Comité Technique Européen du Fluor (CTEF)

Working Group on Storage, Transport and Safety (STS)

Group 8

INTERVENTION HANDBOOK FOR TRAFFIC INCIDENTS WITH ANHYDROUS HYDROGEN FLUORIDE (AHF) AND HYDROFLUORIC ACID SOLUTIONS (HF)

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A sector group of Cefic

European Chemical Industry Council – Cefic aisbl
EU Transparency Register n° 64879142323-90

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Version 2018.04.10

PREFACE

Anhydrous hydrogen fluoride/ hydrofluoric acid (AHF/HF) is essential in the chemical industry and there is a need for HF to be produced, transported, stored and used.

The AHF/HF industry has a very good safety record; nevertheless, the European AHF/HF producers, acting within Eurofluor (previously CTEF) have drawn up this document to promote continuous improvement in the standards of safety associated with AHF/HF handling.

This Recommendation is based on the various measures taken by member companies of Eurofluor.

Each company, based on its individual decision-making process, may decide to apply the present recommendation partly or in full.

It is in no way intended to be a substitute for various national or international regulations, which must be respected in an integral manner.

It results from the understanding and many years of experience of AHF/HF producers in their respective countries at the date of issue of this particular document.

Established in good faith, this recommendation should not be used as a standard or a comprehensive specification, but rather as a guide, which should, in each particular case, be adapted and utilised in consultation with an AHF/HF manufacturer, supplier or user, or other expert in the field.

It has been assumed in the preparation of this publication that the user will ensure that the contents are relevant to the application selected and are correctly applied by appropriately qualified and experienced people for whose guidance it has been prepared.

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The contents of this recommendation are based on the most authoritative information available at the time of writing and on good engineering practice, but it is essential to take account of appropriate subsequent technical developments or legislative changes. It is the intent of Eurofluor that this guideline be periodically reviewed and updated to reflect developments in industry practices and evolution of technology. Users of this guideline are urged to use the most recent edition of it, and to consult with an AHF/HF manufacturer before implementing it in detail.

This edition of the document has been drawn up by the Working Group on "Storage, Transport and Safety" to whom all suggestions concerning possible revision should be addressed via the offices of Eurofluor. It must not be reproduced in whole or in part without the authorisation of Eurofluor or member companies.

AHF is an acronym for anhydrous hydrogen fluoride.

HF is an acronym for hydrofluoric acid solutions of any concentration below 100%.

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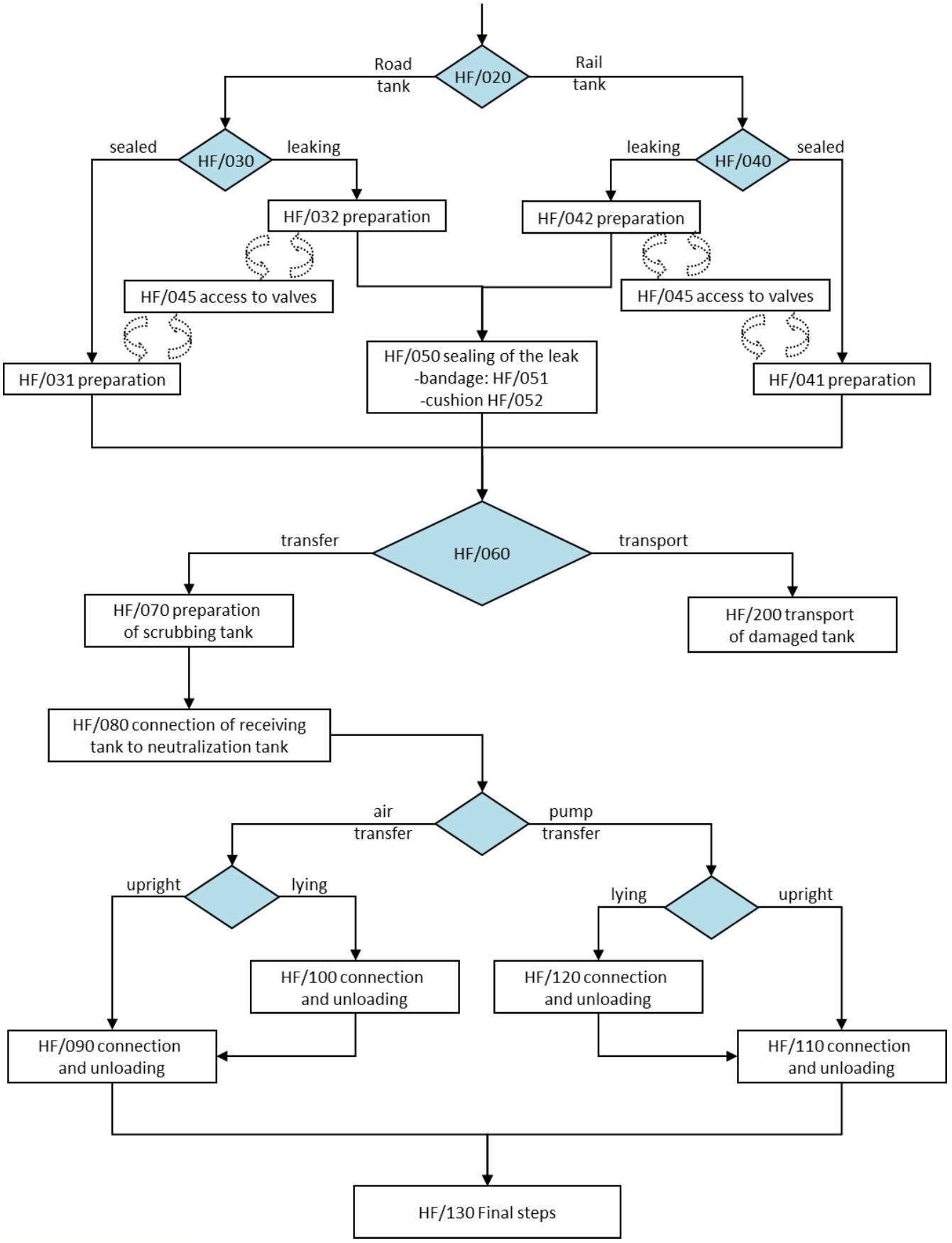


TMD/HF/000 Recommendation

This guideline has been developed by the Storage, Transport and Safety Group of Eurofluor (CTEF). It is intended to offer recommendations in case of traffic incidents involving anhydrous hydrogen fluoride (AHF) and hydrofluoric acid solutions (HF) at ambient temperatures (from -20°C to +50°C), unless stated otherwise.

All materials of construction, which are mentioned in this document should be double-checked and there should be a search for more information on materials, in our "Recommendation on materials of construction for Anhydrous Hydrogen Fluoride and Hydrofluoric Acid solutions" available from Eurofluor publication webpage www.eurofluor.org.

Whatever the accident scenario, decisions taken by local authorities should be based on discussions and the expertise that industry and authority experts can jointly contribute to ensuring the safest option for recovering the situation.

If the container used for the transport has been damaged, a risk assessment must be carried out to decide if the leak can be sealed at the scene or if the content must be transferred. Consider transporting the container to a plant equipped with suitable facilities for the operation proposed.

Before any action, a thorough risk assessment should be carried out in all circumstances and all valves should also be identified and labelled according to the sketches of this document:

1. Accident scenario with leak

If the leak is in the gaseous phase, it could be sealed by:

- setting a paste
- plugging the hole
- installing a sealing cushion

If the leak is in the liquid phase, and the risk assessment suggests it is safe to do so (taking account of all circumstances including the stability of the container), it may be possible to reposition the container such that any leak is the gaseous phase and therefore easier to deal with.

2. Transfer of the tank content

2.1. Intervention equipment

If the contained product must be transferred at the scene of the accident, it is compulsory that the suitable equipment should be available. In this handbook, an intervention equipment list is available according to the various types of accident scenarios.

2.2. Storage containers

The suitable transfer tank must be in steel or in stainless steel, and below 70%, must be lined with at least 6 mm of rubber (suitable for HF solutions). One will always use road tankers or rail tankers previously used for the same product. This road/rail receiving tanker should be authorized for AHF/HF transportation.

2.3. Transfer

Transfer of the product is a difficult and dangerous operation which can only proceed after thorough risk assessment. Appropriate precautionary measures must be implemented. If a transfer is to proceed, the necessary equipment for the transfer should be installed upwind, as close as possible to the damaged tank.

A mobile scrubbing system and/or vacuum system should be prepared to collect and neutralize HF fumes in case a leak appears during the transfer.

The transfer procedure would depend on the product contained in the tank. In the case of aqueous hydrofluoric acid (≤75 %), it would be generally possible (except at very high temperatures) to realize the transfer by pump.

It would be very difficult to transfer by pump the anhydrous HF (except at very low temperatures or if the damaged tank is under pressure). The transfer by pressure is the most comfortable method (Nitrogen or compressed air supplied by a compressor). The pressure should not exceed 1 bar.

2.4. Safety/ Environment

The use of water to knock down acid clouds and fumes (HF, etc…) is strongly recommended. It is important that the water should be provided in the form of a mist and not a jet, and one must make sure that water doesn't go inside or upon the container. One should also be aware of weak acid formed by absorption of HF gas.

In case of a liquid HF pool on the ground, see the document "AHF/HF Neutralization Table" on www.eurofluor.org.

Tests must be made to determine in which depth the acid has penetrated the ground. The easiest method is to use pH paper.

TMD/HF/010 Equipment list

a) Safety equipment

- Ensure that EVERYBODY on the scene and in the area is aware of the potential hazards of AHF/HF and wearing appropriate Personal Protective Equipment (PPE). Refer to document "PPE - Classification for uses" on www.eurofluor.org.
  - α – Level (emergency response)
  - β – Level (Operational Equipment for Increased Risks)
- People not involved should be excluded from the danger area
- Safety shower
- First Aid Kit (including calcium gluconate), refer to document "FIRST AID BROCHURE - Management of hydrofluoric acid injury", available in 6 languages on www.eurofluor.org.

b) Equipment to seal the leak might be

- inflatable cushions
- belts with belt idlers
- inflation kit of cushions
- air bottle for inflation
- wooden and polyethylene plugs of various diameters
- polyethylene tarpaulin
- calcium carbonate
- pH paper
- mastic
- tar
- plate of lead
- soft PTFE + PTFE cord
- metallic strapping rolls

c) Equipment necessary to the transfer

The list below is typical and must be adjusted according to the situation.

