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TECHNICAL SERVICE REPORT NO. 50.78
RECOMMENDATIONS FOR THE STORAGE AND HANDLING OF 60 ° Be', 66 ° 'Be and 98% COMMERCIAL SULFURIC ACID

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TABLE OF CONTENTS

IN THE EVENT OF AN EMERGENCY WITH THIS PRODUCT, CALL THE 24-HOUR GENERAL CHEMICAL EMERGENCY TELEPHONE NUMBER: 800-631-8050.

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TABLE OF DRAWINGS (Enclosure)

DANGER! Sulfuric Acid is a very strong acid which can severely burn skin and eyes and may be fatal if swallowed. Its fumes can also be dangerous to skin, eyes and respiratory system. Release to the environment may cause damage to plant, animal and human life and may be in violation of governmental regulations. Before handling oleum, read and follow important safety procedures presented on pages 12-13.

In the event of an emergency with this product, call the 24-hour General Chemical emergency telephone number: (800) 631-8050

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INTRODUCTION

Sulfuric acid, the largest tonnage product of the chemical industry, is one of the most important commodities in the industrial world. It is used, either directly or indirectly, in nearly all industrial processes. General Chemical has strategically located sulfuric acid shipping locations throughout much of the United States.

The enclosed data cover the recommended equipment and procedures for the storage and handling of 60° Be', 66° Be' and 98% sulfuric acid delivered in tank cars and tank transports.

Sulfuric acid produces severe burns on contact with the skin and eyes. Inhalation of concentrated vapors or mist from hot acid may be hazardous to the lungs. Swallowing the acid may cause severe injury or death.

As a liquid pollutant, sulfuric acid is detrimental to the environment including potable supplies and other bodies of water. All spills are hazardous and should be given immediate attention.

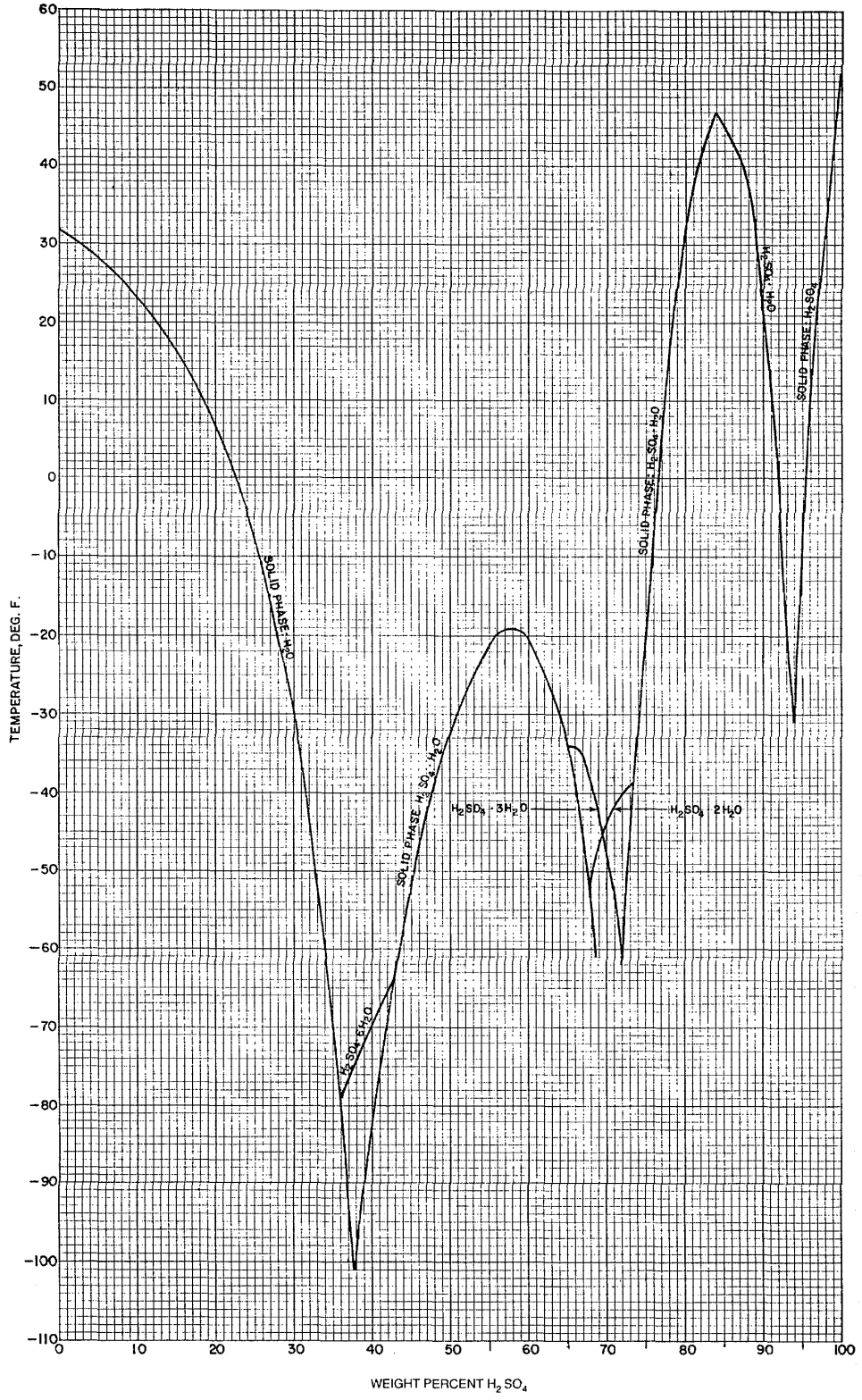
Our Technical Service Department is prepared to furnish more specific recommendations as required. Contact your nearest General Chemical Sales Office, General Chemical Manufacturing Location, or Customer Service for assistance.

