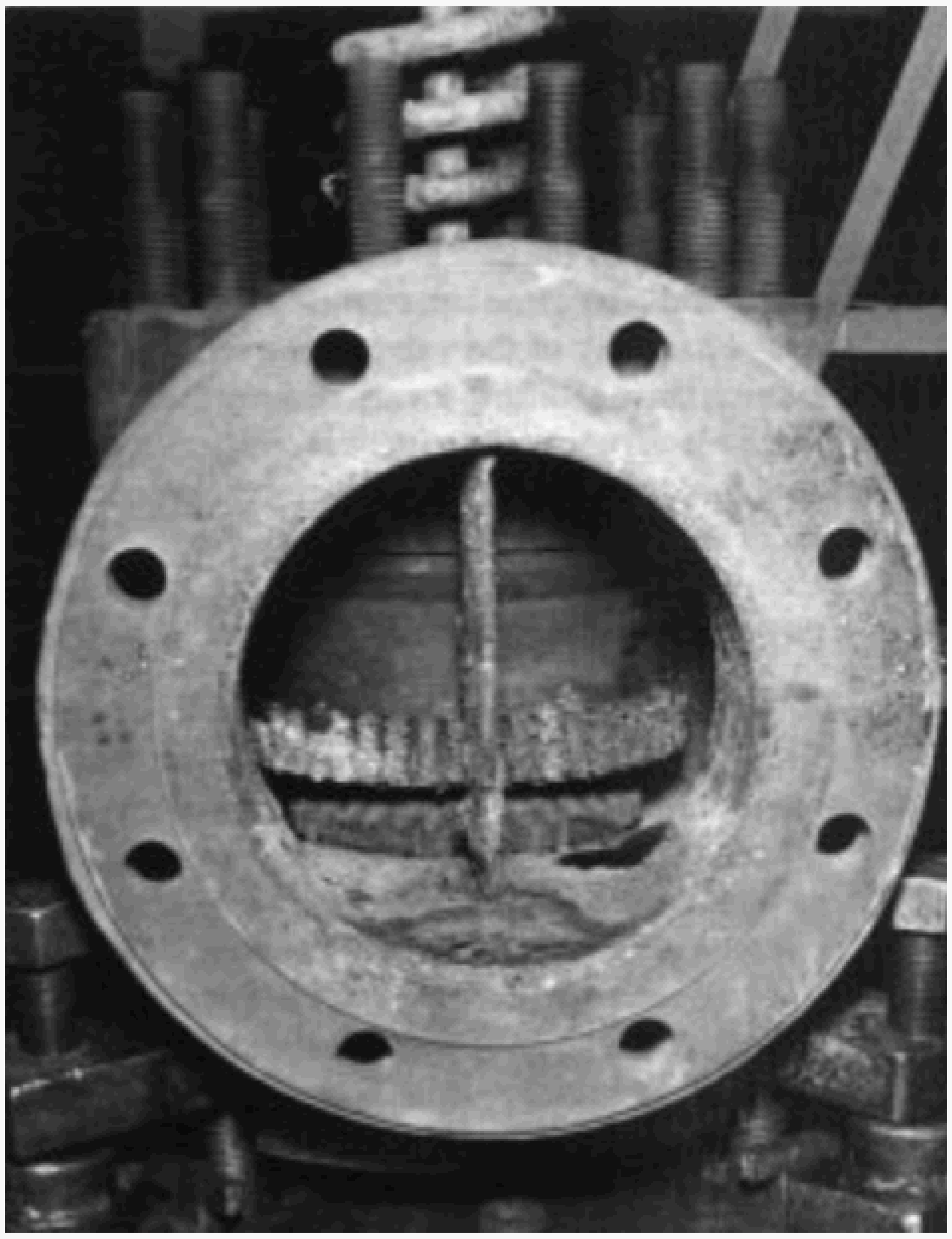


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

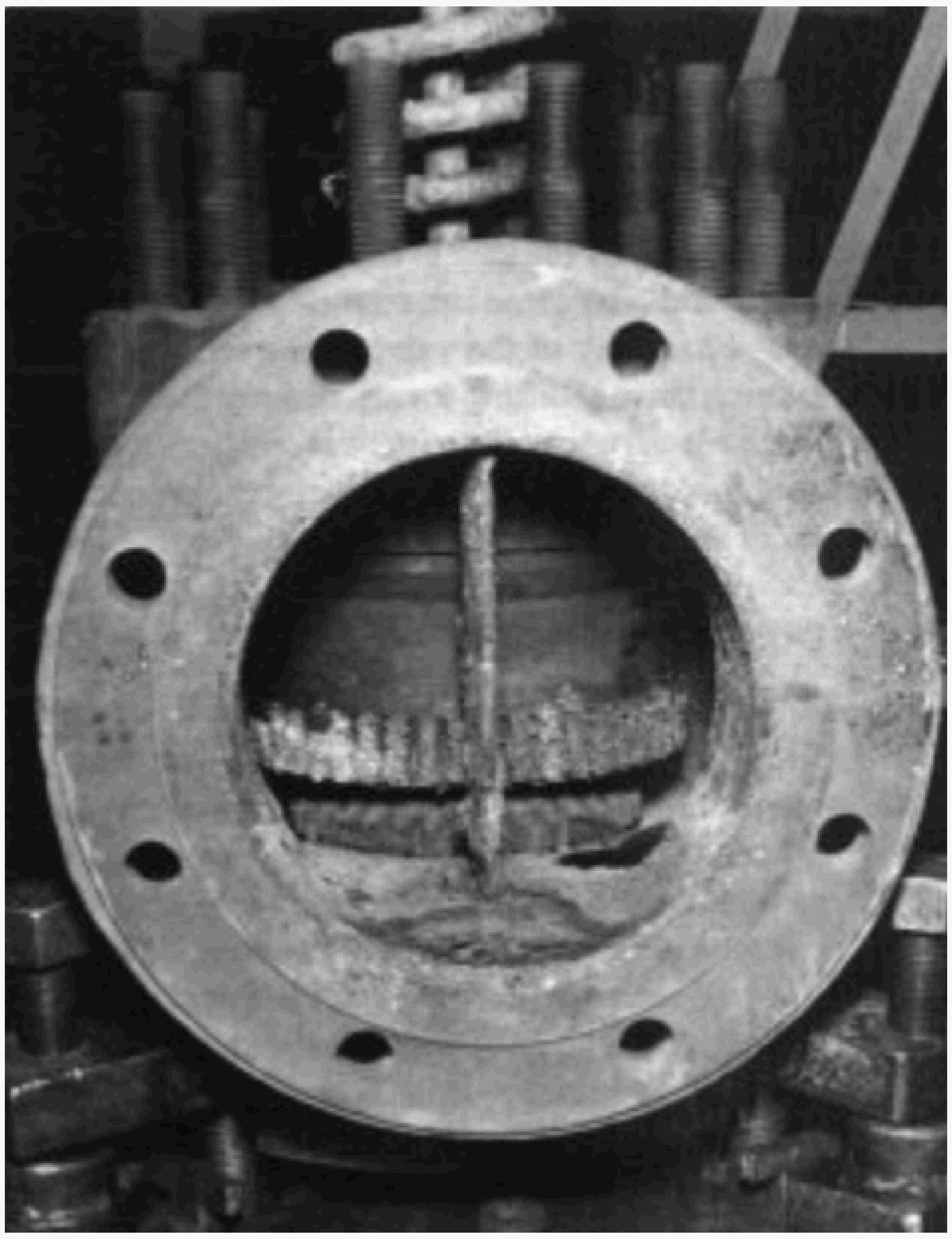


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

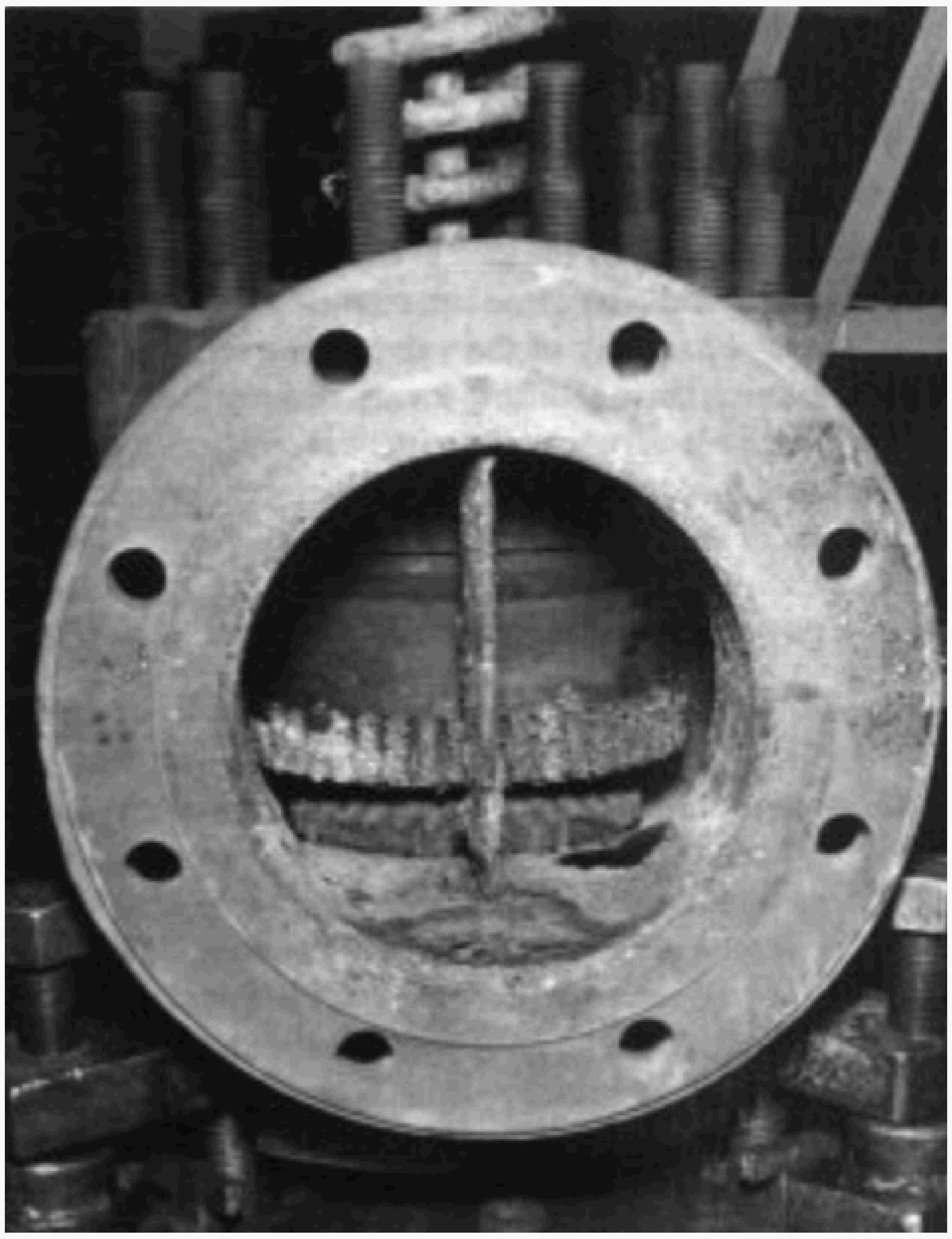


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