- chemical tank for AHF/HF transfer
- a suitable chemical tank for neutralization.
- (PTFE) self-priming pump
- air compressor with suitable connection kit or nitrogen supply
- spare valves
- manual lock control + remote locking cable
- acid-proof hoses (6 bars) (for air)
- internal stainless steel PTFE platted hoses
- quick connections (male and female) with gasket, PTFE tape
- Set of PTFE gaskets

- blind flanges
- Loose flanges on reducers
- Elbow with loose flanges
- A set of bolts
- Diesel fuel for the compressor
- Appropriate tool chest

TMD/HF/020 AHF/HF transport intervention handbook

INTERVENTION ON ROAD TANK: Move up to the stage **TMD/HF/030**

INTERVENTION ON RAIL TANK: Move up to the stage **TMD/HF/040**

TMD/HF/030 Preparation before intervention (road tank)

If the tank is tight move up to the stage
TMD/HF/031: Preparation before intervention (tight)

If the tank is leaking move up to the stage
TMD/HF/032: Preparation before intervention (leaking)

TMD/HF/031 PREPARATION BEFORE INTERVENTION (TIGHT ROAD TANK)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Make sure that the area is closed off and marked (danger area of at least 50m)			
❑ Make sure that the traffic has been stopped			
❑ Prepare water curtain on standby in case of leak			
❑ Ensure that EVERYBODY on the scene and in the area is wearing appropriate PPE, refer to document "PPE - Classification for uses" on www.eurofluor.org. ➢ α – Level (emergency response) ➢ β – Level (Operational Equipment for Increased Risks)			
❑ If the road tank is lying, see	**TMD/HF/045: Access to valves**		
❑ If the road tank is upright, see	**TMD/HF/060: Decision transport/transfer**		

TMD/HF/032 PREPARATION BEFORE INTERVENTION (LEAKING ROAD TANK)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Close off and mark the area, emergency evacuation of the danger area	Local firemen	
❑ Make sure that the traffic has been stopped ❑ Ensure that EVERYBODY on the scene and in the area is wearing appropriate PPE, refer to document "PPE - Classification for uses" on www.eurofluor.org. ➢ α – Level (emergency response) ➢ β – Level (Operational Equipment for Increased Risks)		
❑ Keep water away from the area of the damaged tank	Risk of growing leak	
➔ **If the leak is in vapour phase**		
❑ Create a water curtain to knock down the released HF gas without spaying water on the damaged area of the tank	Beware of diluted acid	
❑ Move up to the stage **TMD/HF/050: Sealing of the leak**		
➔ **If the leak is in liquid phase**		
❑ Create a water curtain to knock down the released HF gas without spraying water on the damaged area of the tank	Beware of diluted acid	
❑ Dyke or channel the released liquid HF acid with PAM (polyacrylamide absorbent) or any other suitable material	The purpose is to limit the spreading	
❑ Cover or neutralize the released liquid HF if possible (refer to document "AHF/HF Neutralization Table" on www.eurofluor.org)		HF release

ACTIONS		COMMENTS	DANGER
❑ Check whether that HF is flowing into lakes, rivers or sewers		Inform the relevant authorities	
❑ Check whether the scene of the accident is situated in or close to a drinking water catchment area		Inform the Water Supply Company and the relevant authorities	
❑ Move up to the stage	**TMD/HF/050: Sealing of the leak**		

TMD/HF/040 Preparation before intervention (rail tank)

If the rail tank is tight move up to the stage
TMD/HF/041: Preparation before intervention (tight)

If the rail tank is leaking move up to the stage
TMD/HF/042: Preparation before intervention (leaking)

TMD/HF/041 PREPARATION BEFORE INTERVENTION (TIGHT RAIL TANK)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Ask for the emergency stop of railway traffic		Railway Company	
❑ Ask for the consignment of catenaries with earthing of the power lines		Railway Company	
❑ Close off and mark the area (danger area)		Local firemen	
❑ Ensure that EVERYBODY on the scene and in the area is wearing appropriate PPE, refer to document "PPE - Classification for uses" on www.eurofluor.org. ➢ α – Level (emergency response) ➢ β – Level (Operational Equipment for Increased Risks)			
❑ Put blocking brakes on each side of each rail tank wheel			
❑ If the road tank is lying, see	**TMD/HF/045: Access to valves**		
❑ If the road tank is upright, see	**TMD/HF/060: Decision transport/transfer**		

TMD/HF/042 PREPARATION BEFORE INTERVENTION (LEAKING RAIL TANK)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

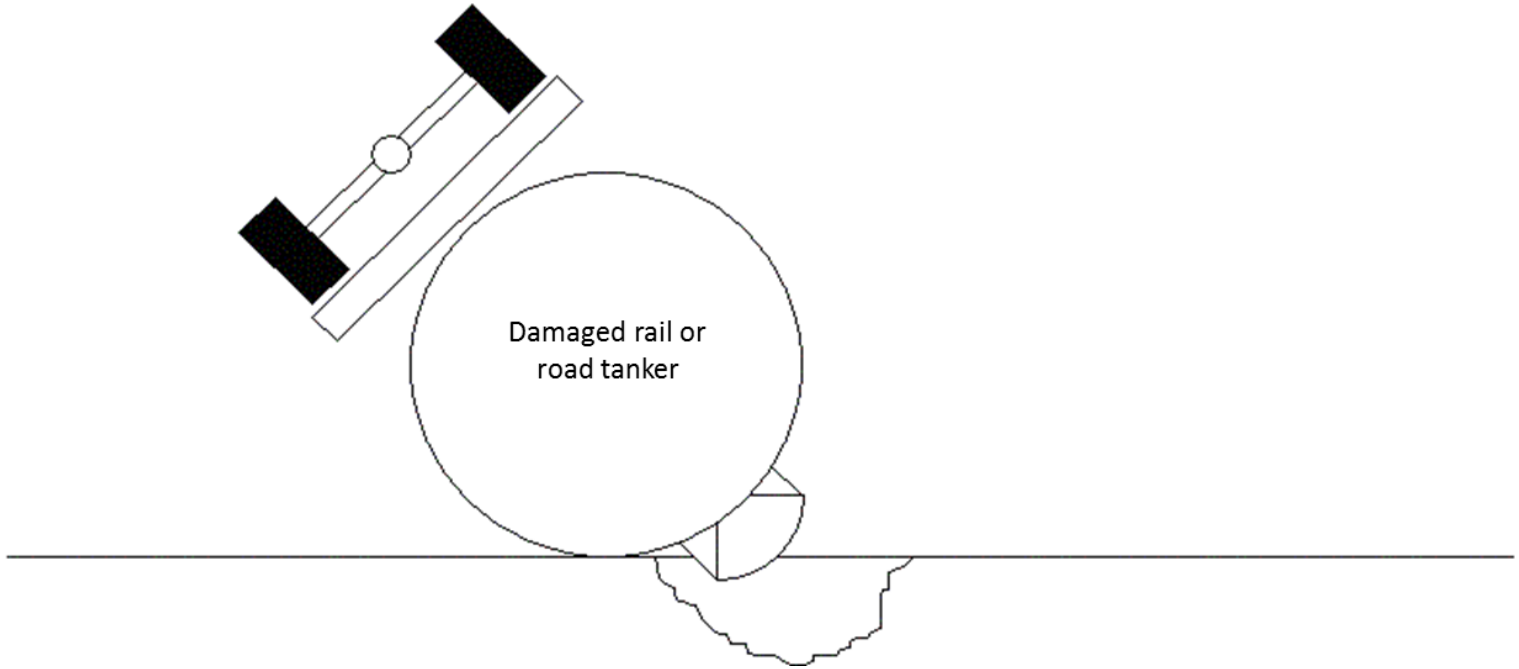
ACTIONS		COMMENTS	DANGER
❑ Ask for the emergency stop of railway traffic		Railway Company	
❑ Ask for the consignment of catenaries with earthing of the power lines		Railway Company	
❑ Close off and mark the area, emergency evacuation of the danger area		Local firemen	
❑ Keep water away from the damaged area of the tank		Risk of growing leak	
❑ Ensure that EVERYBODY on the scene and in the area is wearing appropriate PPE, refer to document "PPE - Classification for uses" on www.eurofluor.org. ➢ α – Level (emergency response) ➢ β – Level (Operational Equipment for Increased Risks)			
❑ Put blocking brakes on each side of each rail tank wheel			
➔ **If the leak is in vapour phase**			
❑ Create a water curtain to knock down the released HF gas without spraying water on the damaged area of the tank		Beware of diluted acid	
❑ Move up to the stage	**TMD/HF/050: Sealing of the leak**		
➔ **If the leak is in liquid phase**			
❑ Create a water curtain to knock down the released HF gas without spraying water on the damaged area of the tank ❑ Dyke or channel the released liquid HF with polyacrylamide foam or any other suitable material		Beware of diluted acid The purpose is to limit the spreading	

ACTIONS		COMMENTS	DANGER
❑ Cover or neutralize released liquid HF if possible (refer to document "AHF/HF Neutralization Table" on www.eurofluor.org)			HF release
❑ Check whether HF is flowing into lakes, rivers or sewers		Inform the relevant authorities	
❑ Check whether the scene of the accident is situated in or close to a drinking water catchment area		Inform the Water Supply Company and the relevant authorities	
❑ Move up to the stage	**TMD/HF/050: Sealing of the leak**		

TMD/HF/045	**Access to valves**

TMD/HF/045 Fig. 1: Access to valves

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/045 Access to valves

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Stabilise the damaged tank with equipment available: ➢ Jack ➢ Inflatable cushions ➢ ropes, cables		
➔ **If the valve cover sticks in the ground:**		
❑ Dig a trench in the ground to get access and to make it easier to open the cover		
➔ **If the valve cover has not been damaged during the accident**		
❑ Open the valve cover	Caution is advised when opening the cover	Leaking HF fumes or liquid HF
➔ **If the valve cover has been damaged during the accident and it cannot be opened manually :**		
❑ Cut off the valve cover with a grinder	grinder available by firemen	Fire risk in case of HF leak (release of H_2)

After assessment of valves condition, go back to previous step (preparation before intervention).

TMD/HF/050 Sealing of the leak

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

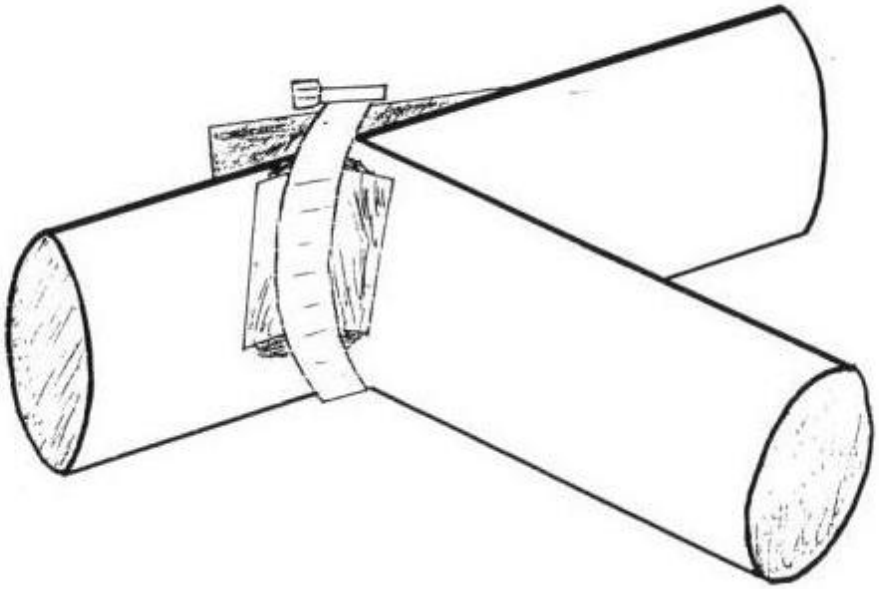
ACTIONS		COMMENTS	DANGER
➔ **If possible, get access to the leak from upwind**			
➔ **A leaking flange can possibly be sealed by:**			
☐ Tightening the flange's bolts			
☐ Consider replacing the gasket if possible			
☐ Capping the flange			
➔ **A leaking safety valve can possibly be sealed by:**			
☐ Capping the safety valve			
☐ Setting a bandage	**See TMD/HF/051: Recommendation for setting a bandage**		
➔ **A leak resulting from a puncture/ hole can possibly be sealed by:**			
☐ Plugging the hole			
☐ Setting of bandage	**See TMD/HF/051: Recommendation for setting a bandage**		
☐ Setting of a sealing cushion	**see TMD/HF/052: Setting of a sealing Cushion**		
➔ **The sealing of the leak on the head of the tank can be possible by:**			
☐ Lever bar method: on the heads of a railcar a band with cushion may be impractical. Instead consider a lever bar with lever point welded to the head (on site) and thus allowing to apply high pressure on the leak			

Move to **TMD/HF/060: Decision transport/transfer**

TMD/HF/051 RECOMMENDATION FOR SETTING A BANDAGE

TMD/HF/051 Fig. 2: Recommendation for setting a bandage

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/051 Recommendation for setting a bandage