PROPERTIES

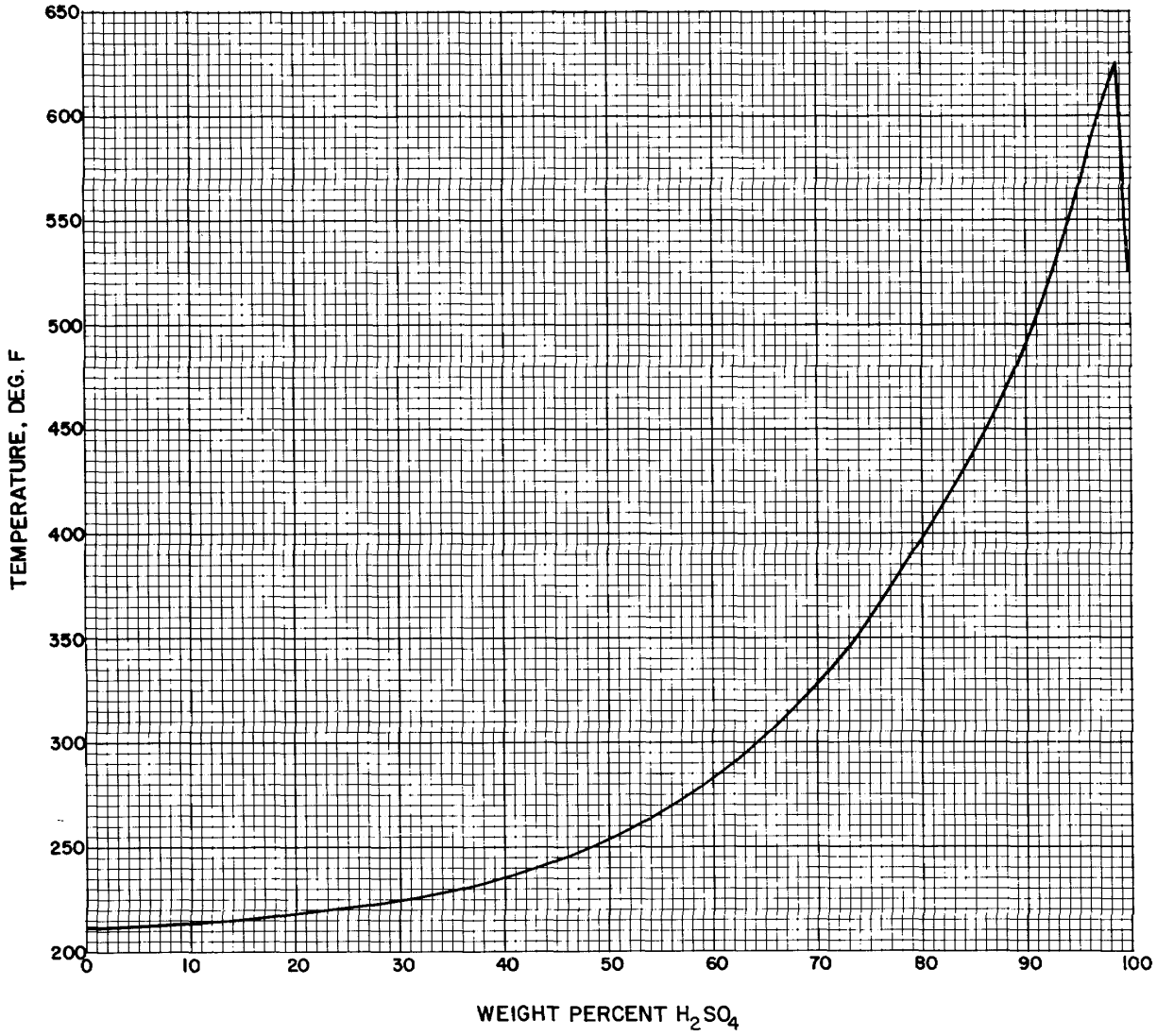
Commercial sulfuric acid is an oily, corrosive liquid, ranging in color from colorless to slightly yellow and in turbidity from clear to turbid. The chemical has the following physical properties:

	60° Be'	66° Be'	98%
Percent H_2SO_4	77.67	93.19	98.0
Specific Gravity 15.6°/15.6 ° C	1.706	1.835	1.844
Density, Pounds per Gallon	14.2	15.3	15.4
Density, Kilograms per Liter	1.70	1.83	1.84
Viscosity, (cps) 32°F	36	45	50
70°F	17	22	24
Viscosity, (Pa s) 0°C	0.036	0.045	0.050
21°C	0.017	0.022	0 024
Boiling Point °F	379.5	535.0	621.0
°C	193.0	279	327.2
Freezing Point °F	11.5	21.0	30 0
°C	11 4	29 4	1.1