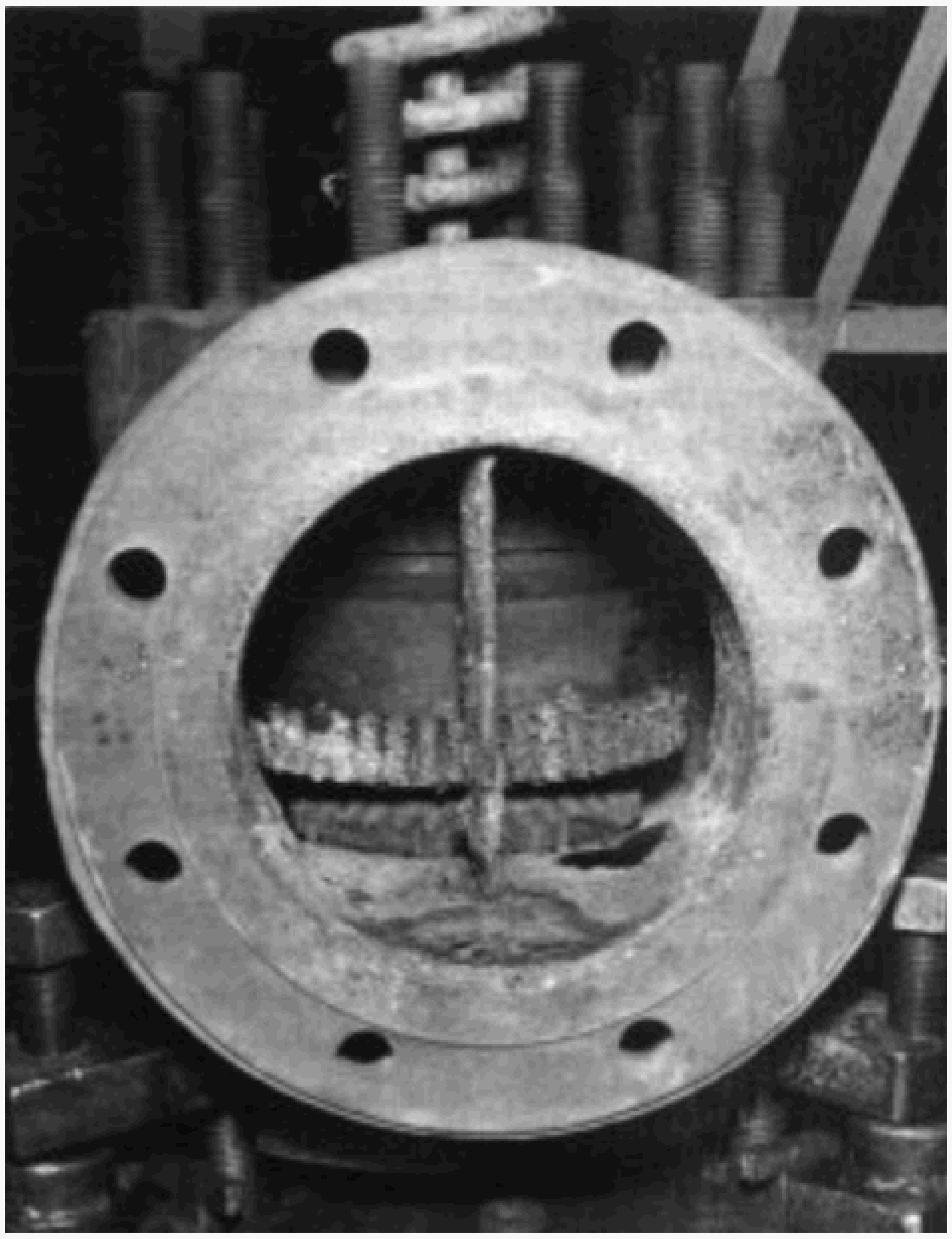


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

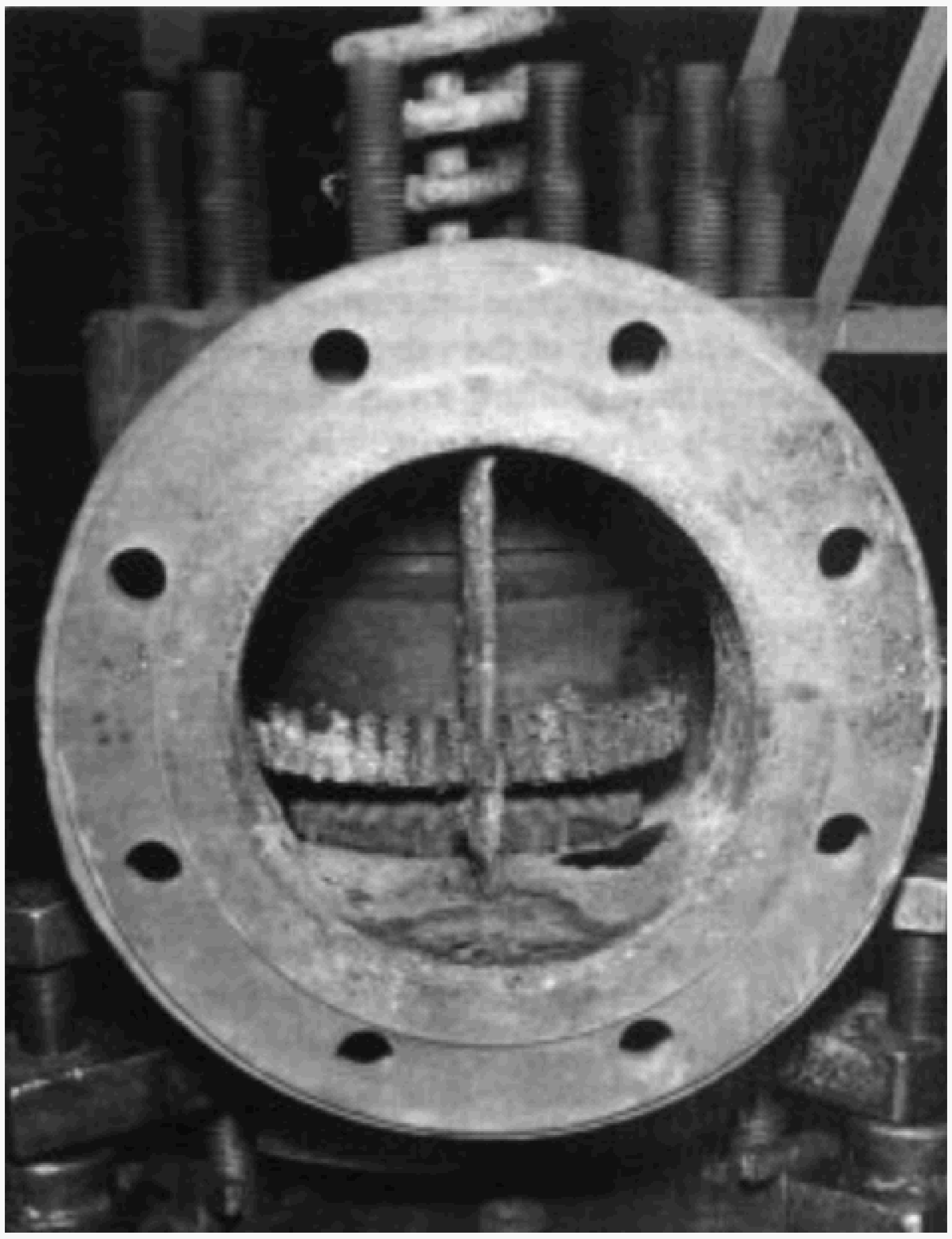


Figure 34—Valve Stuck Because of Iron Sulfide (FeS_2) Deposits

Figure 35—Disk Frozen in Guide Because of Buildup of Products of Corrosion in Sour-Oil Vapor Service