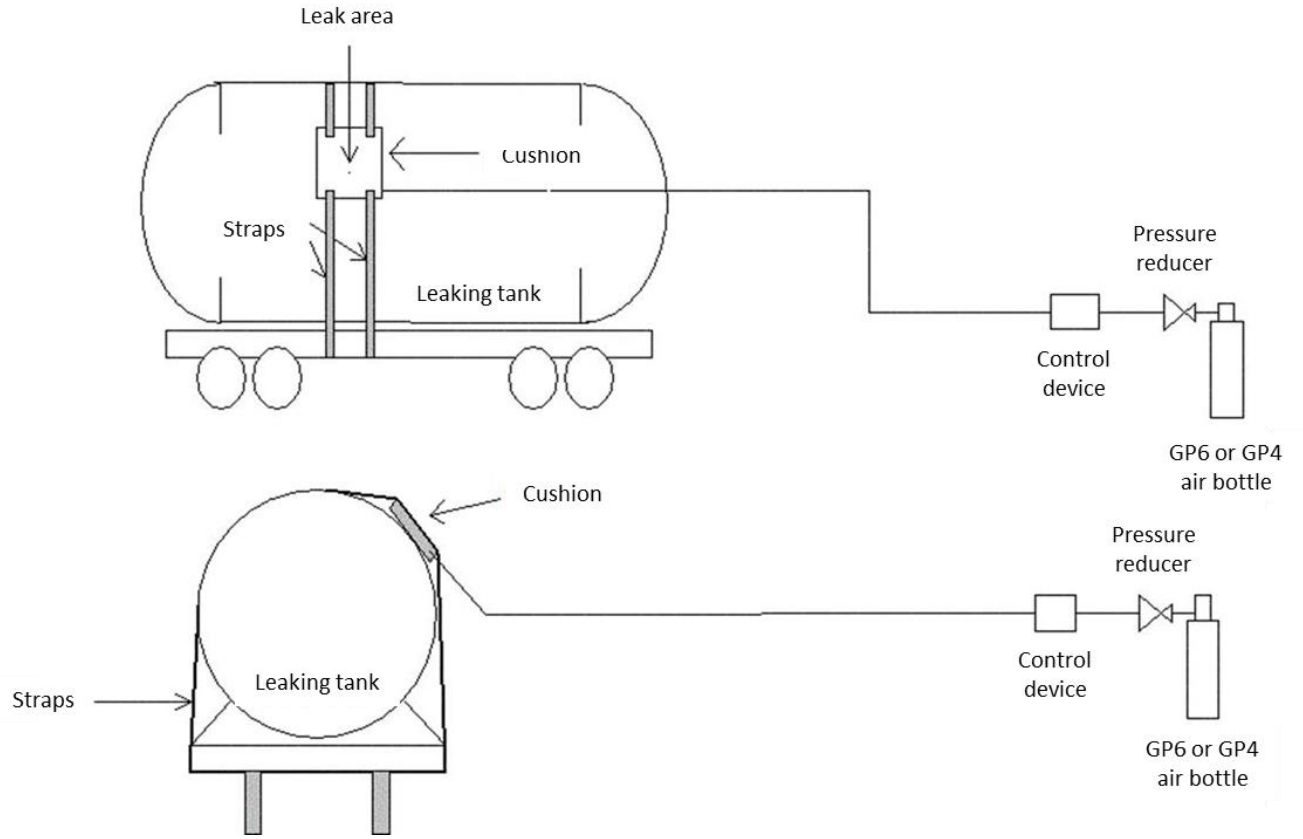
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
➔ **Materials resistant to anhydrous HF:** ➢ PTFE sheet (for liquid or gas phase) ➢ Raw PTFE tape or cord form ➢ Lead ➢ Viton ➢ Mastic (suitable depending of either liquid or gas phase)			
➔ **Recommendations for setting a PTFE sheet (or lead plate):**			
❑ Cut a piece of PTFE according to the hole size			
❑ Apply mastic on the PTFE sheet			
❑ Fix the sheet using either: ➢ hose clamp ➢ metallic strapping roll ➢ inflatable cushion (see **TMD/HF/052: Setting of a sealing cushion**)			
❑ Go back to the stage	**TMD/HF/050: Sealing of the leak**		

TMD/HF/052 SETTING OF A SEALING CUSHION

TMD/HF/052 Fig. 3: Setting of a sealing cushion

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/052 Setting of a sealing cushion

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Install two straps on each side of the leak			
❑ Position the cushion above the leak		Environmental protection: ❑ Install water curtains ❑ Neutralize effluents	Release of liquid or gaseous HF
❑ Link the cushion to the straps by means of rings and spring hooks			
❑ Place a piece of PTFE between the leak and the cushion	**See Fig. 2 TMD/HF/051: Recommendation for setting a bandage**		
❑ Tighten the two straps with a ratchet tie-down			
❑ Connect the pressure reducer device to the air cylinder (threaded coupling connection)			
❑ Connect the control device to the pressure reducer (quick connection)			
❑ Connect the cushion to the control device (quick connection)			
❑ Inflate the cushion until the leak is sealed			
❑ Go back to the stage	**TMD/HF/050: Sealing of the leak**		

TMD/HF/060 Decision transport/ transfer

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

The decision between transport and transfer will be taken together with the local authorities at the accident scene, taking into consideration several parameters, such as:

- Tank and trailer damage assessment
  - crack, dent, score – size, depth and distance to welds
  - tightness
  - exposure to fire during the accident
  - position after accident (upright, lying, upside down)
  - construction material & design, age
  - condition of frame, drive, brakes, …
  - …
- Location of the accident scene
  - proximity of residential area
  - proximity of river, lake, drinking water pumping station
  - accessibility for crane or truck
  - nature of soil (clay, sand, rock, …)
  - …
- Distance to the closest suitable industrial facility
- Availability of suitable receiving tank
- Others

If the decision is to transfer the content of the tank, move up to the stage

TMD/HF/070: Preparation of the scrubbing tank

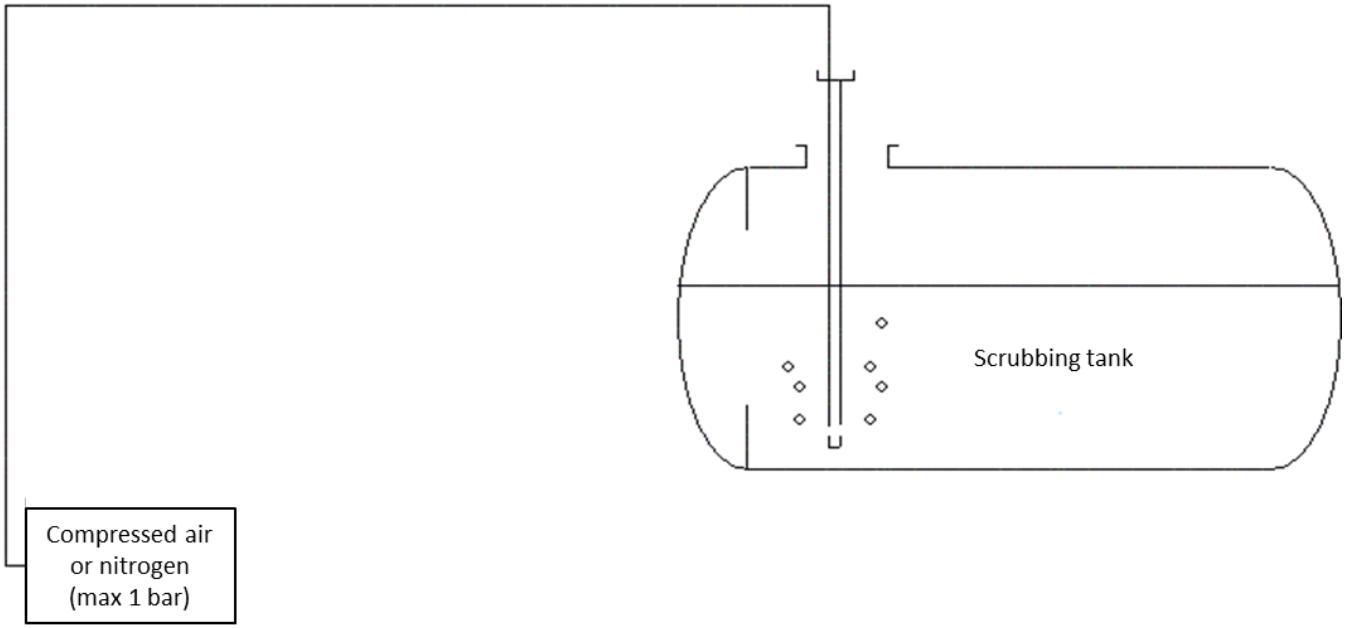
If the decision is to transport the damaged tank, move up to the stage

TMD/HF/200: Transport of the damaged tank

TMD/HF/070 Preparation of the scrubbing tank

TMD/HF/070 Fig. 4: Preparation of the scrubbing tank

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/070 Preparation of the scrubbing tank

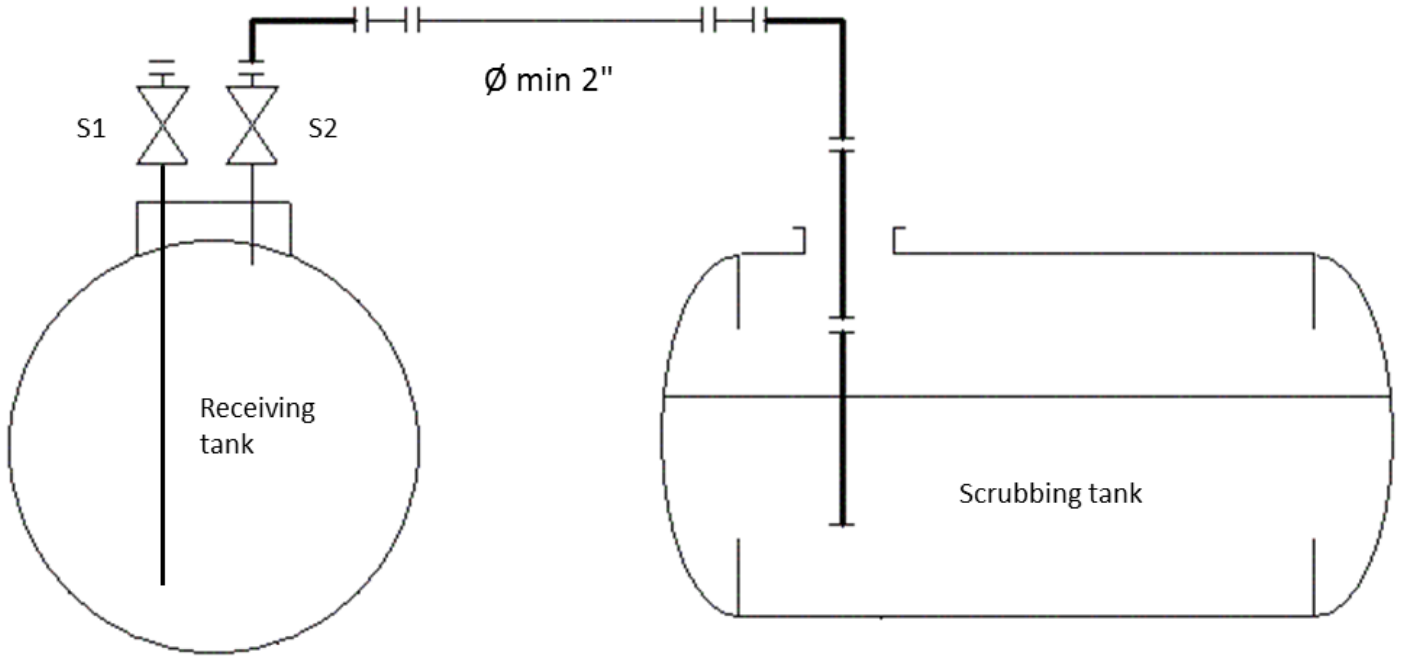
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		OBSERVATIONS	DANGER
❑ Use a chemical tank, preferentially plastic or lined, manhole fitted with a dip pipe		If no dip pipe available, make one	
Observation: If it is impossible to obtain a chemical tank, a plastic pool of at least 3,000 litters could be used		Inflatable pool generally available by firemen	
❑ Fill up the tank with water			
❑ Create an air injection with the tank's dip pipe			
❑ Connect the air hose of the compressed air or nitrogen to the dip pipe			
❑ Introduce calcium carbonate or any other neutralizing agent (refer to document "AHF/HF Neutralization Table" on www.eurofluor.org) inside the tank, wearing gloves and goggles		As a guidance use 1,000 kg of CaCO3 for a 20 m3 tank	
❑ Check the dip pipe is properly attached to the tank and start the compressed air/nitrogen supply			
❑ Let the carbonate dissolve in water, stirring with the air/nitrogen injection			
❑ Stop the air/nitrogen supply			
❑ Disconnect the hose of the compressed air/nitrogen supply from the dip pipe			
❑ Prepare equipment to spray water on the scrubbing tank during the venting of AHF/HF		The purpose is to limit the temperature increase (exothermic absorption of AHF/HF)	
❑ Move up to the stage	**TMD/HF/080: Venting of receiving tank**		

TMD/HF/080 Venting of the receiving tank

TMD/HF/080 Fig. 5: Connecting and venting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



S1 is a liquid phase valve and S2 a gas phase valve.