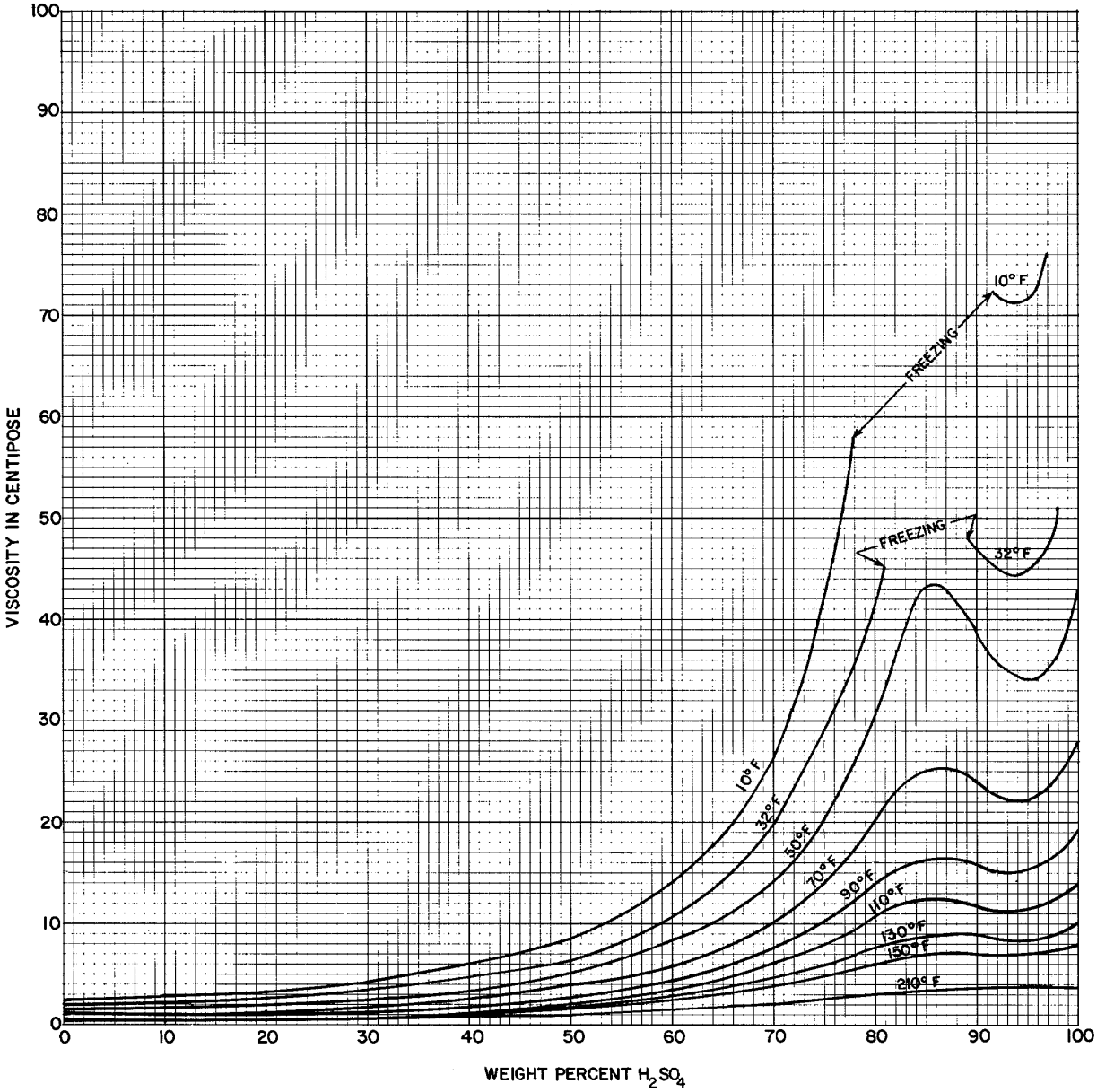
FREEZING POINTS, SULFUR TRIOXIDE-WATER SYSTEM