Figure 36—Rough Handling of Valves Should Be Avoided

5.8.2 During Maintenance

Pressure relief valve parts are usually precision items manufactured to extremely close tolerances. Rough handling can degrade these tolerances. Rough handling can also destroy the basic valve alignment on which the fine, exacting performance characteristics of the device primarily depend. Careful handling of the valve during all phases of maintenance is important. Both before and after repairs, rough handling of the completely assembled valve should be avoided. Before the valves leave the shop, valve inlets and outlets should be covered.

Rough handling during maintenance includes application of excessive back pressure, which should not be applied to a bellows valve during a maintenance-related test.

5.8.3 During Installation

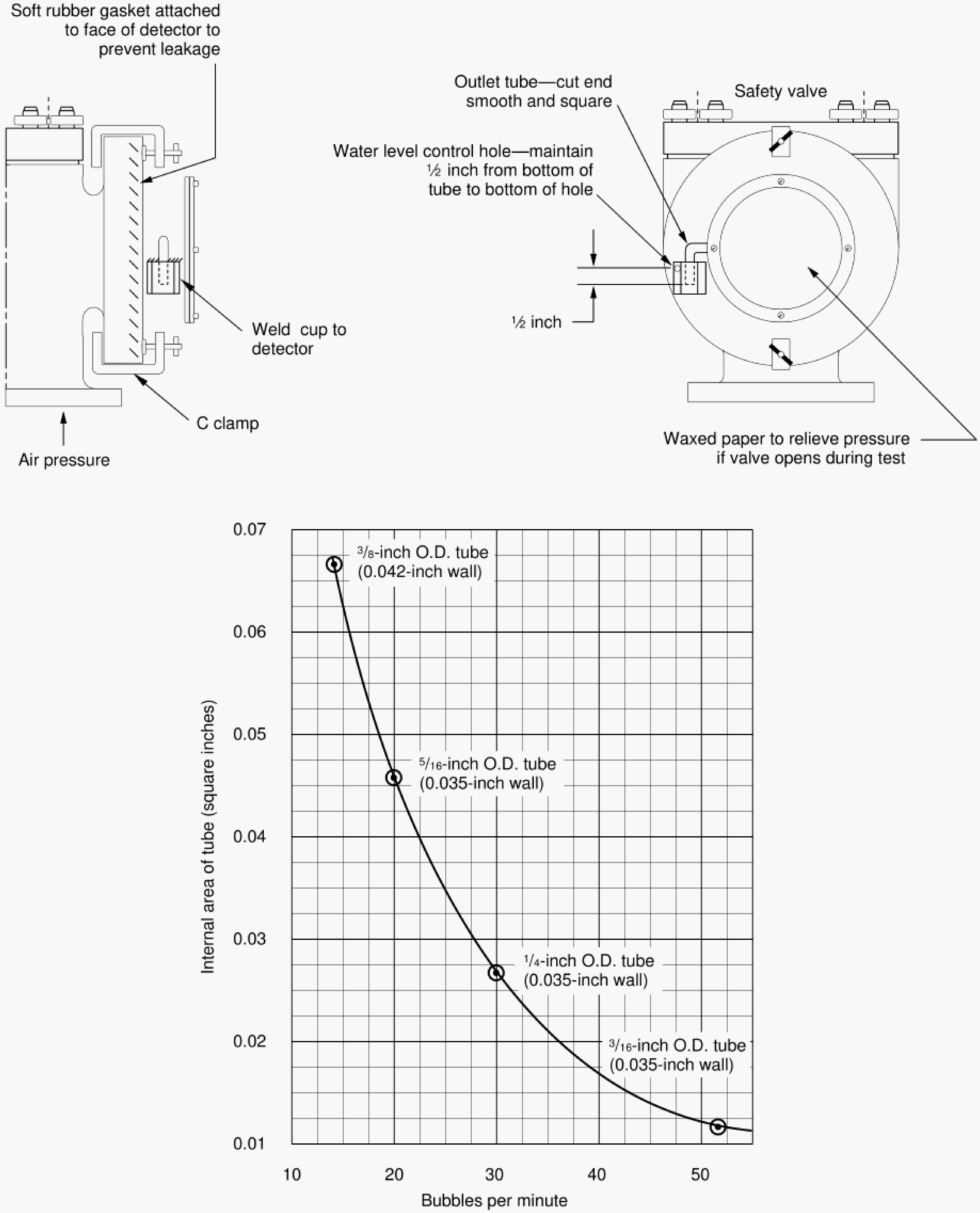
Valve inlets and outlets should have been covered before the valves left the shop. If they were not covered when received for installation, provisions should be made to ensure that in the future they are covered before leaving the shop.

Pressure relief valves should be transported in an upright position.

Rough handling of a pressure relief valve by personnel during installation may cause poor valve performance in service. Bumping or dropping the valve should be carefully avoided. The valves shown in Figure 36 were dropped from the bed of a truck after being repaired. As a result, they leaked once they were installed.

5.9 IMPROPER DIFFERENTIAL BETWEEN OPERATING AND SET PRESSURES

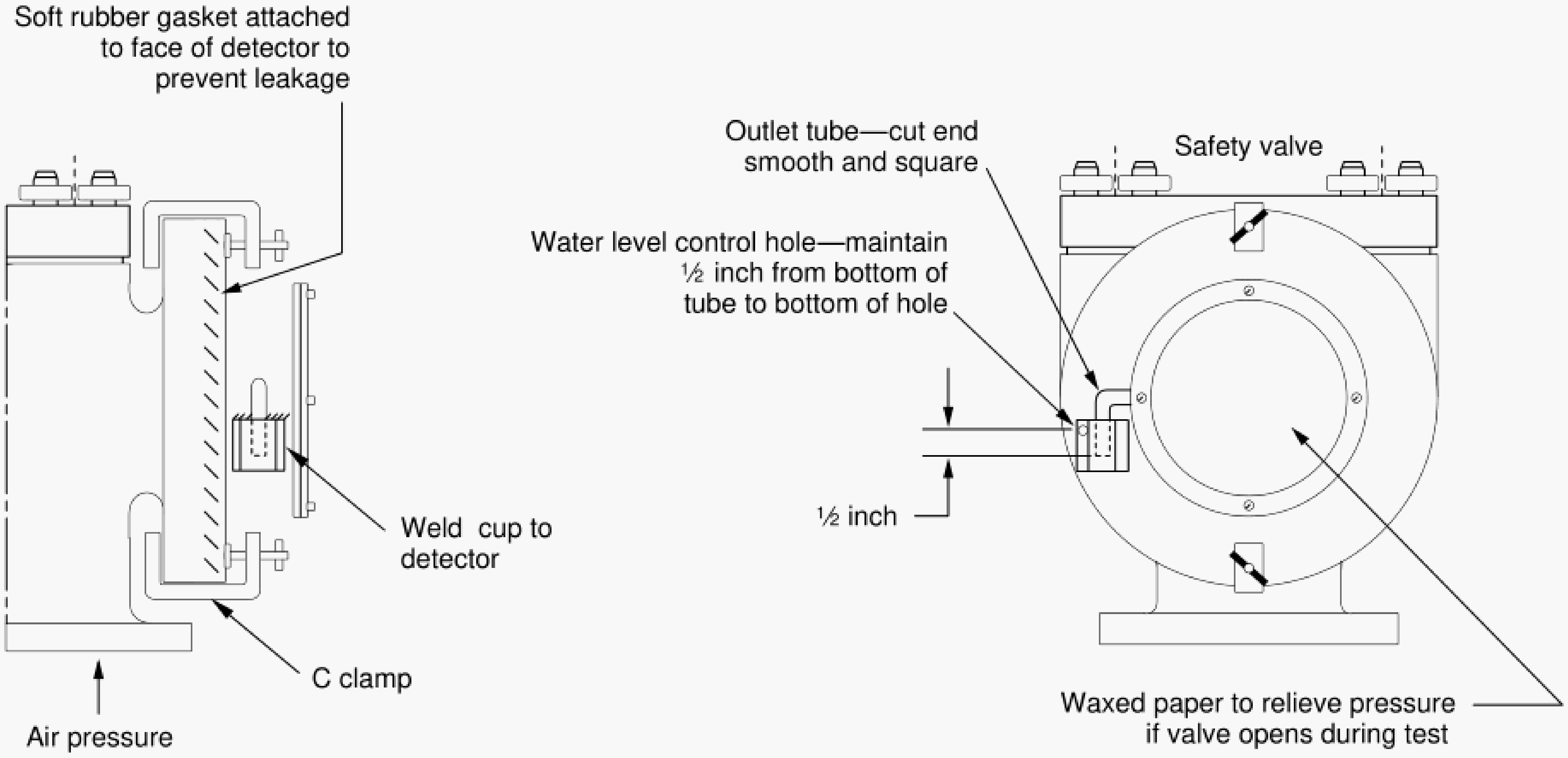
The differential between operating and set pressures provides seat loading to keep the pressure relief valve tightly closed. Due to a variety of service conditions and valve designs, only general guidelines can be given for designing a system. NB-23 and Sections VI and VII of the ASME Code are useful references. However, individual applications and experience must ultimately be relied on. Although greater differentials between operating and set pressures promote trouble-free