TMD/HF/080 Connecting and venting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Use a receiving tank suitable for HF transport with a capacity at least equal to the damaged tank. **In this checklist and associated drawings, S1 is a liquid phase valve and S2 a gas phase valve.** **However, the receiving tank will preferably be equipped with two gas phase valves: in that case S1 will also be a gas phase valve in order to avoid possible backflow of AHF/HF**	see Eurofluor's "Recommendation on transport, distribution and handling of AHF/HF" for suitable HF tank	
❑ Open the valve cover of the receiving tank		
❑ Check that valve S2 of the receiving tank (vapour phase) is closed		
❑ Remove the blind flange on valve S2		
❑ Connect the valve S2 to the dip pipe of the scrubbing tank using hoses and/or PTFE-lined pipes	Ø minimum 2" Material suitable for AHF or aqueous HF	
❑ Open the valve S2	Vent in case of potential overpressure of the receiving tank	
➔ **If the pressurization of the damaged tank is possible** Upright damaged tank **See TMD/HF/090: Unloading by pressure (upright)** Lying damaged tank **See TMD/HF/100: Unloading by pressure (lying)**	Good condition of tank/ leak sealed	

ACTIONS	COMMENTS	DANGER
➔ **If the pressurization of the damaged tank is impossible**	Badly damaged tank/ tank with leakage/ leak sealed with plugs and paste	
❑ Close the valve S2		
❑ Remove the connection between the valve S2 and the scrubbing tank ➢ Upright damaged tank **See TMD/HF/110: Unloading by pumping (upright)** ➢ Lying damaged tank **See TMD/HF/120: Unloading by pumping (lying)**		

TMD/HF/090 Unloading of the damaged tank by pressure (upright tank)

For Connecting: move up to stage **TMD/HF/091**

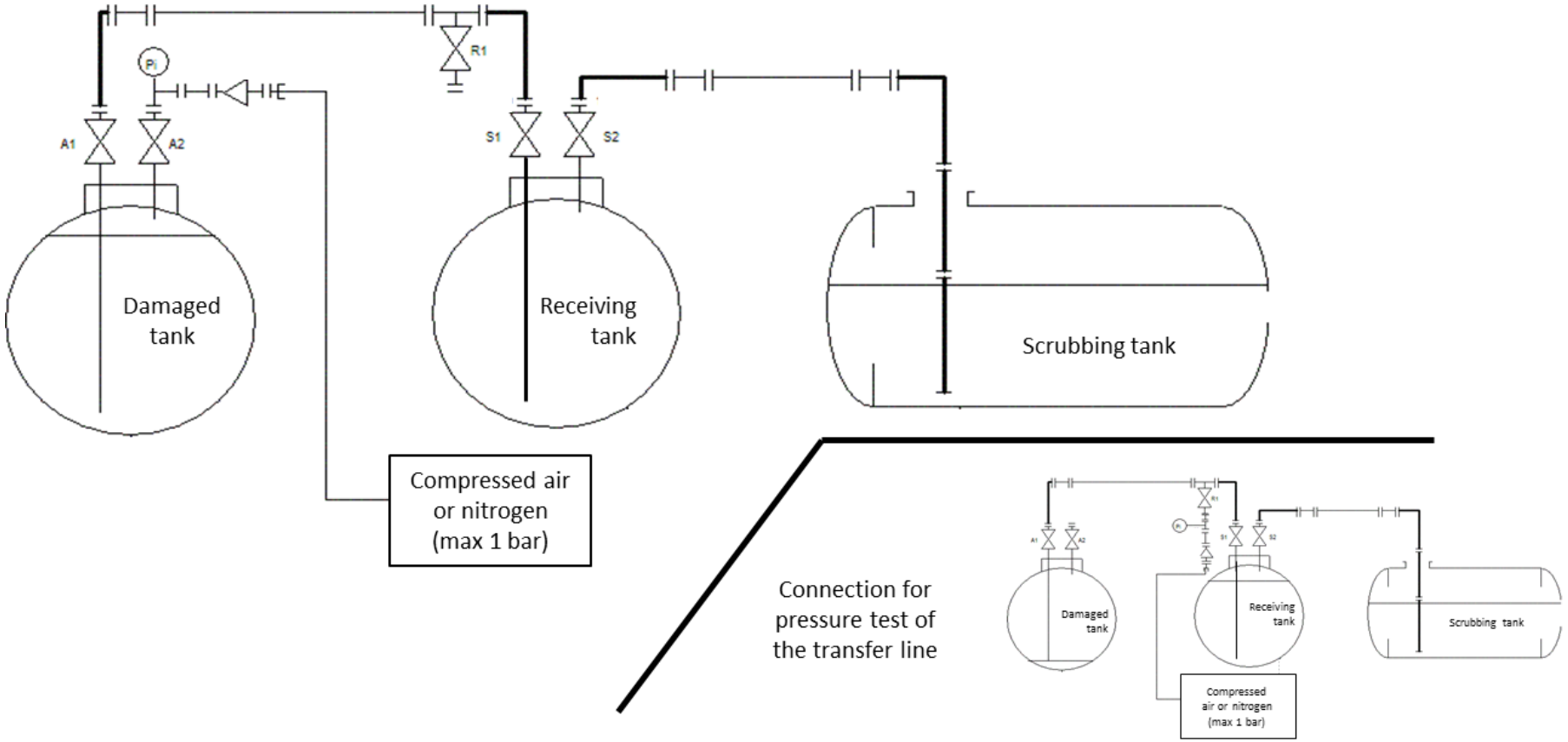
For Unloading: move up to stage **TMD/HF/092**

For Disconnecting: move up to stage **TMD/HF/093**

TMD/HF/091 CONNECTING

TMD/HF/091 Fig. 6: Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/091 Connecting

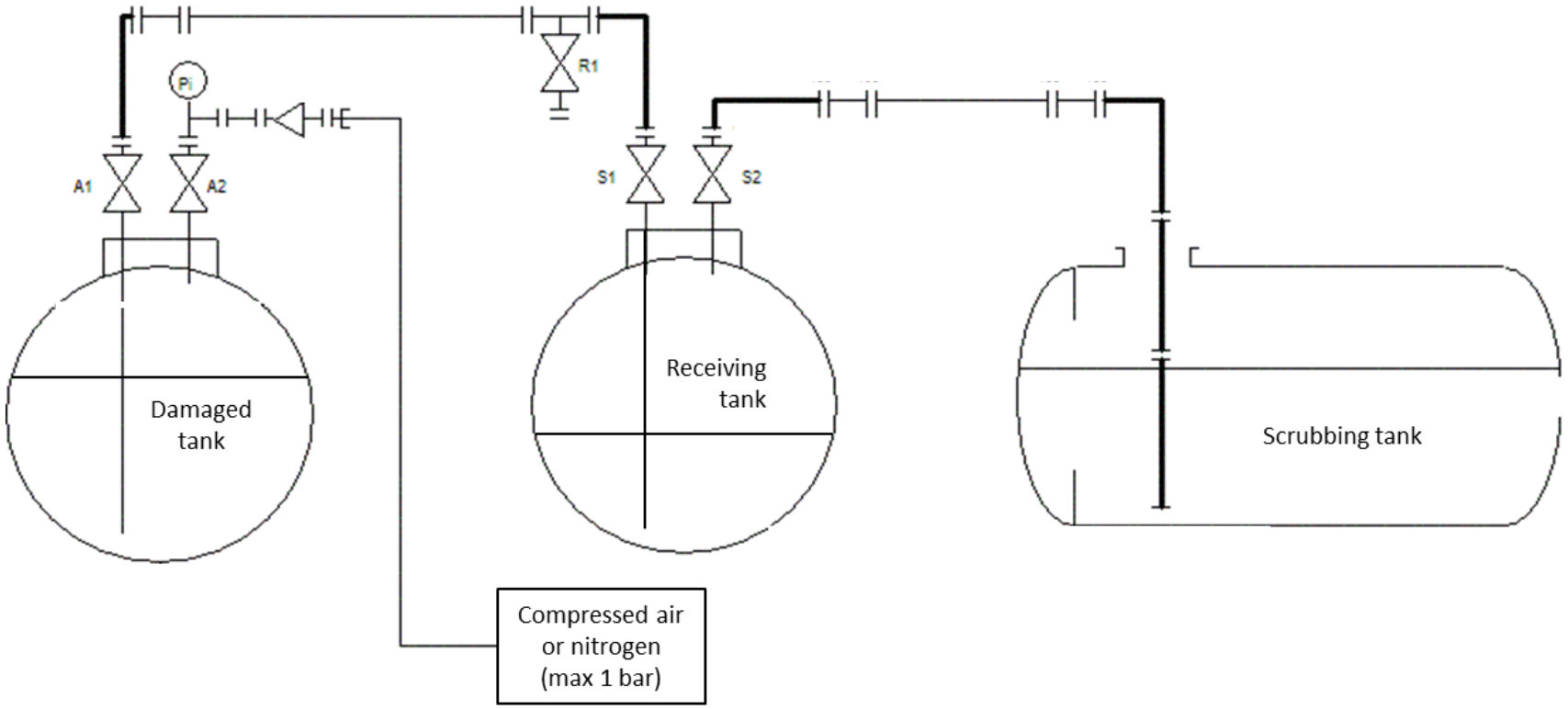
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Check that valve S1 of the receiving tank (liquid phase) is closed		
❑ Remove the blind flange valve S1		
❑ Install a hose on the valve S1		
❑ Open the valve cover of the damaged tank		
❑ Check that valve A1 of the damaged tank (liquid phase) is closed		
❑ Remove the blind flange on valve A1		
❑ Install a hose on the valve A1		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece and valve R1 (for pressure test)	Material suitable for AHF or aqueous HF	
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of air/nitrogen supply hose) on R1 and pressure test the connection. If tight, disconnect the compressed air/nitrogen supply from R1.		
❑ Check that valve A2 of the damaged tank (gas phase) is closed		
❑ Remove the blind flange on valve A2		
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen supply) on A2		
❑ Check that valve R1 is closed		
❑ Check the presence of the blind flange on valve R1		
❑ Move up to the stage **TMD/HF/092: Unloading**		

TMD/HF/092 UNLOADING

TMD/HF/092 Fig. 7: Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/092 Unloading