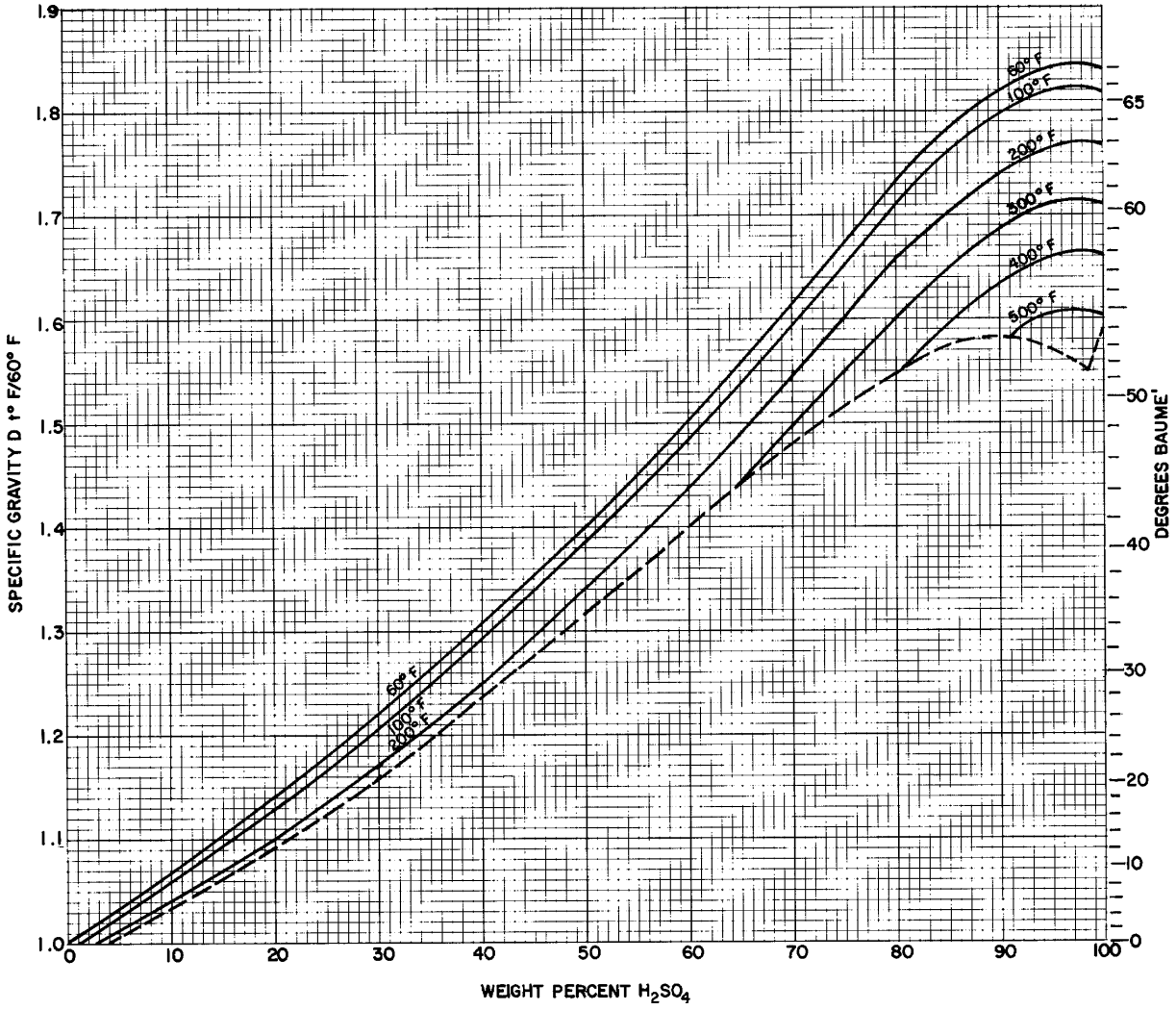
NORMAL BOILING POINTS, SULFURIC ACID-WATER SYSTEM



VISCOSITY, SULFURIC ACID-WATER SYSTEM



SPECIFIC GRAVITY, SULFURIC ACID-WATER SYSTEM

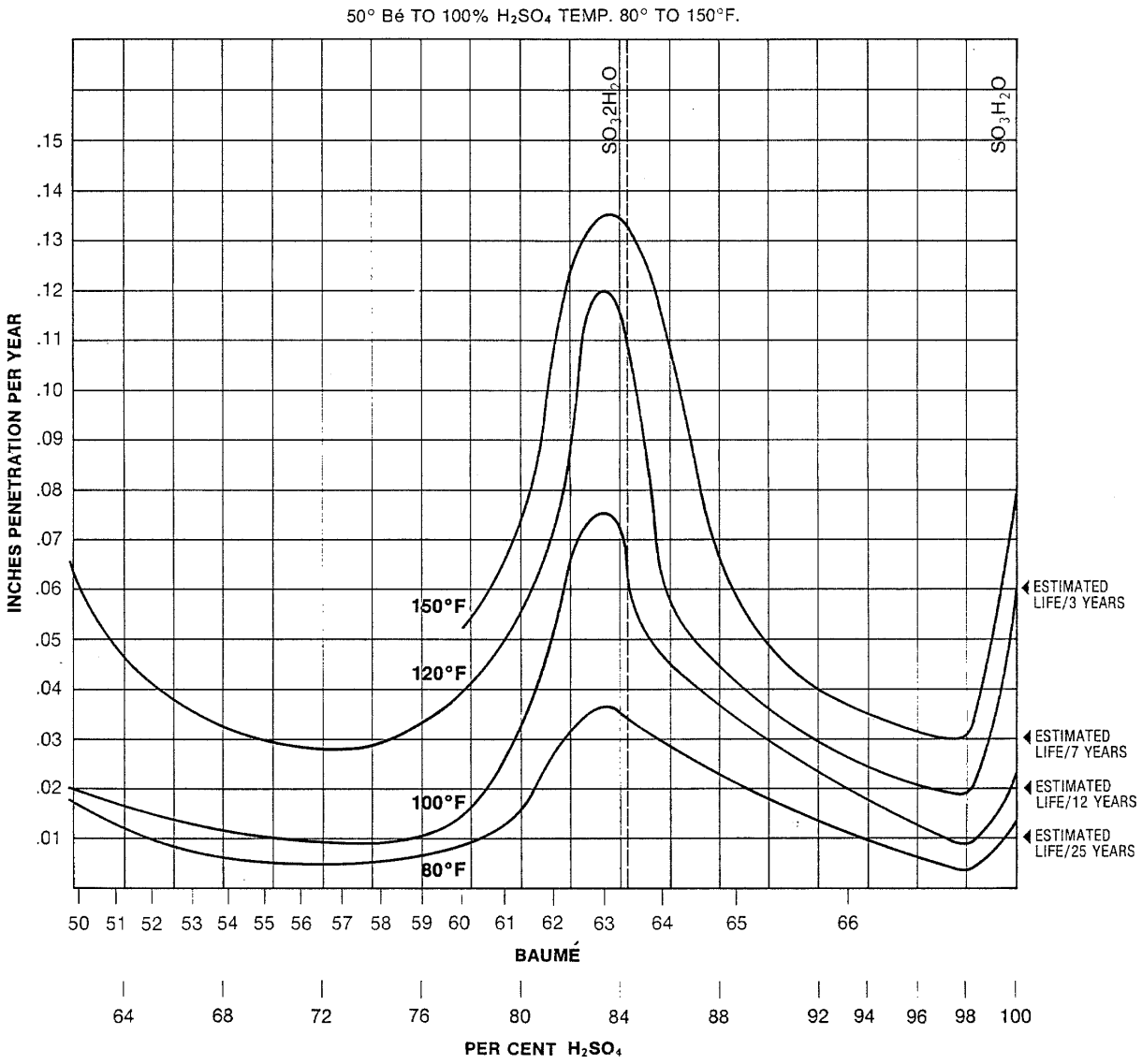


FLANGE QUALITY
SPECIFICATIONS

CARBON .....0.25% MAX.
MANGANESE 0.30-.60%
PHOSPHORUS ....0.05% MAX.
SULFUR .....0.05% MAX.

STEEL CORROSION BY SULFURIC ACID

50° Bé TO 100% H_2SO_4 TEMP. 80° TO 150°F.



SHIPMENTS

Tank Cars

Commercial sulfuric acid is delivered in tank cars of steel construction having up to 13,300 gallon (50.3 m^3) capacity. Storage tanks for tank car delivery should be sized one and one half times the size of the proposed deliveries or have the capacity for a minimum of ten (10) days' requirements, whichever is greater

The acid and air connections for unloading tank cars are 2 inch, capped, threaded connections located on the dome at the center of the car. The connections for unloading tank cars are shown on Drawing No. 50.78-1. A suitable unloading platform and removable bridge must be available at the customer's site to provide access to the dome connections and to insure a safe operation.