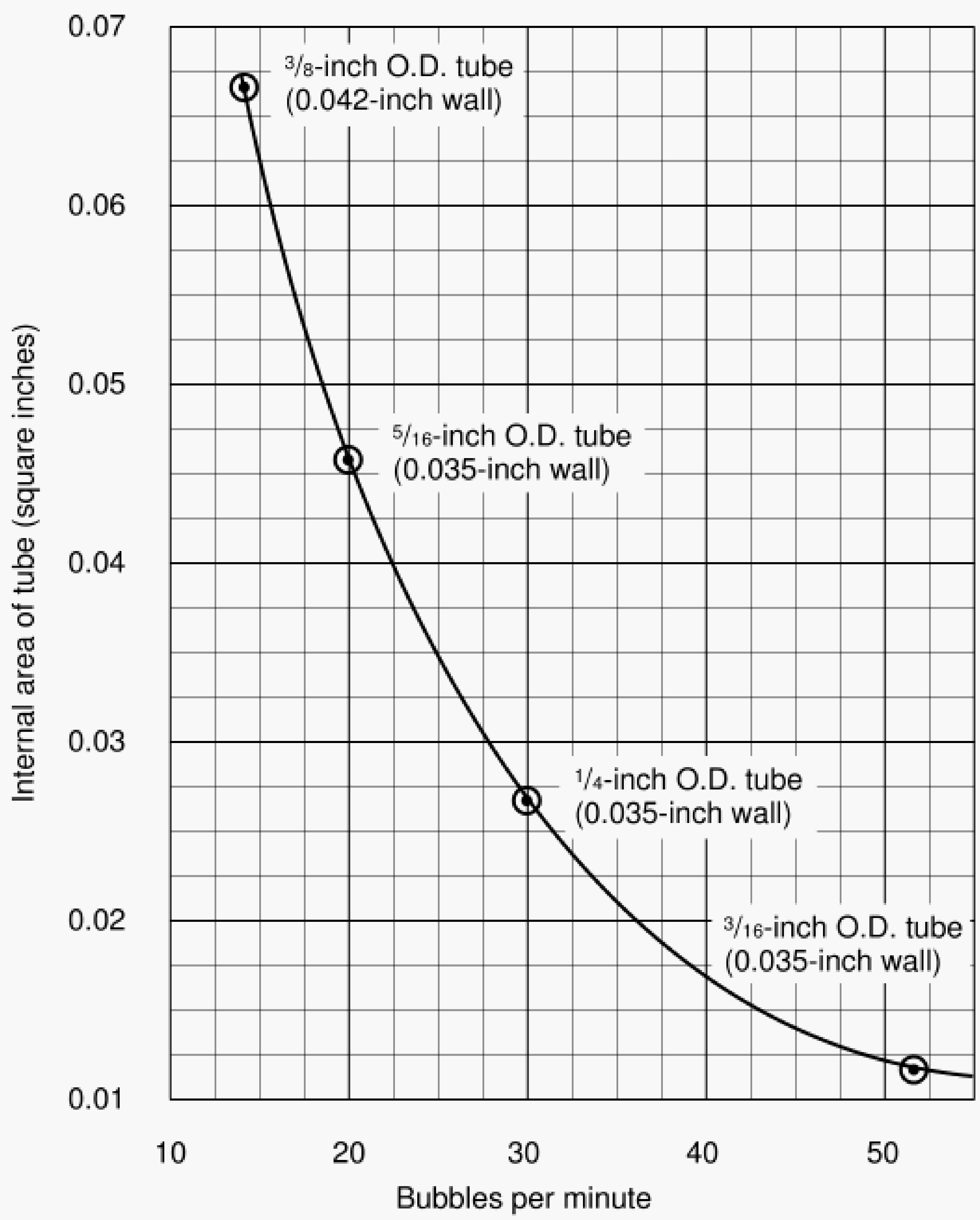


Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

Figure 40—Safety-Valve and Relief-Valve Leak Detector

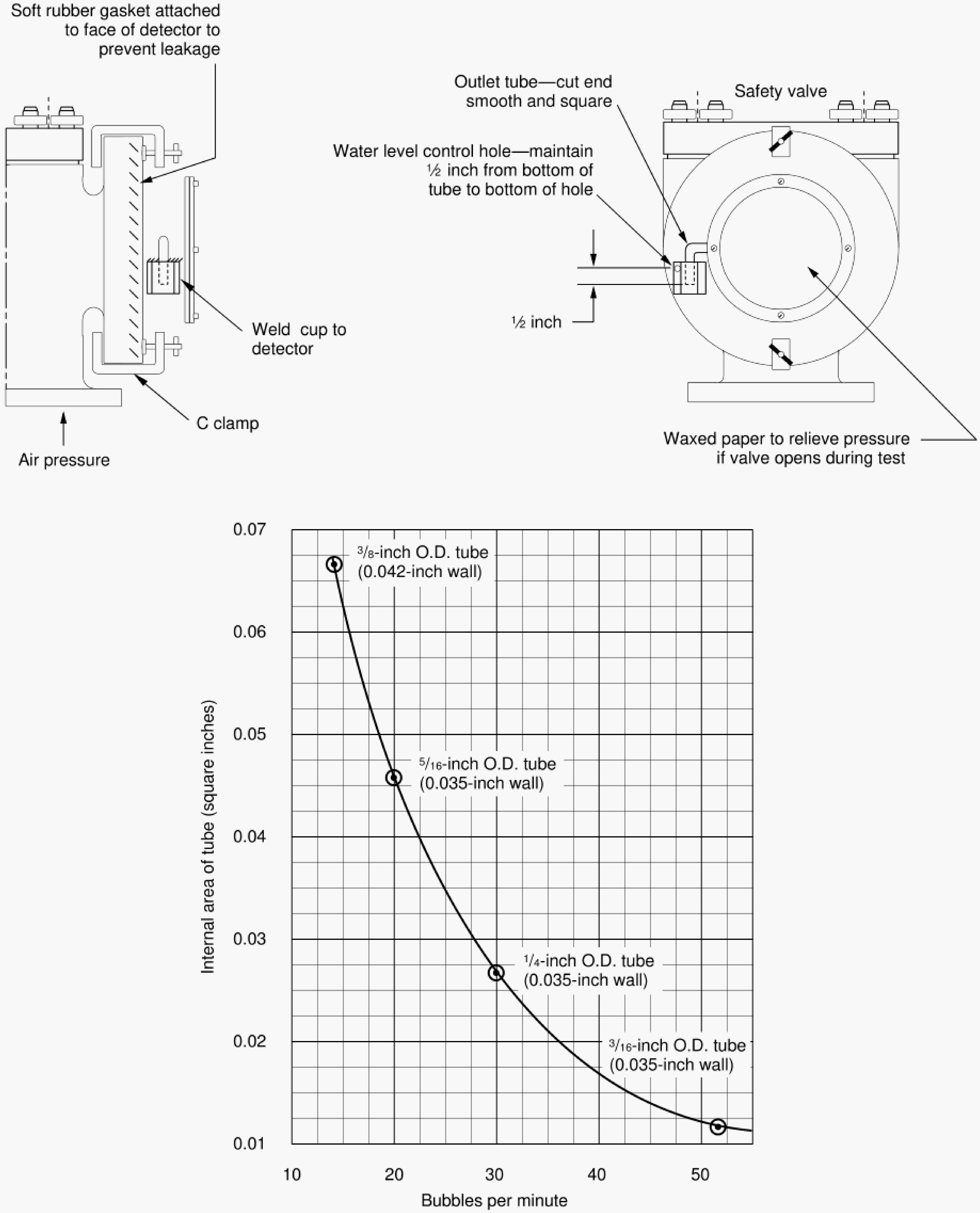




Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