ALL STAGES, APPROPRIATE PPE MUST BE WORN

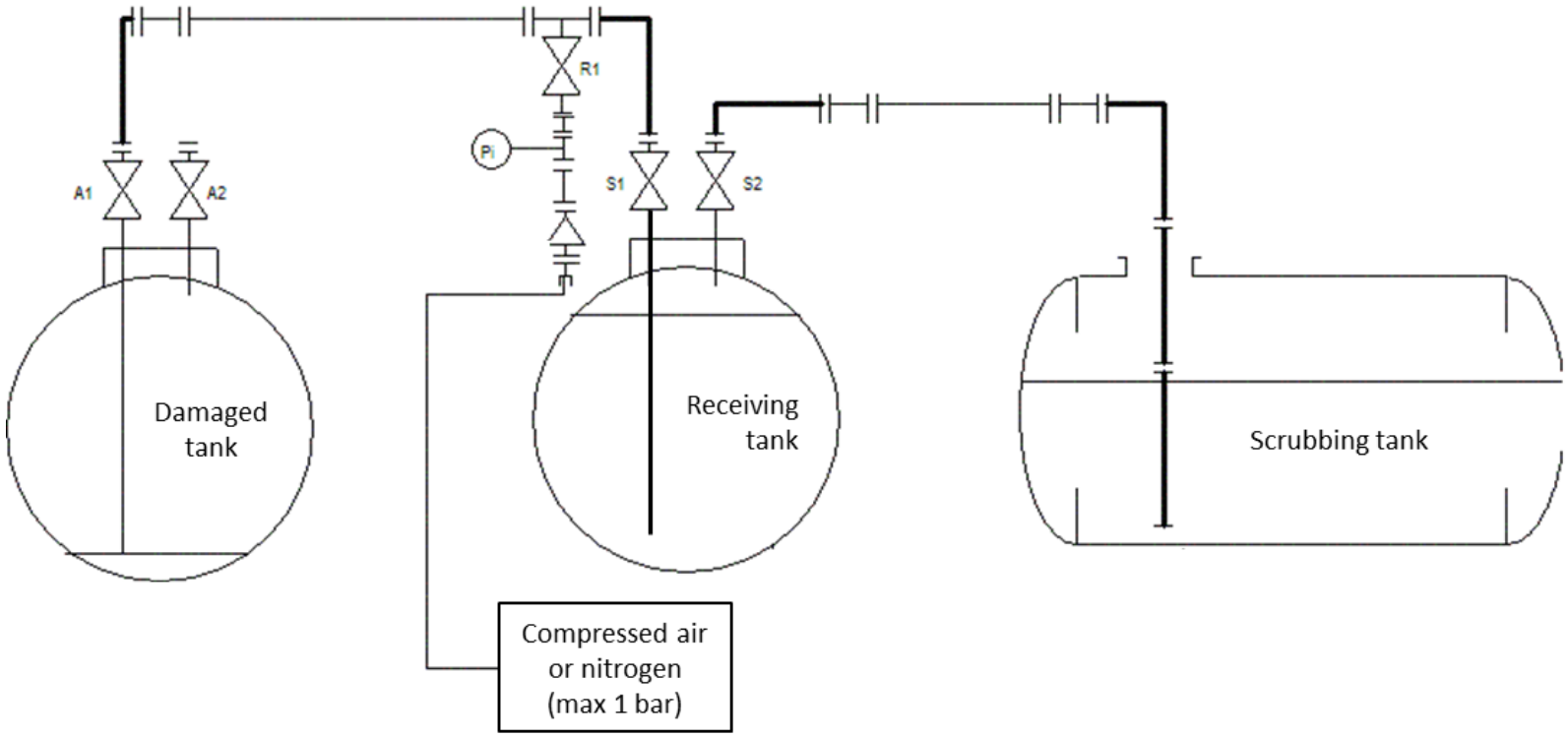
ACTIONS	COMMENTS	DANGER
❑ Start the compressed air/nitrogen supply and check that valve S2 is open		
❑ Open the valve S1 of the receiving tank		
❑ Open the valve A1 of the damaged tank		
❑ Open the valve A2 of the damaged tank		
HF TRANSFER BEGINS AND MAY LAST FOR A FEW HOURS **Monitor the temperature in the scrubbing tank (heat of neutralization of HF fumes):** ➢ **If the temperature increases too much, slow down the transfer.** **Also monitor the pH of the neutralizing solution (must remain alkaline):** ➢ **add calcium carbonate if necessary (as pH drops)**		
❑ Wait for the pressure drop on the manometer (end of the transfer) and continue blowing the lines for about 10 minutes		
❑ Close valve S1		
❑ Close valve A2		
❑ Remove the blind flange on valve R1		
❑ Open cautiously and close the valve R1 to check the end of the transfer	Only gas may be expected to escape from the valve	AHF/HF fumes or liquid AHF/HF

ACTIONS		COMMENTS	DANGER
❑ If no liquid drains from R1, stop the compressed air/nitrogen supply		Otherwise open valves A2 and S1 and go on blowing the lines	**If S1 is a liquid phase valve with a dip pipe, beware of possible backflow of AHF/HF when the compressed air/nitrogen supply is off**
❑ Close the valve A1		A slight pressure will remain in the damaged tank	
❑ Release the pressure in the compressed air/nitrogen supply hose			
❑ Disconnect the compressed air/nitrogen supply from valve A2			
❑ Reinstall the blind flange on valve A2			
❑ Move up to the stage	**TMD/HF/093: Disconnecting**		

TMD/HF/093 DISCONNECTING

TMD/HF/093 Fig. 8: Disconnecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/093 Disconnecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Open the valve R1 in order to depressurize the pipe	HF gas possible	
❑ Close the valve R1		
❑ Remove the connection between the valve A1 of the damaged tank and the valve S1 of the receiving tank	HF gas possible	
❑ Reinstall the blind flange on the valve A1		
❑ Reinstall the blind flange on the valve S1		
❑ Close the valve S2 of the receiving tank		
❑ Remove the connection between the valve S2 and the scrubbing tank		
❑ Reinstall the blind flange on the valve S2		
❑ Close the manhole of the scrubbing tank		
❑ Clean hoses, pipes and valves in a container with carbonate solution and treat it correctly at the plant site	If not available, flush with water and discharge in an appropriate waste water treatment facility	
❑ Move up to the stage **TMD/HF/130: Final Steps**		

TMD/HF/100 Unloading of the damaged tank by pressure (lying tank)

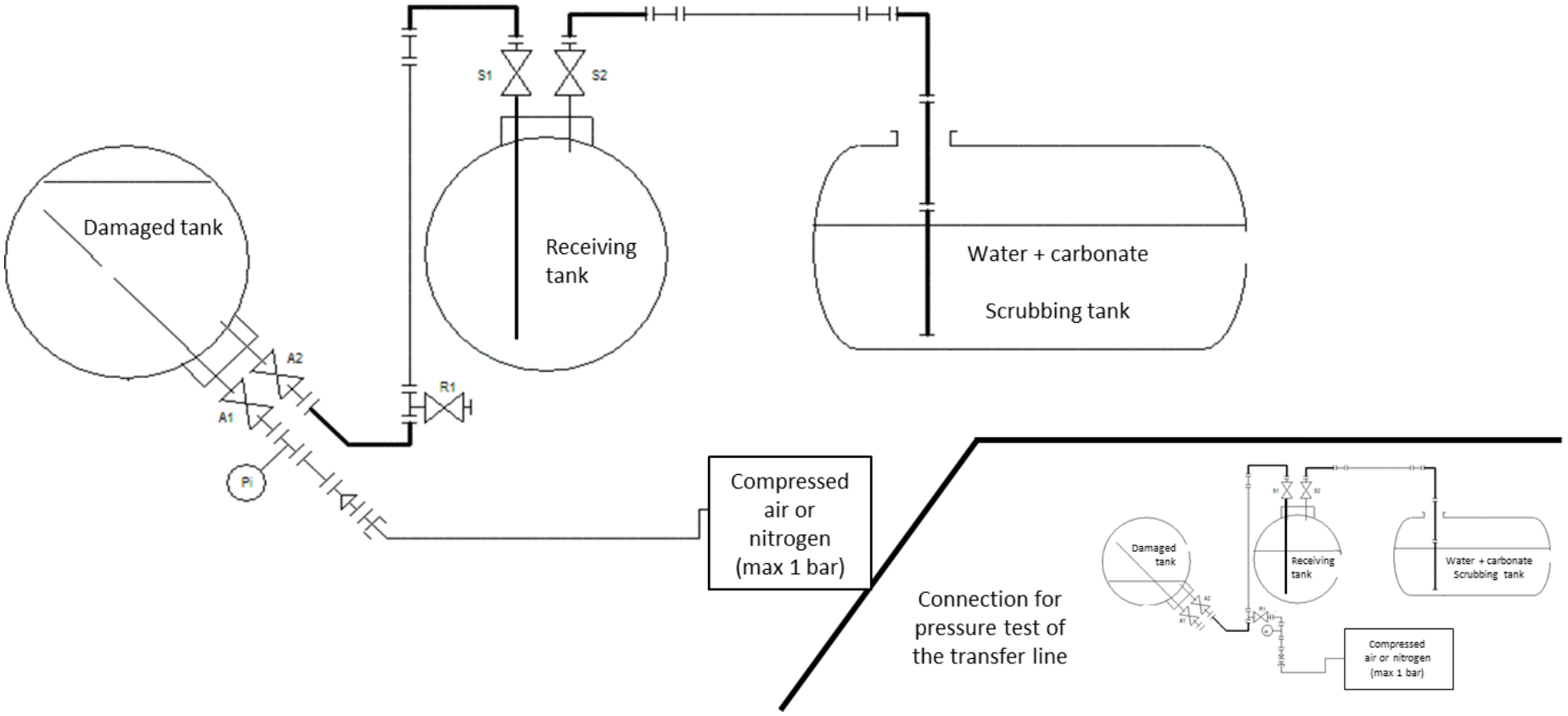
- If the tank is lying at 90°:
  - Transfer the maximum of acid according to the following procedure
  - Lift the tank with the help of a jack or a crane in order to empty out a maximum of liquid and then try to put the tank in the upright position

For Connecting: move up to stage **TMD/HF/101**
For Unloading: move up to stage **TMD/HF/102**
For Disconnecting: move up to stage **TMD/HF/103**

TMD/HF/101 CONNECTING

TMD/HF/101 Fig. 9: Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/101 Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

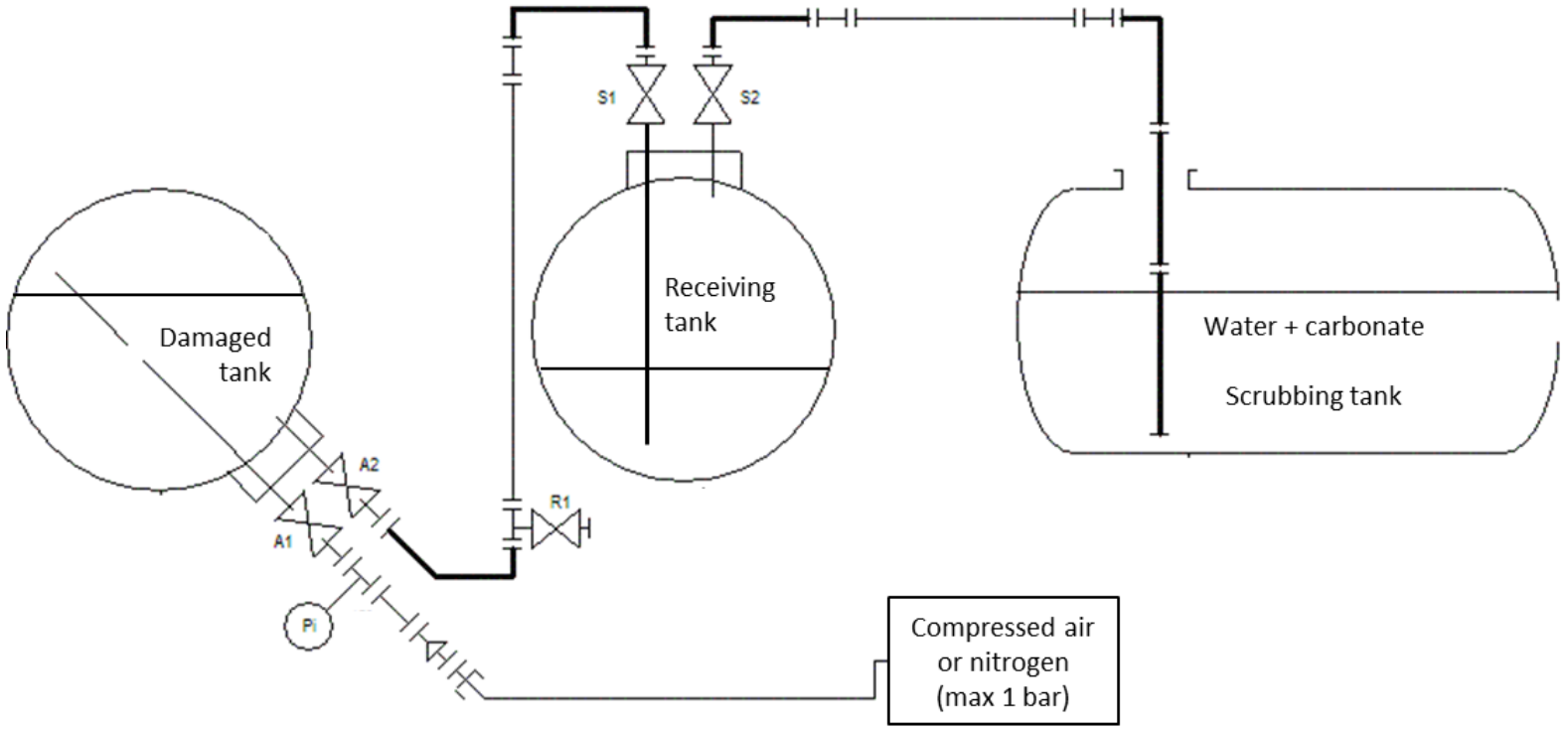
ACTIONS	COMMENTS	DANGER
❑ Check that valve S1 of the receiving tank (liquid phase) is closed		
❑ Remove the blind flange valve S1		
❑ Install a hose on the valve S1		
❑ Open the valve cover of the damaged tank		
❑ Check that valve A2 of the damaged tank (gas phase) is closed	If the tank is upside down, its gas phase valve is actually in the liquid HF phase	
❑ Remove the blind flange on valve A2		
❑ Install a hose on the valve A2		
❑ Make a connection between these hoses using steel or PTFE-lined pipe, with a T-piece and valve R1 (for pressure test)	Material suitable for AHF or aqueous HF	
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen supply) on R1 and pressure test the connection. If tight, disconnect the air/nitrogen supply from R1.		
❑ Check that valve A1 of the damaged tank (liquid phase) is closed	If the tank is upside down, the dip pipe of the liquid phase valve is actually in the AHF/HF vapour phase	
❑ Remove the blind flange on valve A1		