Hoses for unloading should be of reinforced construction with a liner of TFE plastic and should have a pressure rating corresponding to or greater than, the working pressure of the storage system. Alternately, reinforced Hypalon hose is satisfactory for unloading 66° Be' and weaker strengths of sulfuric acid. Periodic checks and pressure testing of the hoses are recommended to insure they are maintained in a safe operating condition. Hoses should be valved where attached to the permanent unloading piping and terminate with a 2 inch female threaded connection.

Sulfuric acid cars are unloaded using clean, dry compressed air. In order to unload a car in a reasonable time, an air compressor with a flow of approximately 1015 cfm (0.0047 0.0071 m^3/s) should be available. The pressure for unloading must not exceed 30 psig (207 kPa).

Once the car has been properly spotted with the necessary warning signs and flags displayed and the derails in place, the unloading connections can be made. First, vent the car by loosening very slowly the entire vent device or air inlet cap to relieve internal pressure. Care is necessary since the tank car may be under pressure, particularly during hot weather. Pressure buildup may be caused by the generation of flammable hydrogen gas and/or SO_2 and SO_3 fumes. **(SEE SAFETY PRECAUTIONS.)** If this pressure is not released gradually, there is danger from acid spray being carried out with the escaping air. Then, remove this device from the top of the pipe nipple, insert a tee and replace the safety vent. Remove the pipe cap from the top of the acid discharge pipe and make the connection from the pipe on the car to the acid piping. A chemical hose designed for H_2SO_4 service must be used for this acid discharge connection. Next, make up the connection from the plant air line to the tee on the safety vent as shown in Drawing No. 50.78-1.

Where Sulfuric acid is subject to freezing in transit, the product should be shipped in cars equipped with steam coils. If necessary to thaw frozen sulfuric acid, apply 15 psig (100 kPa) steam pressure to these coils until the product is completely thawed. Do not overheat.

Apply air pressure slowly until there is normal acid flow into the storage tank, then adjust air pressure to maintain a constant flow until the tank car is completely empty.

When the car is empty, shut off the air, open the air release valve on the air line and allow the acid pipe to drain to the storage tank and/or back to the tank car. Allow the car pressure to come to atmospheric. Disconnect the plant air fittings from the tee on the car and leave the tee open.

The unloading line can then be disconnected and the acid discharge cap and safety vent replaced. All tools and equipment should be thoroughly washed, neutralized and stored for future use. Any drips from the unloading connections should be neutralized as outlined in the "Spill and Vapor Control" section. The dome area and platform should be thoroughly washed with water following the unloading of the car.

Tank Transports

Sulfuric acid is delivered in steel tank transports of up to 3,000 gallon (11.4 m^3) capacity depending on individual state road weight allowances. Storage tanks for tank transport delivery should have a minimum capacity of 5,000 gallons (18.9 m^3) or have the capacity for a minimum of ten (10) days' requirements, whichever is greater.

The transports are equipped with unloading hoses, which terminate with a 2 inch, 150 lb. flange, protected with a blind flange. The customer's connection should be a corresponding 2 inch, 150 lb. flanged valve with a blind flange located in a horizontal line approximately 48 inches (1.22 m) above grade and within 8 feet (2.4 m) of the center line of the transport when positioned for unloading.

It is the normal procedure for the driver, dressed with full protective clothing and who has been specifically trained to unload the transport, to make the necessary liquid and pressure connections to unload, using the self-contained air compressor on the transport. Sulfuric acid receiving pipelines must be clearly marked to preclude the possibility of delivery of the acid into the wrong storage tank with potentially disastrous results. Pressure for unloading the transport must not exceed 30 psig (207 kPa). Details are shown on Drawing No. 50.78-1. It is recommended that the customer have one of their personnel present to assist the driver during the unloading should the need arise. Assisting personnel should be clothed as outlined in the "Safety Clothing and Equipment" section.

STORAGE CONSIDERATIONS

Gravity Systems

Sulfuric acid should be stored in an atmospheric or non pressurized system. Under these conditions, an elevated storage tank with gravity flow to process is the safest and from an operations and maintenance standpoint will eventually provide the most economical and trouble free installation.

Pump Systems

Where gravity flow cannot be utilized, a pump specifically recommended for sulfuric acid service can be used. Pumps in this service are subject to considerable maintenance, and their use should be avoided if possible.

Pressurized Systems

The pressurizing of a sulfuric acid storage tank to transfer the acid is not recommended because of the safety hazards involved should a leak occur.

Storage Tanks

The storage tank should be sized as previously outlined and should be provided with an access manhole and nozzles as shown on Drawing Nos. 50.78-4 and 5.

Sulfuric acid storage tanks should be designed for atmospheric pressure The material of construction recommended is ASTM AS16 Grade 70 flange quality (copper bearing preferred) steel and all welded construction in accordance with Part UW of the latest edition of the ASME Code for Unfired Pressure Vessels but not code stamped. Other suitable alloys may be substituted. Plastic tanks are NOT recommended as they are more subject to rupture than steel tanks.

Horizontal cylindrical tanks with dished heads are usually used for capacities up to 14,000 gallons (53 m^3). (Drawing No. 50.78-4) Larger tanks are generally of the vertical cylindrical type with a flat bottom and conical or spherical roof. (Drawing No. 50.78-5)

Bottom discharge storage tanks should have the outlet provided with an internal plug valve porcelain plug and seat with operating mechanism. (Drawing No. 50.78-6) This equipment is available from Kingsport Foundry and Manufacturing Corporation, East Sullivan and Main Streets, Kingsport, TN 37662. Use mechanism No. 50.78-6A. The internal plug valve is recommended as a means of stopping flow from the tank in the event of a leak in the system anywhere downstream of the bottom discharge nozzle. Where this valve must be precluded for cogent reason, then a suitable valve should be mounted directly on the exit of the bottom discharge nozzle. (See Drawing Nos. 50.78-4A or 50.78-5A as appropriate.) Bear in mind that elimination of the internal plug valve affords no means of stopping leaks in the bottom discharge nozzle or from its contiguous valve.