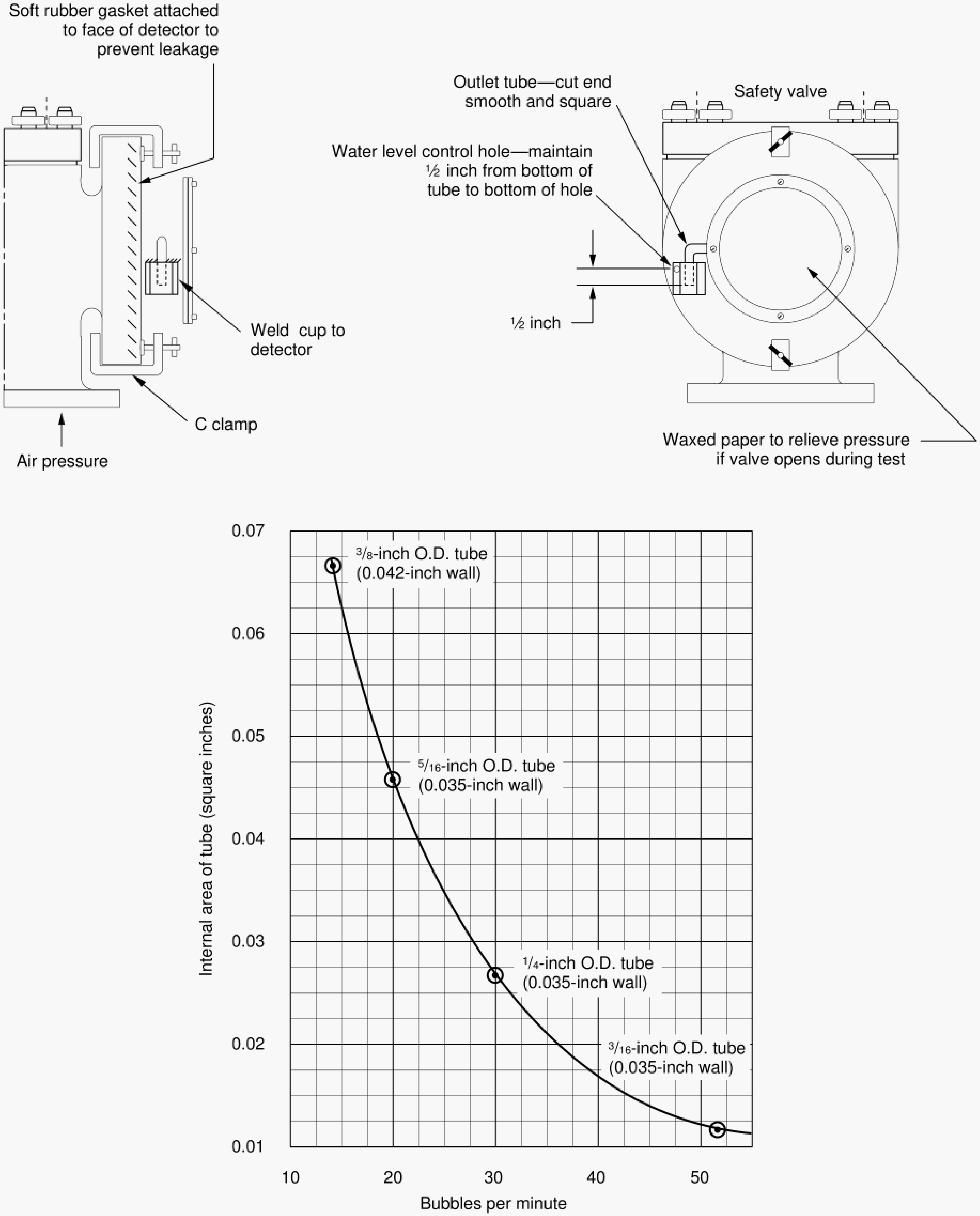
Figure 40—Safety-Valve and Relief-Valve Leak Detector



Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

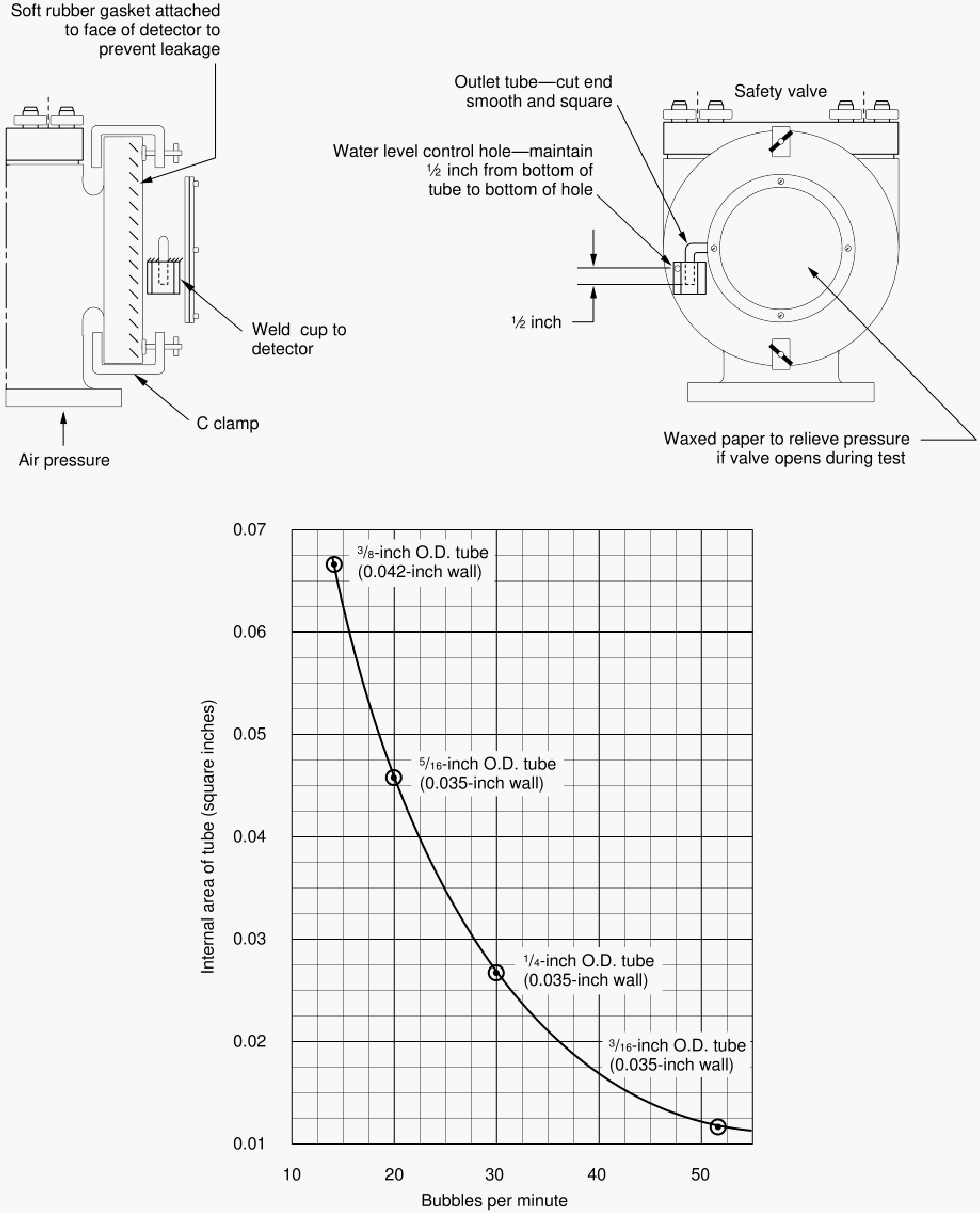
Figure 40—Safety-Valve and Relief-Valve Leak Detector



Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

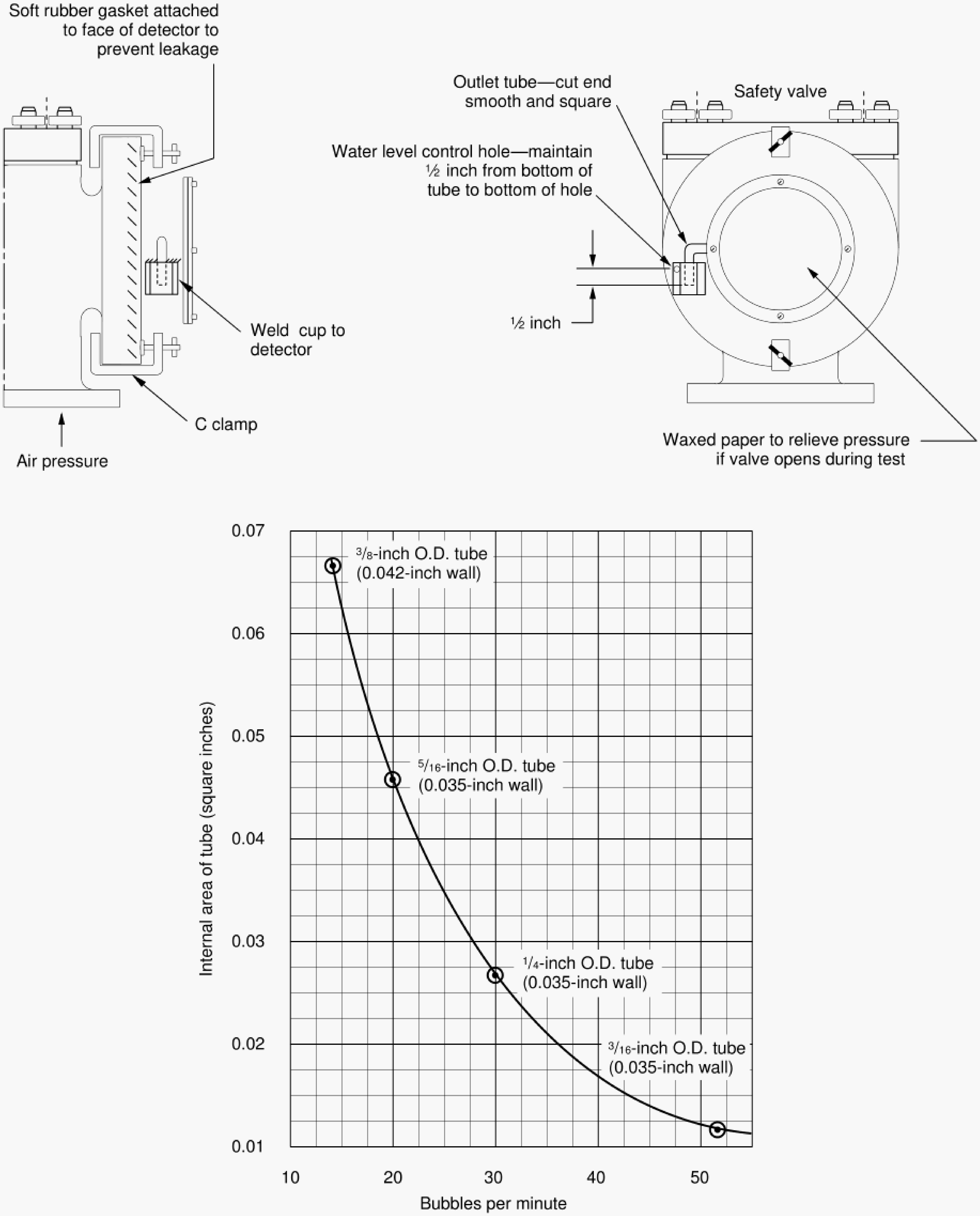
Figure 40—Safety-Valve and Relief-Valve Leak Detector



Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

Figure 40—Safety-Valve and Relief-Valve Leak Detector



Leakage rates corresponding to 0.3 cubic feet in 24 hours

Note: When using this detector, all other valve outlets must be closed. Leakage should be sought at 90% of the set pressure. Bubbles should be counted after they appear at uniform rate.

Figure 40—Safety-Valve and Relief-Valve Leak Detector

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________ Remarks ____________________________________

Body and bonnet material ____________________ ____________________________________

Nozzle and disk material _____________________ ____________________________________

Trim material ______________________________ ____________________________________

Spring material: ❍ Carbon steel ❍ Alloy ____________________________________

Spring no. __________________________________ ____________________________________

Flange sizes ____________________________________

Inlet _____________ Outlet _______________ ____________________________________

Orifice ______________ Back pressure ________ ____________________________________

Spring set pressure __________________________ ____________________________________

Relieving pressure ___________________________ ____________________________________

Normal operating temperature _______________ Maintenance engineer s phone no. ______________

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________ Remarks ___________________________________

Body and bonnet material ____________________ ___________________________________

Nozzle and disk material _____________________ ___________________________________

Trim material ____________________________ ___________________________________

Spring material: ❍ Carbon steel ❍ Alloy ___________________________________

Spring no. _______________________________ ___________________________________

Flange sizes ___________________________________

Inlet _____________ Outlet _______________ ___________________________________

Orifice ______________ Back pressure ________ ___________________________________

Spring set pressure __________________________ ___________________________________

Relieving pressure __________________________ ___________________________________

Normal operating temperature ________________ Maintenance engineer s phone no. ______________

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________	Remarks ___________________________________
Body and bonnet material ____________________	____
Nozzle and disk material _____________________	____
Trim material ____________________________	____
Spring material: ❍ Carbon steel ❍ Alloy	____
Spring no. _________________________________	____
Flange sizes	____
Inlet _____________ Outlet _______________	____
Orifice ______________ Back pressure ________	____
Spring set pressure __________________________	____
Relieving pressure __________________________	____
Normal operating temperature ________________	Maintenance engineer s phone no. ______________

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________ Remarks ________________________________

Body and bonnet material ____________________ ________________________________

Nozzle and disk material ______________________ ________________________________

Trim material ______________________________ ________________________________

Spring material: ❍ Carbon steel ❍ Alloy ________________________________

Spring no. __________________________________ ________________________________

Flange sizes ________________________________

Inlet _____________ Outlet _______________ ________________________________

Orifice ______________ Back pressure ________ ________________________________

Spring set pressure __________________________ ________________________________

Relieving pressure __________________________ ________________________________

Normal operating temperature ________________ Maintenance engineer s phone no. ______________

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________ Remarks ____________________________________

Body and bonnet material ____________________ ____

Nozzle and disk material ______________________ ____

Trim material ______________________________ ____

Spring material: ❍ Carbon steel ❍ Alloy ____

Spring no. __________________________________ ____

Flange sizes ____

Inlet _____________ Outlet _______________ ____

Orifice ______________ Back pressure ________ ____

Spring set pressure __________________________ ____

Relieving pressure __________________________ ____

Normal operating temperature ________________ Maintenance engineer s phone no. ______________

APPENDIX A—SAMPLE RECORD AND REPORT FORMS

The specification record for a pressure-relieving device shows a typical permanent card-form record for specifying a pressure relief valve. Its card form provides convenience in handling, filing, and reviewing. This record holds the basic information needed to properly repair or replace the valve.

The historical record for a pressure-relieving device shows a typical permanent card-form service record that holds the dates and results of periodic inspections and tests. The information recorded will form a basis for determining test intervals and design changes.

In the record and report program illustrated here, the engineering-inspection group maintains the records and periodically informs the operations group responsible for operating the pressure relief valves of the due dates of any work to be done. A report such as that shown in the inspection and repair work order and report for pressure-relieving devices (with sample data) is a simple and effective means for initiating inspection, testing and repair work. Its return to the engineering-inspection group indicates that the operations group responsible for operating the pressure relief valves has taken action. The report should list all the pressure-relieving devices at a given unit to help minimize oversights and clerical work.

When a valve is sent to the shop for inspection, it is inspected and tested by the maintenance group in the "as received" condition. A report such as the testing report for a pressure-relieving device is filled out to document the results of this inspection and testing.

Inspection and testing of a device may lead to its setting and repair by the maintenance group. Orders and records such as the condition, repair, and setting record for a pressure-relieving device and the setting record and repair order for pressure-relieving devices should be filled out as appropriate.

At the shop, the valve may have a part replaced with a spare part by the maintenance group. In this case, a report is prepared indicating the replacement as well as other basic information on the condition, repair, and setting record for a pressure-relieving device form.

After a pressure relief valve has been returned to the process unit and installed by the operations group, the authority in the operations group responsible for writing the valve work orders should prepare a report such as the in-service report for a pressure-relieving device. This report is filled out to certify that the valve has been reinstalled in its proper location. The report is then sent to the engineering-inspection group. It serves as an independent check on earlier steps and as the final expected report on this particular inspection of the pressure-relieving device.