ACTIONS		COMMENTS	DANGER
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen supply) on A1			
❑ Check that valve R1 is closed			
❑ Check the presence of the blind flange on valve R1			
❑ Move up to the stage	**TMD/HF/102: Unloading**		

TMD/HF/102 UNLOADING

TMD/HF/102 Fig. 10: Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/102 Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Check that valve S2 of the receiving tank is open		
❑ Open the valve S1 of the receiving tank		
❑ Open the valve A2 of the damaged tank		
❑ Start compressed air/nitrogen supply		
❑ Open the valve A1 of the damaged tank		
HF TRANSFER BEGINS AND MAY LAST FOR A FEW HOURS **Monitor the temperature in the scrubbing tank (heat of neutralization of HF gas):** ➢ **If the temperature increases too much, slow down the transfer.** **Also monitor the pH of the neutralizing solution (must remain alkaline):** ➢ **Add calcium carbonate if necessary (as pH drops).**		
❑ Wait for the pressure drop with the manometer (end of the transfer) and continue blowing the lines for about 10 minutes		
❑ Close valve S1		
❑ Close valve A1		
❑ Remove the blind flange on valve R1		
❑ Open cautiously and close the valve R1 to check the end of the transfer	Only gas may be expected to escape from the valve	

ACTIONS		COMMENTS	DANGER
❑ If no liquid drains from R1, stop the compressed air/nitrogen supply		Otherwise open valves A1 and S1 and go on blowing the lines	**If S1 is a liquid phase valve, beware of possible backflow of HF when the compressed air/nitrogen supply is off**
❑ Close the valve A2		A slight pressure will remain in the damaged tank	
❑ Release the pressure in the hose of the compressed air/nitrogen supply			
❑ Disconnect the compressed air/nitrogen supply from valve A1			
❑ Reinstall the blind flange on valve A1			
❑ Move up to the stage	**TMD/HF/103: Disconnecting**		

TMD/HF/103 DISCONNECTING

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Open the valve R1 in order to depressurize the pipe		HF gas possible	
❑ Close the valve R1			
❑ Remove the connection between the valve A2 of the damaged tank and the valve S1 of the receiving tank		HF gas possible	
❑ Reinstall the blind flange on the valve A2			
❑ Reinstall the blind flange on the valve S1			
❑ Close the valve S2 of the receiving tank			
❑ Remove the connection between the valve S2 and the scrubbing tank			
❑ Reinstall the blind flange on the valve S2			
❑ Close the manhole of the scrubbing tank			
❑ Clean hoses, pipes and valves in a container with carbonate solution and treat it correctly at the plant site		If not available, flush with water and discharge in an appropriate waste water treatment facility	
❑ Check that valves A1 and A2 are correctly closed			
❑ Check the presence of the blind flange on valves A1 and A2			
❑ Lift the tank with the help of jack or cranes to put it back in upright position			
❑ Move up to the stage	**TMD/HF/090: Unloading by pressure (upright)**	And continue unloading according to TMD/HF/090	

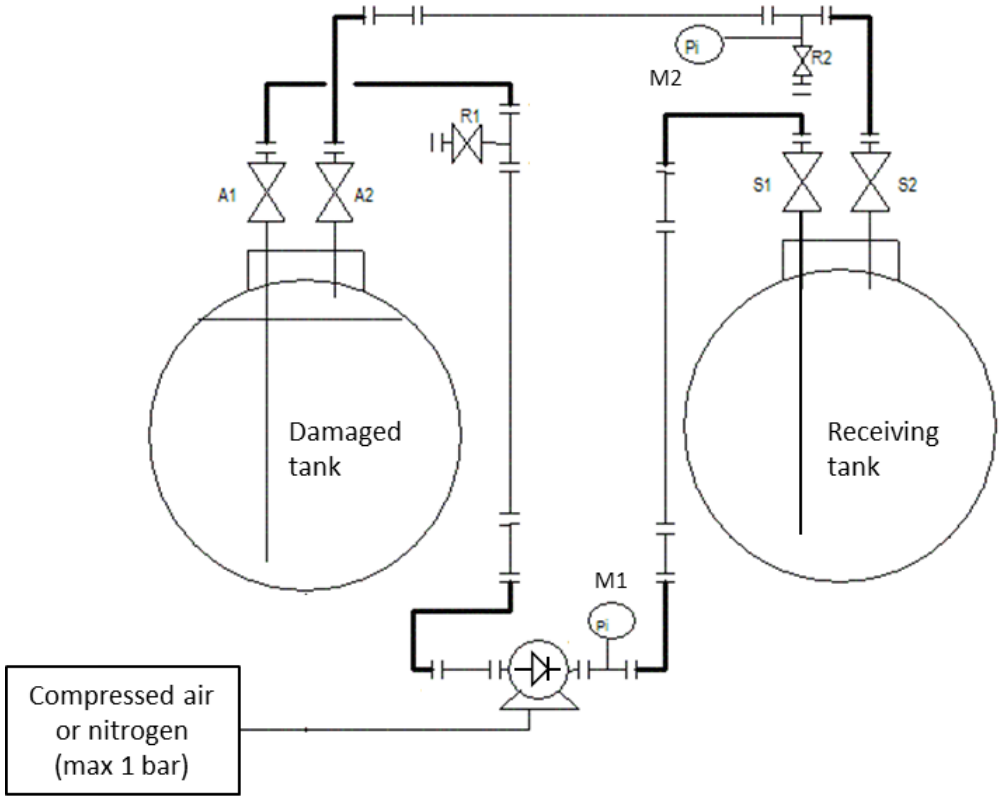
TMD/HF/110 Unloading of the damaged tank by pumping (upright tank)

For Connecting:	move up to stage **TMD/HF/111**
For Unloading:	move up to stage **TMD/HF/112**
For Priming of the pump:	move up to stage **TMD/HF/113**
For Sweeping up and cleaning of the pipes (liquid):	move up to stage **TMD/HF/114**
For Sweeping up and cleaning of the pipes (gas):	move up to stage **TMD/HF/115**
For Disconnecting:	move up to stage **TMD/HF/116**

TMD/HF/111 CONNECTING

TMD/HF/111 Fig. 11: Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/111 Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

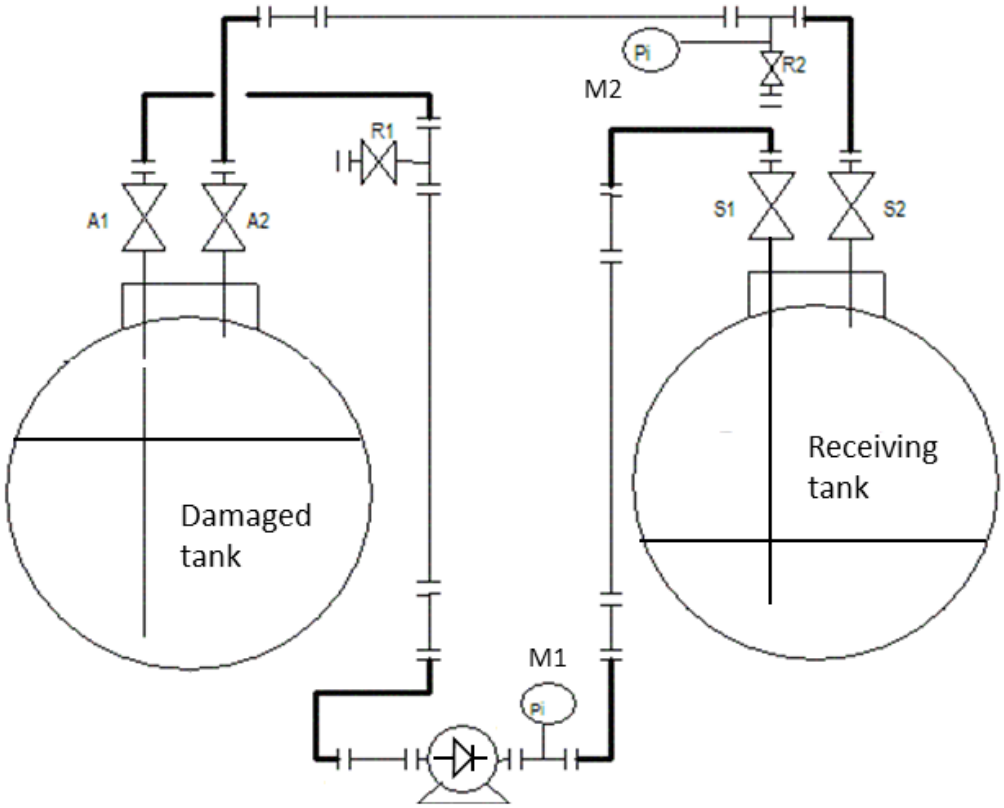
ACTIONS	COMMENTS	DANGER
❑ Check that valve S2 of the receiving tank (gas phase) is closed		
❑ Remove the blind flange valve and install a hose on the valve S2		
❑ Open the valve cover of the damaged tank		
❑ Check that valve A2 of the damaged tank is closed (gas phase valve)		
❑ Remove the blind flange and install a hose on the valve A2 of the damaged tank		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece, manometer M2 and valve R2 (for pressure test)	Material suitable for AHF or aqueous HF	
❑ Check that valve S1 of the receiving tank (liquid phase) is closed		
❑ Remove the blind flange valve and install a hose on the valve S1		
❑ Install a hose on the discharge flange of the pump		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece and manometer M1	Material suitable for AHF or aqueous HF	
❑ Check that valve A1 of the damaged tank (liquid phase) is closed		
❑ Remove the blind flange and install a hose on the valve A1 of the damaged tank		
❑ Install a hose on the suction flange of the pump		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece and valve R1 (for pressure test)	Material suitable for AHF or aqueous HF	

ACTIONS		COMMENTS	DANGER
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen supply) on R1 and pressure test the connection. If tight, disconnect the air/nitrogen supply from R1.			
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen supply) on R2 and pressure test the connection. If tight, disconnect the air/nitrogen supply from R2.			
❑ Connect the hose of the compressed air/nitrogen supply to the pump			
❑ Move up to the stage	**TMD/HF/112: Unloading**		

TMD/HF/112 UNLOADING

TMD/HF/112 Fig. 12: Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/112 Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Check that valve R1 is closed		
❑ Check the presence of the blind flange on valve R1		
❑ Check that valve R2 is closed and check the presence of its blind flange		
❑ Open the valve A1 of the damaged tank		
❑ Open the valve S1 of the receiving tank		
❑ Open the valve S2 of the receiving tank		
❑ Start the pump		
❑ Check the correct operation of the pump	Listen to the sound of the pump	
➢ If the pump doesn't prime: move up to **TMD/HF/113: Priming of the Pump**		
➢ If the pump primes: open quickly the valve A2 of the damaged tank	Risk of further damage of the tank due to vacuum	
HF TRANSFER BEGINS AND MAY LAST FOR A FEW HOURS **Control the manometer M2:** ➢ **If it shows an overpressure or a vacuum, stop the pump and check the correct operation of valves A2 and S2**		
❑ A pressure drop on the manometer M1 will indicate the end of the transfer	Listen to the sound of the pump	
❑ Close the valve S1 about 10 minutes after the pressure drop		

ACTIONS		COMMENTS	DANGER
❑ Stop the pump			
❑ Close the valve S2			
❑ Close the valve A1			
❑ Close the valve A2			
❑ Move up to the stage	**TMD/HF/114: Sweeping up and cleaning of the pipes (liquid phase pipe)**		

TMD/HF/113 PRIMING OF THE PUMP

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

The priming of the pump may need the pressurization (about 1 bar) of the damaged tank during a relatively short time.