The internal surface of the tank becomes coated by the formation of an iron sulfate film, which slows corrosion. This film is self forming. Because sulfuric acid is hydroscopic, atmospheric moisture entering the tank through the vent will combine with the acid. Since certain dilute concentrations of sulfuric acid are highly corrosive, higher corrosion rates on the steel surfaces may then occur. This leads to a higher rate of iron sulfate formation than if the acid remained at the original concentration. A buildup of iron sulfate sludge, therefore, may be experienced where acid usage and flow rates are low, leading to the plugging of valves and piping. In such instances, use of lined tanks as outlined on page 6 and polypropylene lined steel piping is desirable to reduce formation of iron sulfate and subsequent line plugging difficulties.

It is essential that a sulfuric acid tank be vented since, while the film is forming, considerable hydrogen gas is evolved. **(SEE SAFETY PRECAUTIONS.)** Acid remaining idle in a storage tank for an extended period should be recirculated (where pump systems are used) approximately every ten (10) days to prevent weak acid accumulation on the surface, which results in serious grooving and cutting of the tank at the acid surface.

The storage tank must be air purged to remove flammable hydrogen gas before making external repairs to the tank. This may be accomplished, after the manholes have been opened, by forced air ventilation from a blower or compressor prior to and during the welding operation. An explosimeter should be used to monitor the exiting air before and during welding to ensure vapors are below combustible limits. Repairs of this sort should be performed on the tank when empty to reduce the hydrogen hazard further. If repairs must be performed on a partially full tank, the level must be well below the repair area as the heat from welding will greatly increase hydrogen generation from warm acid.

If internal repairs are to be made, the tank should be air purged, and the entire internal tank surface should be rinsed thoroughly with water and neutralized beforehand. (See Technical Service Report No. 57.80, "Recommendations for the Internal Cleaning of Sulfuric Acid Storage Tanks.")

When iron contamination cannot be tolerated, the tank should be lined with a baked phenolic lining 0.006 to 0.008 inches (0.15 to 0.20 mm) thick. The lining is applied by Heresite Sackaphen, Inc., 882 14th Street, P. 0. Box 249, Manitowoc, WI 54220, the Lithcote Company, 111 West Jackson, Chicago, IL 60604, SocCo Plastic Coating Company, 11251 Jersey Blvd., Cucamonga, CA 91730, and others.

Because of the higher freezing point and viscosity of 98% sulfuric acid, storage tanks in this service should be either located in a heated area or fitted with external heating coils. Steam or electric tracing should be used for piping. Steam tracers should be generally turned off and only used when required, as overheating causes a rapid increase in the rate of corrosion of acid on steel.

Thermostatically controlled electric heating cable tracing reduces the overheating problem associated with steam tracing.

Spill Protection

Good practice suggests that the storage tank should be provided with a retaining dike or other suitable secondary containment with a capacity of at least 110% of the capacity of the storage tank. Where the storage tank might be a part of a tank farm, the dike would normally be sized for at least 110% of the capacity of the largest tank in the tank farm. Governmental regulations may require different criteria than that which is described herein.

Diked areas are primarily intended for emergency containment of major leaks. The floor should be impervious and may have crushed limestone on top for neutralizing minor leaks should they occur. Suitable materials of construction would be concrete, concrete block, or similar materials, and could include polypropylene sheet linings or epoxy and polyester coatings. Provision should be made for removing any accumulated rainwater that is not dissipated through normal evaporation.

The diking should be constructed to permit prompt recovery by pumping directly into tank cars or transports, flushing the residue with copious quantities of water to suitable treatment facilities in order to minimize personnel safety problems. See "Spill and Vapor Control" section for additional recommendations.

Storage Tank Level Indicators

Various instruments and methods are available for measuring or gauging the amount of sulfuric acid in a storage tank. These would include manometer gauge, strain gauge load cells with a readout device, electronic sensors, visible TFE shielded sight gauges, or the tank can mounted on a tank scale. If a manometer gauge is used, it should be the pressure equalized type to prevent the acid or acid vapors from entering the gauge. Typical manufacturers of this gauge include the Uehling Instrument Company, 12 Vesper Street, Paterson, NJ 07503; Meriam Instrument, a Division of Scott & Fetter Company, 10920 Madison Avenue, Cleveland, OH 44102, Petrometer Corporation, 1807 Gilford Avenue, New Hyde Park, NY 11040; and others.

AUXILIARY FACILITIES

Pumps and Metering Equipment

Centrifugal transfer pumps with wetted parts of Alloy 20 stainless steel are suitable for this service. These pumps are subject to considerable maintenance, however, particularly at the shaft seals. Mechanical seals of Alloy 20 and TFE are recommended for sulfuric acid service. Alloy 20 stainless steel pumps are manufactured by The Duriron Company, Inc., North Findlay and Thomas Streets, Dayton, OH 45401; and others. Pumps of all polypropylene construction such as are manufactured by the Vanton Pump and Equipment Corporation, 201 Sweetland Avenue, Hillside, N] 07205, and others, may be satisfactory.

For continuous measurement, controlled volume pumps with all wetted parts of Alloy 20 and with Alloy 20 or TFE plastic diaphragms are recommended. These pumps must be protected by a filter system as specified by the manufacturer. Pump manufacturers include the Keystone Engineering Company, 6312 Sidney Street, Houston, TX 77021; Lapp Insulator, Gilbert and Mills Streets, LeRoy, NY 14482; and others.

Measuring tanks, with visible TFE shielded sight gauges or other means of measuring, constructed of steel and in accordance with the construction procedures for storage tanks, can be used for

measuring batch quantities of sulfuric acid. They should be sized accordingly and provided with adequate safety relief assemblies or vented back to the storage tank. The calibrated, sight gauge is obtainable from Jerguson Gage & Valve Company, 15 Adams Street, Burlington, MA 01803.