SPECIFICATION RECORD FOR A PRESSURE–RELIEVING DEVICE

Device No.	Unit	Location	Set Pressure	Test Interval

Make ______________ Style ________________ Remarks ___________________________________

Body and bonnet material ____________________ ___________________________________

Nozzle and disk material _____________________ ___________________________________

Trim material ______________________________ ___________________________________

Spring material: ❍ Carbon steel ❍ Alloy ___________________________________

Spring no. _________________________________ ___________________________________

Flange sizes ___________________________________

Inlet _____________ Outlet ______________ ___________________________________

Orifice ______________ Back pressure ________ ___________________________________

Spring set pressure __________________________ ___________________________________

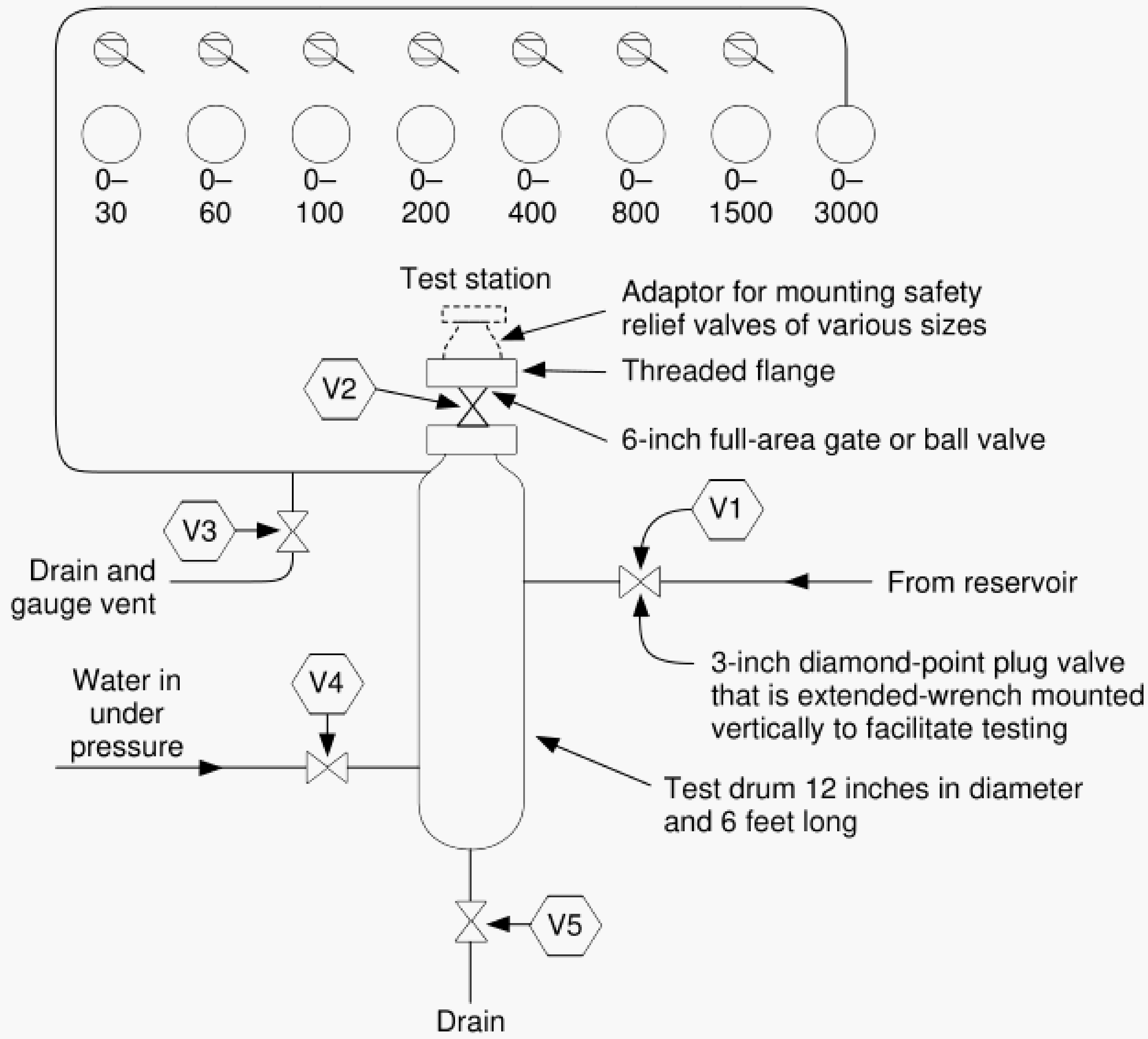
Relieving pressure __________________________ ___________________________________

Normal operating temperature ________________ Maintenance engineer s phone no. ______________

IN–SERVICE REPORT FOR A PRESSURE–RELIEVING DEVICE

Upon completion of this report, put it in the special envelope provided and send it to the engineering-inspection group.

Device no. ________________________________	Unit ______________________________________
Date tested ______________________________	Location ___________________________________
Date installed _____________________________	___________________________________

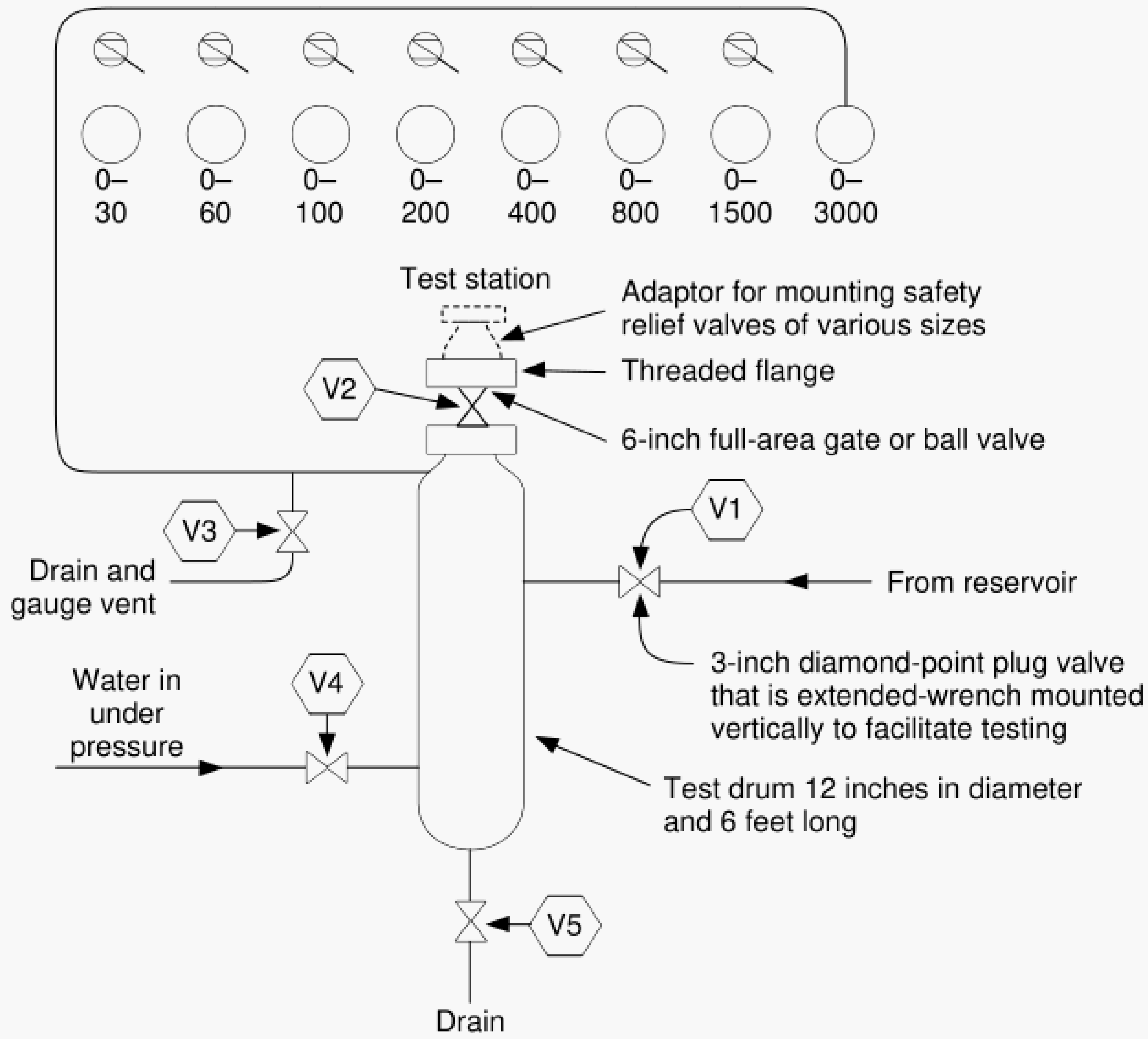


Notes on Construction:

1. This layout uses the available air supply at the highest pressure possible. If required, the pressure can be raised further by inserting water that is under pressure into the test drum until the desired pressure is reached.
2. A single test drum is shown. Duplicate stations for flanged valves can be added if desired. Another duplicate station with a smaller test drum is sometimes desirable for testing small valves with screwed connections.
3. Flanged valves are to be secured to test stations by bolting, clamping, or use of a pneumatic clamping device.
4. Line from reservoir to test drum is to be designed for minimum pressure drop to allow reservoir volume to hold up test drum pressure when needed.
5. Test drum pressure and piping are to be made of oxidation-resistant materials.

Notes on Operation:
1. When test station is not in use, valves V1, V2, V4, and V5 should be closed. Valve V3 should be opened to prevent possible buildup pressure in the test drum if valve V1 should leak.
2. Before testing the first valve, the test drum should be blown to remove any accumulation of dust or sediment that might blow through the safety relief valve and damage the seats. To blow the drum, close valve V3, open valve V2, and release air through the drum by opening and closing valve V1.
3. Close valve V2.
4. Secure safety relief valve to test station.
5. Open valve V2.
6. If safety-valve set pressure is lower than available air pressure, slowly increase pressure through valve V1 until safety relief valve pops. Then close valve V1. If safety-valve set pressure is higher than available air pressure, open valve V1 and fill test drum with maximum air pressure available. Then close valve V1. Open valve V4 and increase pressure by inserting water that is under pressure until safety relief valve opens. Then close valve V4 and drain water from drum by opening and closing valve V5.
7. If necessary, adjust valve spring so that safety relief valve opens at the required set pressure.
8. Vent test drum to 90% of the set pressure.
9. Test safety relief valve for leakage.
10. After satisfactory test, close valve V2.
11. Remove safety relief valve from test rack. Loosen bolts or clamps slowly to allow pressure in adapter and valve nozzle to escape.
12. Vent test drum through V3 to approximately 75% of the set pressure of the next valve to be tested. Repeat 4 through 11.
13. If another valve is not to be tested immediately, leave test station as specified in 1.