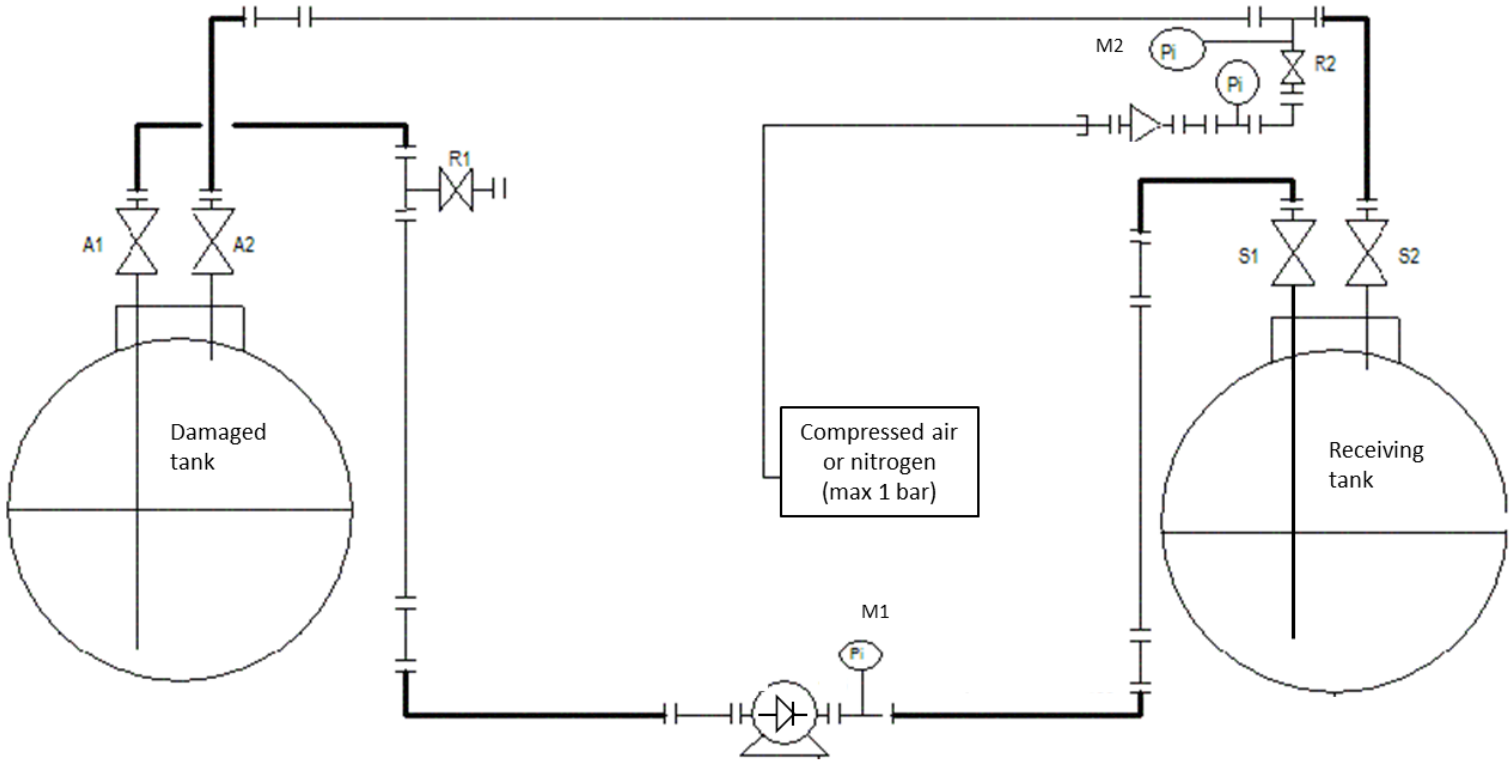
A mobile scrubbing system and/or vacuum system should be prepared to collect and neutralize HF gas in case a leak appears during the pressurization.

- If the leak has been sealed in a temporary way (plug, paste, etc…):
  - Prepare water curtains close to the tank in case of a failure of the sealing device during the priming phase.

- If the leak has not been sealed:
  - Prepare additional water curtains close to the leak (quickly increasing HF emissions) during the priming phase.

TMD/HF/113 Fig. 13: Priming of the pump

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/113 Priming of the pump

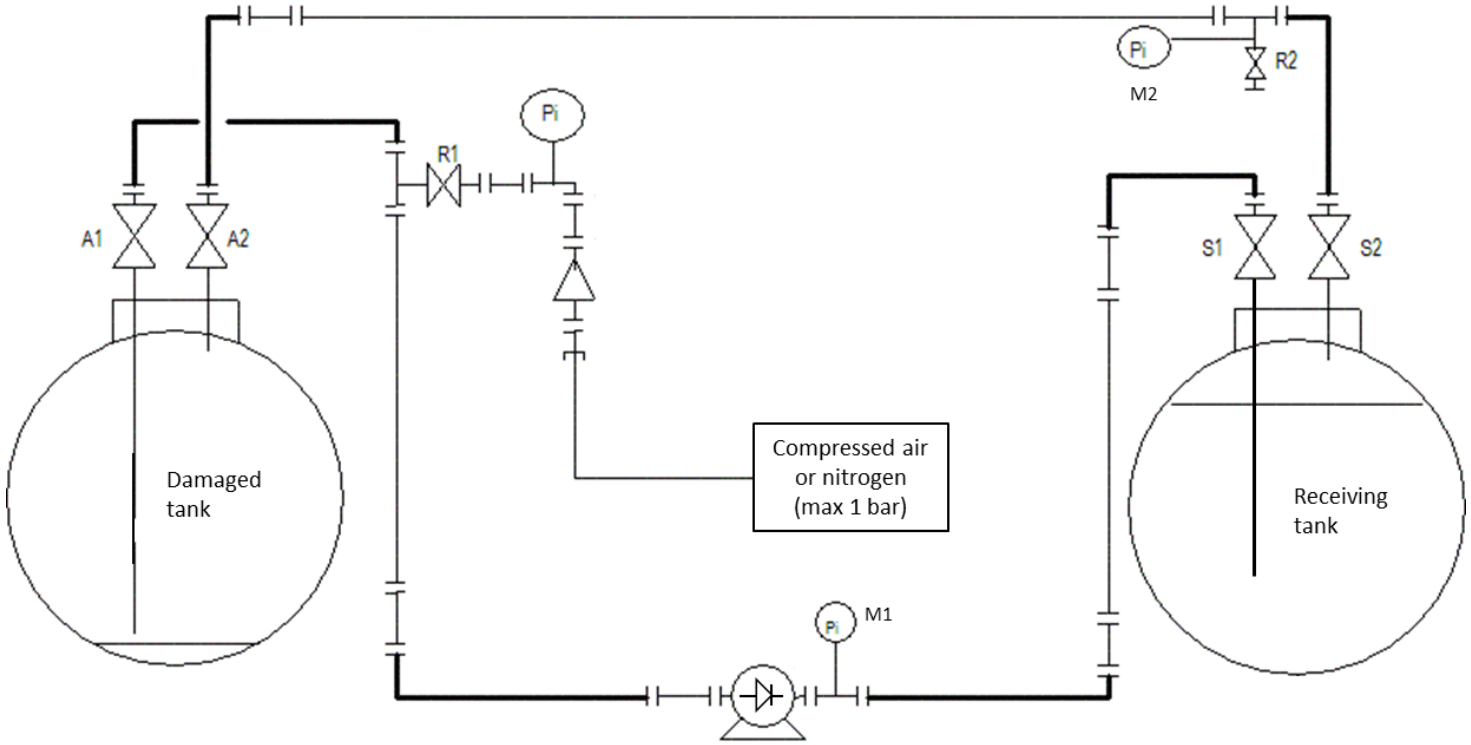
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen) on R2		
❑ Start the compressed air/nitrogen supply and open the valves in the hose connected to R2		
❑ Close the valve S2 of the receiving tank		
❑ Open the valve A2 of the damaged tank		
❑ Open cautiously the valve R2 until the priming of the pump	The pressure in M2 must not exceed 1 bar	
❑ Close the valve R2		
❑ Open the valve S2		
❑ Stop the compressed air/nitrogen supply		
❑ Disconnect the compressed air/nitrogen supply from the valve R2		
❑ Move to the previous step at stage **TMD/HF/112: Unloading (upright)** or **TMD/HF/122: Unloading (lying)**		

TMD/HF/114 SWEEPING UP AND CLEANING OF THE PIPES (LIQUID)

TMD/HF/114 Fig. 14: Sweeping up and cleaning of the pipes (liquid)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/114 Sweeping up and cleaning of the pipes (liquid)

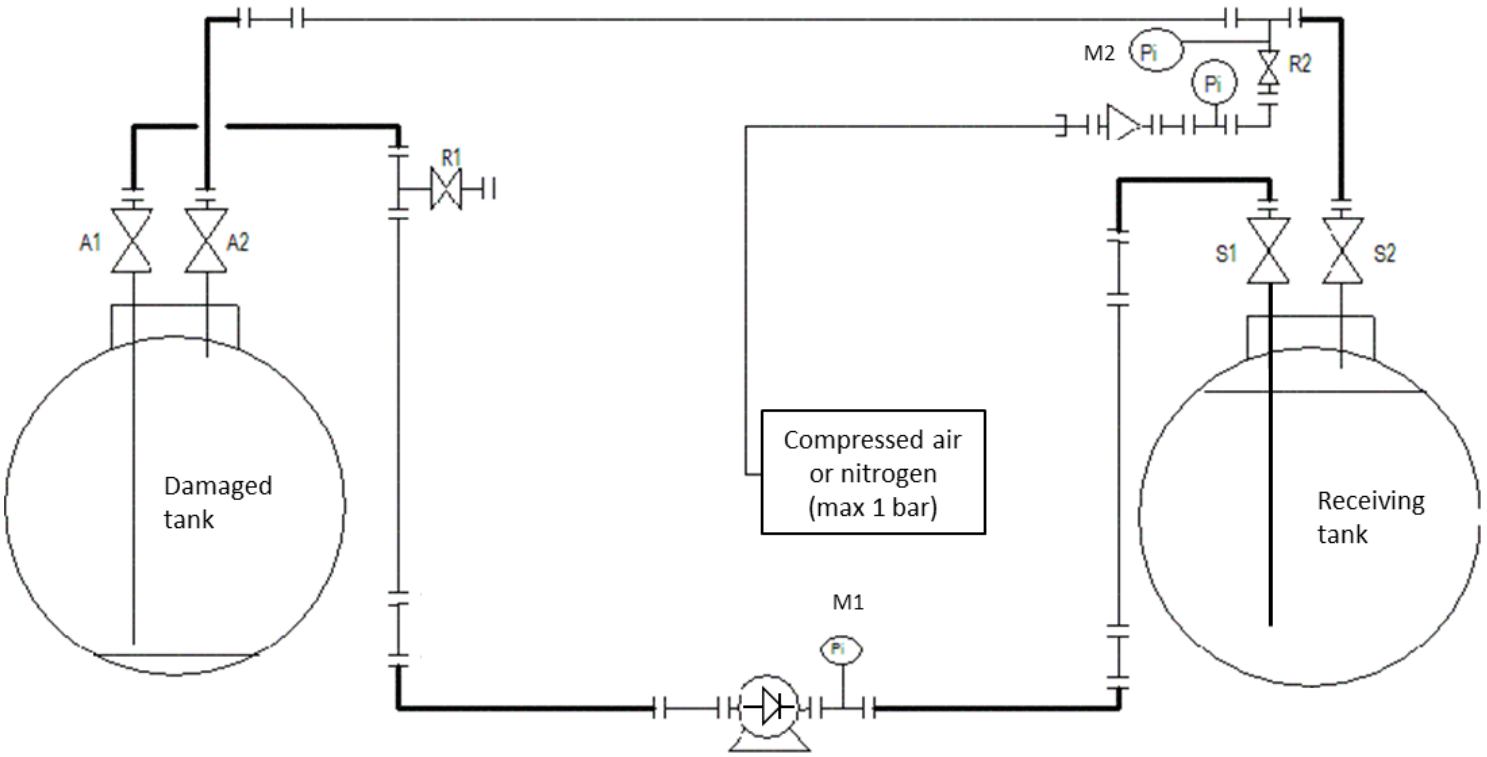
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Remove the blind flange on valve R1		
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen) on R1		
❑ Open the valve S1 of the receiving tank		
❑ Start the compressed air/nitrogen supply		
❑ Open the valve R1		
❑ Blow the pipe for a few minutes		
❑ Close the valve S1		
❑ Open the valve A1 of the damaged tank		
❑ Blow the pipe for a few minutes		
❑ Close the valve A1		
❑ Close the valve R1		
❑ Stop the compressed air/nitrogen supply		
❑ Release the pressure in the hose of the compressed air/nitrogen supply		
❑ Disconnect the compressed air/nitrogen supply from valve R1		
❑ Open the valve R1 to depressurize the pipe		
❑ Close the valve R1 and reinstall its blind flange		
❑ Move up to the stage **TMD/HF/115: Sweeping up and cleaning of the pipes (gas)**		