Plug Valves

Alloy 20 valves, 150 lb. MSS flanged and constructed with TFE sleeves, are obtainable from The Duriron Company, Inc., North Findlay and Thomas Streets, Dayton, OH 45401, Xomox Corporation, 4444 Cooper Road, Cincinnati, OH 45242, and others.

Ball Valves

Alloy 20 valves, 150 lb. MSS flanged, with TFE seats are obtainable from The Walworth Company, 1002 9th Avenue, King of Prussia, PA 19406, JacobyTarbox Corporation, 818 Nepperhan Avenue, Yonkers, NY 10703; and others.

Gate, Globe and Y Valves

Alloy 20 valves, 150 lb. MSS flanged, OS&Y with TFE packing, are obtainable from Hayward Industrial Products, Inc., 900 Fairmount Avenue, Elizabeth, NJ 07207, Rockwell International, 401 North Lexington Avenue, Pittsburgh, PA 15208, Jenkins Brothers, 510 Main Street, Bridgeport, CT 06601 and others.

Valves should always be installed with stems in an upright vertical or a horizontal position. Valves should never be installed with stems in a downward position if it can be avoided.

Piping

Recommended minimum piping includes Schedule 80 seamless steel with Schedule 80 seamless welding fittings and 150 lb. ASA minimum welding flanges for valve and nozzle connections. Screwed connections are not recommended in this service. Steel piping should be sized to maintain an approximate line velocity of <3 ft/s (1 m/s), and pipe bends should be utilized where possible in the place of elbows to insure long life and trouble free operation. High velocities will scour the protective sulfate film from the pipe surface. For very low flow rates, the following materials are recommended.

a) 60° Be' and 66° Be' Plastic lined steel (Polypropylene, PVDC, TFE), Schedule 40 Alloy 20 pipe for temperatures below 79 °C (175 °F).

b) 66° Be' Materials listed in (a) above and Schedule 40 Austenitic stainless steel for temperatures below 49 °C (120 °F).

c) 98% and 99.3% Materials listed in (a) above and Schedule 40 Austenitic stainless steel pipe for temperatures below 82 °C (180 °F)

Piping should never be buried. Where underground installations cannot be avoided, piping should be installed in a covered trench or encased in a PVC (polyvinyl chloride) conduit so that all leaks can be immediately detected. Trapped lines should be provided with blank flanged connections at the end of piping runs so lines can be drained if required. Acid lines should have sufficient pitch to drain completely for maintenance purposes.

To minimize corrosion, piping systems should be designed so they are full of acid at all times if possible. Sections of piping which are blocked with closed valves due to operating conditions

should be vented to the storage tank to prevent pressure buildup due to temperature or the formation of hydrogen, which is formed when handling sulfuric acid in steel piping. Vent piping may be Schedule 40 PVC.

Hose

Where flexible acid hose is required such as for tank car unloading, suitably reinforced TFE plastic may be used. Reinforced Hypalon is satisfactory for unloading of 66° Be' and weaker strength sulfuric acid. A typical supplier is Resistoflex Corporation, Woodland Road, Roseland, NJ 07068.

Gaskets

Gaskets for nozzle connections should be ring type, 1/16 or 1/8 inch (1.6 or 3.2 mm) thick, fabricated from TFE or CTFE plastic.

Painting

Exterior surfaces of all equipment and supports should be prepared by sandblasting or mechanical sanding and painted with a suitable light-colored PVC or epoxy base paint to reflect the rays of sun. Such paints are available from Valepar Corporation, 1401 Severn Street, Baltimore, MD 21230; Devoe Napco, 13531 South Choctaw, Baton Rouge, LA 70815, SherwinWilliams Company, 101 Prospect Avenue, NW, Cleveland, OH 44115, and others.

Electrical Equipment

All wiring should be 600 volt, Type TW, and should be installed in tight, rigid, thickwall conduit. In extremely corrosive areas, PVC conduit can be used if it is properly supported. Pump motors should be of TEFC or TE chemical type, and lighting fixtures, pump switches, starters, etc., should be vapor proof with NEMA-4 enclosures. Push buttons and starters should have provision for locking in the "OFF" position

SAFETY PRECAUTIONS

Sulfuric acid can be handled and used safely by following proper precautions based on known effects of the chemical on personnel and equipment.

Sulfuric acid is a very strong acid which can severely burn skin and eyes and may be fatal if swallowed. Fumes from sulfuric acid systems including SO_2, SO_3 and hydrogen are irritating and dangerous. They can injure the lungs and mucous membranes if inhaled. Sulfuric acid is not flammable, however, in higher concentrations it may cause ignition by contact with combustible materials. Sulfuric acid should also be isolated from organic materials and products such as nitrates, carbides, chlorates and metallic powders.

Safety Clothing and Equipment

The principal health hazard from sulfuric acid is through contact of the acid with body tissues, which can be severely burned, depending upon the length of contact and strength of acid. Adequate protection should be provided to persons working with sulfuric acid. The personal protective equipment required for handling sulfuric acid will vary with the degree of exposure for the particular application.

Full face shield, hard hats, goggles and protective gloves are usually required during routine operations which involve the handling of sulfuric acid. (Never wear contact lenses when handling sulfuric acid.)

Gloves should always be inspected prior to their use, and, if damage is suspected and not visible, they should be tested with air pressure. When worn with a protective jacket, the gauntlet part of the glove would normally be covered by the sleeve of the jacket. However, if work must be done overhead or if there is a possibility of acid being sprayed up the sleeve, it may be advantageous to have the sleeve of the jacket inside the gauntlet part of the glove to prevent the acid from getting into the sleeve. Special arm protectors or glove inserts can also be worn to prevent this from happening.