Figure B-1—Typical Safety-Valve and Relief-Valve Test Block Using Air as Test Medium



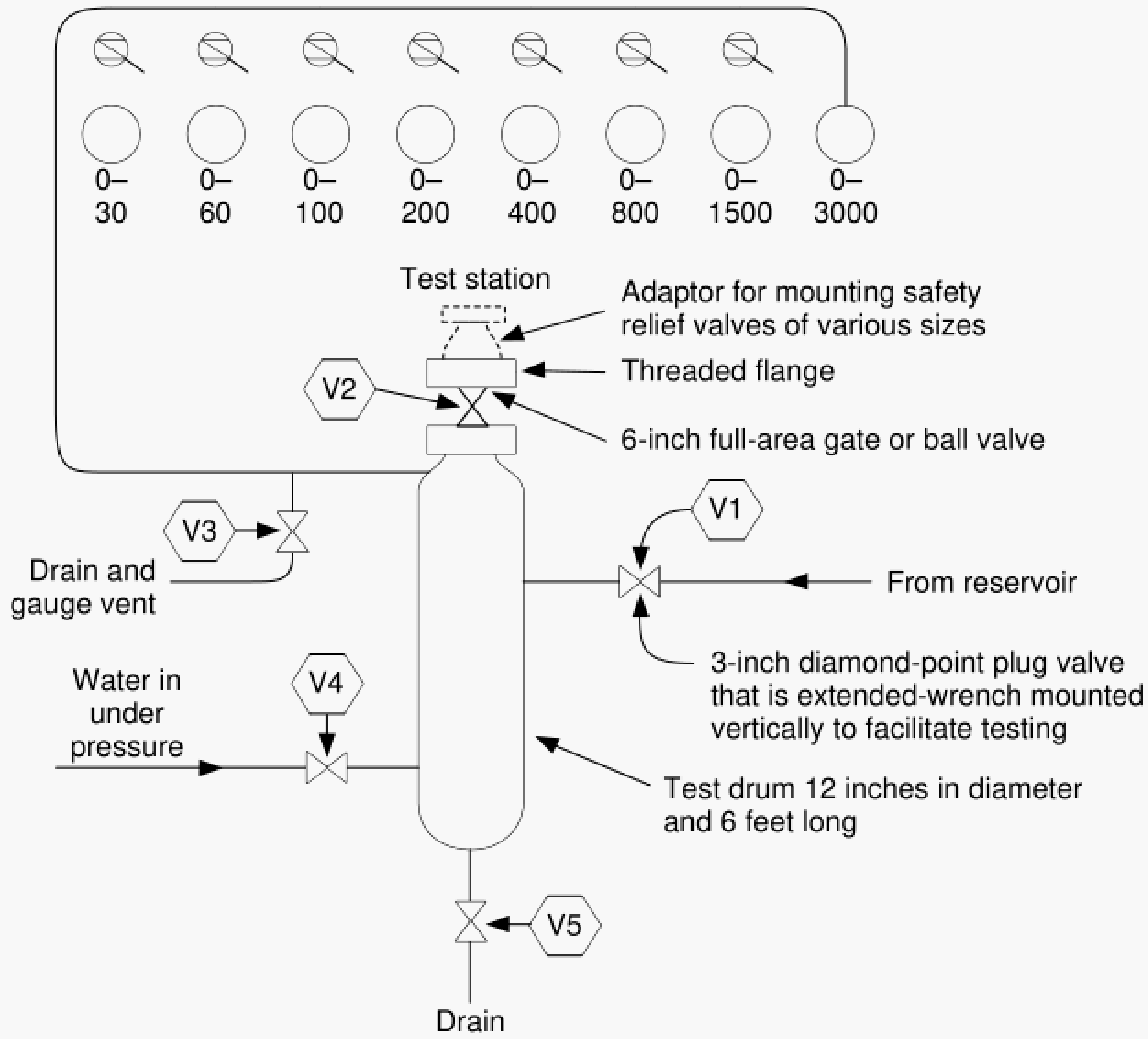
Notes on Construction:

1. This layout uses the available air supply at the highest pressure possible. If required, the pressure can be raised further by inserting water that is under pressure into the test drum until the desired pressure is reached.
2. A single test drum is shown. Duplicate stations for flanged valves can be added if desired. Another duplicate station with a smaller test drum is sometimes desirable for testing small valves with screwed connections.
3. Flanged valves are to be secured to test stations by bolting, clamping, or use of a pneumatic clamping device.
4. Line from reservoir to test drum is to be designed for minimum pressure drop to allow reservoir volume to hold up test drum pressure when needed.
5. Test drum pressure and piping are to be made of oxidation-resistant materials.

Notes on Operation:

1. When test station is not in use, valves V1, V2, V4, and V5 should be closed. Valve V3 should be opened to prevent possible buildup pressure in the test drum if valve V1 should leak.
2. Before testing the first valve, the test drum should be blown to remove any accumulation of dust or sediment that might blow through the safety relief valve and damage the seats. To blow the drum, close valve V3, open valve V2, and release air through the drum by opening and closing valve V1.
3. Close valve V2.
4. Secure safety relief valve to test station.
5. Open valve V2.
6. If safety-valve set pressure is lower than available air pressure, slowly increase pressure through valve V1 until safety relief valve pops. Then close valve V1. If safety-valve set pressure is higher than available air pressure, open valve V1 and fill test drum with maximum air pressure available. Then close valve V1. Open valve V4 and increase pressure by inserting water that is under pressure until safety relief valve opens. Then close valve V4 and drain water from drum by opening and closing valve V5.
7. If necessary, adjust valve spring so that safety relief valve opens at the required set pressure.
8. Vent test drum to 90% of the set pressure.
9. Test safety relief valve for leakage.
10. After satisfactory test, close valve V2.
11. Remove safety relief valve from test rack. Loosen bolts or clamps slowly to allow pressure in adapter and valve nozzle to escape.
12. Vent test drum through V3 to approximately 75% of the set pressure of the next valve to be tested. Repeat 4 through 11.
13. If another valve is not to be tested immediately, leave test station as specified in 1.

Figure B-1—Typical Safety-Valve and Relief-Valve Test Block Using Air as Test Medium



Notes on Construction:

1. This layout uses the available air supply at the highest pressure possible. If required, the pressure can be raised further by inserting water that is under pressure into the test drum until the desired pressure is reached.
2. A single test drum is shown. Duplicate stations for flanged valves can be added if desired. Another duplicate station with a smaller test drum is sometimes desirable for testing small valves with screwed connections.
3. Flanged valves are to be secured to test stations by bolting, clamping, or use of a pneumatic clamping device.
4. Line from reservoir to test drum is to be designed for minimum pressure drop to allow reservoir volume to hold up test drum pressure when needed.
5. Test drum pressure and piping are to be made of oxidation-resistant materials.

Notes on Operation:

1. When test station is not in use, valves V1, V2, V4, and V5 should be closed. Valve V3 should be opened to prevent possible buildup pressure in the test drum if valve V1 should leak.
2. Before testing the first valve, the test drum should be blown to remove any accumulation of dust or sediment that might blow through the safety relief valve and damage the seats. To blow the drum, close valve V3, open valve V2, and release air through the drum by opening and closing valve V1.
3. Close valve V2.
4. Secure safety relief valve to test station.
5. Open valve V2.
6. If safety-valve set pressure is lower than available air pressure, slowly increase pressure through valve V1 until safety relief valve pops. Then close valve V1. If safety-valve set pressure is higher than available air pressure, open valve V1 and fill test drum with maximum air pressure available. Then close valve V1. Open valve V4 and increase pressure by inserting water that is under pressure until safety relief valve opens. Then close valve V4 and drain water from drum by opening and closing valve V5.
7. If necessary, adjust valve spring so that safety relief valve opens at the required set pressure.
8. Vent test drum to 90% of the set pressure.
9. Test safety relief valve for leakage.
10. After satisfactory test, close valve V2.
11. Remove safety relief valve from test rack. Loosen bolts or clamps slowly to allow pressure in adapter and valve nozzle to escape.
12. Vent test drum through V3 to approximately 75% of the set pressure of the next valve to be tested. Repeat 4 through 11.
13. If another valve is not to be tested immediately, leave test station as specified in 1.

Figure B-1—Typical Safety-Valve and Relief-Valve Test Block Using Air as Test Medium

Additional copies available from API Publications and Distribution:
(202) 682-8375

Information about API Publications, Programs and Services is available on the World Wide Web at: http://www.api.org

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005-4070
202-682-8000

Order No. C57602