For full protection during tank car or transport unloading and during maintenance, each workman should be fully clothed. He should wear goggles under a full face shield, a hard hat, rubber safety boots, a rubber covered jacket and pants, and rubber gauntlet gloves. Tops of the boots should be covered by the trousers.

For emergency situations, a complete rubber suit and rubber hood, with rubber gauntlet gloves and rubber safety boots, are recommended. In situations where fumes or mist from sulfuric acid are present, a NIOSH approved respirator should be worn. Self-contained breathing equipment approved by NIOSH should always be on hand and is required to be worn when working in areas of reduced oxygen content such as when servicing empty sulfuric acid tanks.

Protective clothing should be washed and preferably neutralized after each use and checked to insure that it is free of pinholes and tears. The maintenance of all protective clothing and equipment should be a continuing operation to insure their ready availability for use in an emergency.

Neutralizing vats containing soda ash or other mildly alkaline solution should be available for the neutralizing of acid contaminated tools and other equipment.

Due to the weight and impervious nature of safety clothing, the potential for heat exhaustion exists. Provision should be made to rotate frequently personnel wearing such clothing, especially during warm weather.

FIRST AID

Bodily Contact

Contaminated clothing should be removed under the shower and the application of water should be continued for at least 15 minutes. If burns can still be felt, consult a physician. Do not use burn ointments or alkali's as they may hinder further treatment.

Eye Contact

If acid enters the eyes, they should be washed thoroughly with water for at least 15 minutes. Consult a physician at once. If a physician is not immediately available, it is advisable to continue the irrigation for another 15 minutes.

Ingestion

In case of ingestion and if the individual is conscious, have him drink large amounts of lime water or milk of magnesia. If these are not readily available, drink large amounts of water immediately to dilute the acid. Consult a physician at once. Do not give emetics or baking soda.

Inhalation

If exposed to mist or vapors arising from sulfuric acid, the individual should be removed at once to an uncontaminated area and a physician called. The individual should be kept under observation until the possibility of developing a delayed pulmonary reactions is no longer present. If oxygen inhalation apparatus is available, oxygen may be administered under the direction of a physician.

ENGINEERING DESIGN CONSIDERATIONS

Sulfuric acid storage and work areas should be adequately ventilated to reduce the possible hazard of exposure to fumes or accumulation of hydrogen gas.

If sulfuric acid containing equipment becomes engulfed by fire, use dry chemical or carbon dioxide extinguishing equipment to combat the fire. Cool containers exposed to fire with water, but do not get water into the acid.

When mixing sulfuric acid and water, always add acid slowly and cautiously to water with slow stirring to minimize spattering from localized heat of dilution.

Hydrogen gas may be formed from contact of sulfuric acid with many metals. For example, hydrogen is generated slowly in steel containers and piping. Since this gas is flammable and may be explosive, smoking, open lights, flames, welding, etc., should be strictly forbidden in areas where sulfuric acid is stored or used. Spark proof tools should be used in servicing metal equipment wetted with sulfuric acid and having a vapor space which may contain hydrogen. Venting of sulfuric acid containers is recommended to release pressure buildup. In sealed containers, venting is recommended weekly, taking care not to spray acid during pressure release. More frequent venting is required in warm locations.

Safety Showers and Eyewash Fountains

Continuous flow safety showers and eyewash fountains should be conveniently located and clearly marked. Their location and use should be known and understood by all personnel. Periodic inspections, preferably on a weekly basis, should be made to insure that they are in proper working order at all times. It is recommended they be equipped with both visible and audible alarms so that those in the areas are alerted when someone may need assistance. Water temperature should be approximately 27 °C (80 °F) to permit long periods of washing without adding to the victim's discomfort. Showers and eyewash fountains should meet the following criteria:

1 Water should be in the form of a quick acting safety shower, protected against freezing, and installed wherever sulfuric acid is handled.

2. Showers should provide deluge water rather than spray.

3. Eyewash fountains should also be provided.

4. The pathways to these water supplies should always be kept free and clear.

Spill and Vapor Control

Accidental spills of sulfuric acid and the resulting formation of potentially hazardous reaction products must be minimized. It is imperative that remedial action be taken immediately to reduce injury to personnel and damage to property. Environmental effects resulting in damage to plant and animal life can occur from releases of sulfuric acid. Every effort should be taken to prevent discharge of this chemical into the environment. Regulatory and/or disaster control agencies should be notified, as may be applicable, of significant releases into the environment. If there is a possibility that sulfuric acid eventually could find its way to a treatment facility, treatment personnel should be advised in advance.

Knowing what to do and being prepared to execute an emergency plan if there is a spill should be part of the job operation for anyone who is involved with handling this chemical.

Evacuation of the immediate area is required to the extent necessary to minimize personal injuries. Subsequent actions, such as closing shutoff valves or controls to stop a leak or approaching an area where a spill has occurred, should only be done by personnel who are familiar with the hazards and who are wearing the proper protective clothing and equipment.

Minor spills should be contained if possible, diluted with an excess of water, and neutralized with a lime slurry, limestone, soda ash or other alkaline material. Care must be taken when adding water or a neutralizer to a spill of sulfuric acid, as the chemical reaction will be immediate and can be quite violent. Fumes from the reaction can be extensive and, if not handled properly, will add to the severity of the situation. To minimize the reaction and fuming, the spill can be covered with earth, sprayed with water and neutralized. The resulting slurry or residue can be removed and transferred to an approved disposal site. Any remaining material can then be further neutralized and flushed with water in accordance with local regulations.

Major spills may be handled in a similar manner, however, special assistance and/or procedures may be required. In this case, evacuate the area, contain the spill or stop the leak if possible, and call the 24 hour GENTRECS (General Chemical emergency) telephone number: 800-631-8050. Advise them that you have a chemical emergency. General Chemical's emergency specialists will provide assistance and direction for the correct procedure to be followed in handling your particular situation.

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