TMD/HF/115 SWEEPING UP AND CLEANING OF THE PIPES (GAS)

TMD/HF/115 Fig. 15: Sweeping up and cleaning of the pipes (gas)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/115 Sweeping up and cleaning of the pipes (gas)

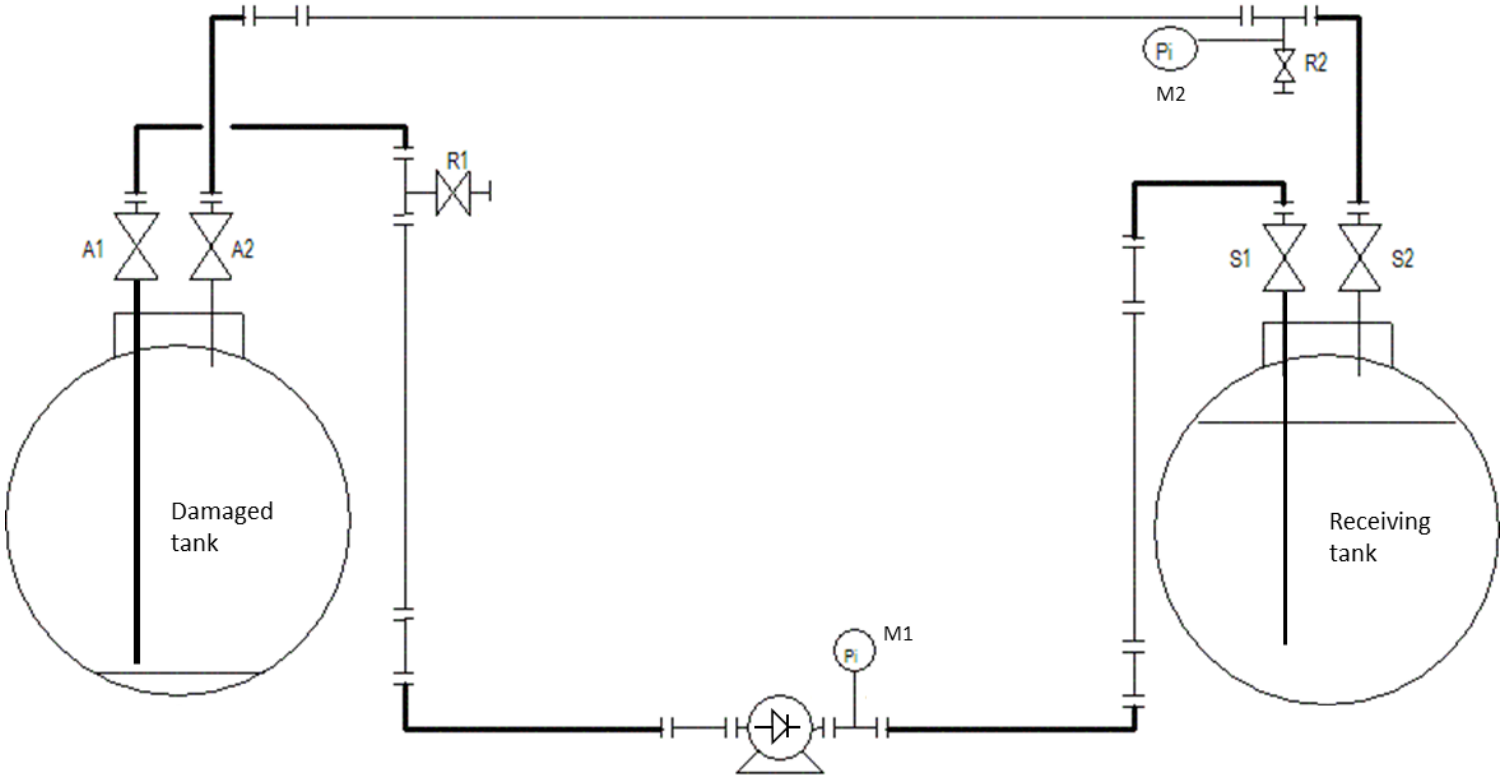
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Install the compressed air/nitrogen supply (manometer, check-valve) on R2			
❑ Open the valve A2 of the damaged tank			
❑ Start the compressed air/nitrogen supply			
❑ Open the valve R2			
❑ Blow the pipe for a few minutes			
❑ Close the valve A2			
❑ Open the valve S2 of the receiving tank			
❑ Blow the pipe for a few minutes			
❑ Close the valve S2			
❑ Close the valve R2			
❑ Stop the compressed air/nitrogen supply			
❑ Release the pressure in the hose of the compressed air/nitrogen supply			
❑ Disconnect the compressed air/nitrogen supply from valve R2			
❑ Open the valve R2 to depressurize the pipe			
❑ Close again the valve S2			
❑ Move up to the stage	**TMD/HF/116: Disconnecting**		

TMD/HF/116 DISCONNECTING

TMD/HF/116 Fig. 16: Disconnecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/116 Disconnecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS		COMMENTS	DANGER
❑ Remove the connection between the valve A2 of the damaged tank and the valve S2 of the receiving tank			
❑ Reinstall the blind flange on valve A2			
❑ Reinstall the blind flange on valve S2			
❑ Remove the connection between the valve A1 of the damaged tank and the suction of the pump			
❑ Reinstall the blind flange on valve A1			
❑ Remove the connection between the valve S1 of the receiving tank and the discharge of the pump			
❑ Reinstall the blind flange on valve S1			
❑ Clean hoses, pipes and valves in a container with carbonate solution and treat it correctly at the plant site		If not available, flush with water and discharge in appropriate waste water treatment facility	
❑ Move up to the stage	**TMD/HF/130: Final Steps**		

TMD/HF/120 Unloading of the damaged tank by pumping (lying tank)

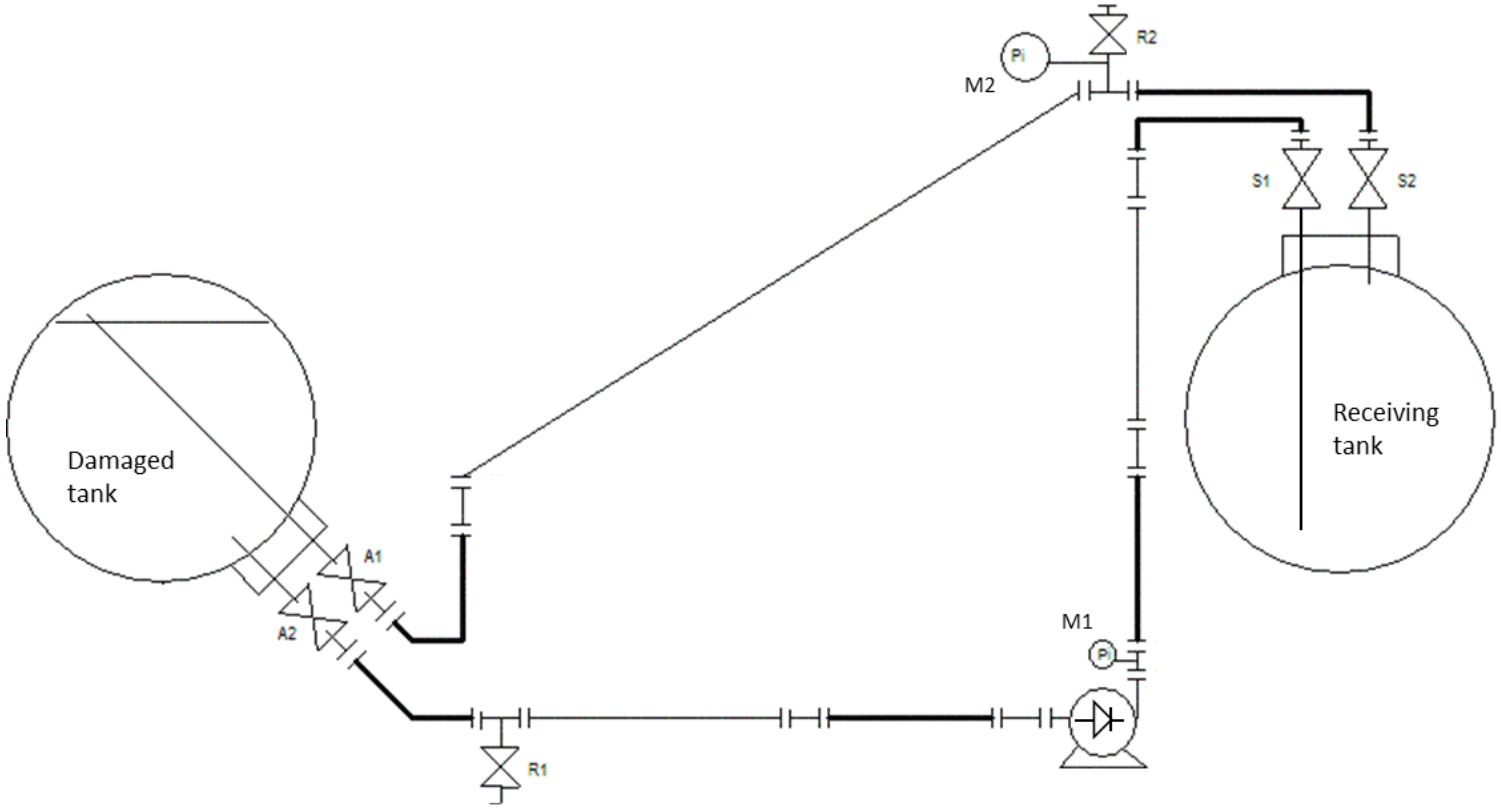
- If the tank is lying at above 90°:
  - Transfer the maximum of acid according to the following procedure
  - Lift the tank with the help of jack or a crane in order to empty out the maximum of liquid and then try to put the tank in the upright position

For Connecting:	move up to stage **TMD/HF/121**
For Unloading:	move up to stage **TMD/HF/122**
For Sweeping up and cleaning of the pipes (liquid):	move up to stage **TMD/HF/123**
For Sweeping up and cleaning of the pipes (gas):	move up to stage **TMD/HF/124**
For Disconnecting:	move up to stage **TMD/HF/125**

TMD/HF/121 CONNECTING

TMD/HF/121 Fig. 17: Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/121 Connecting

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

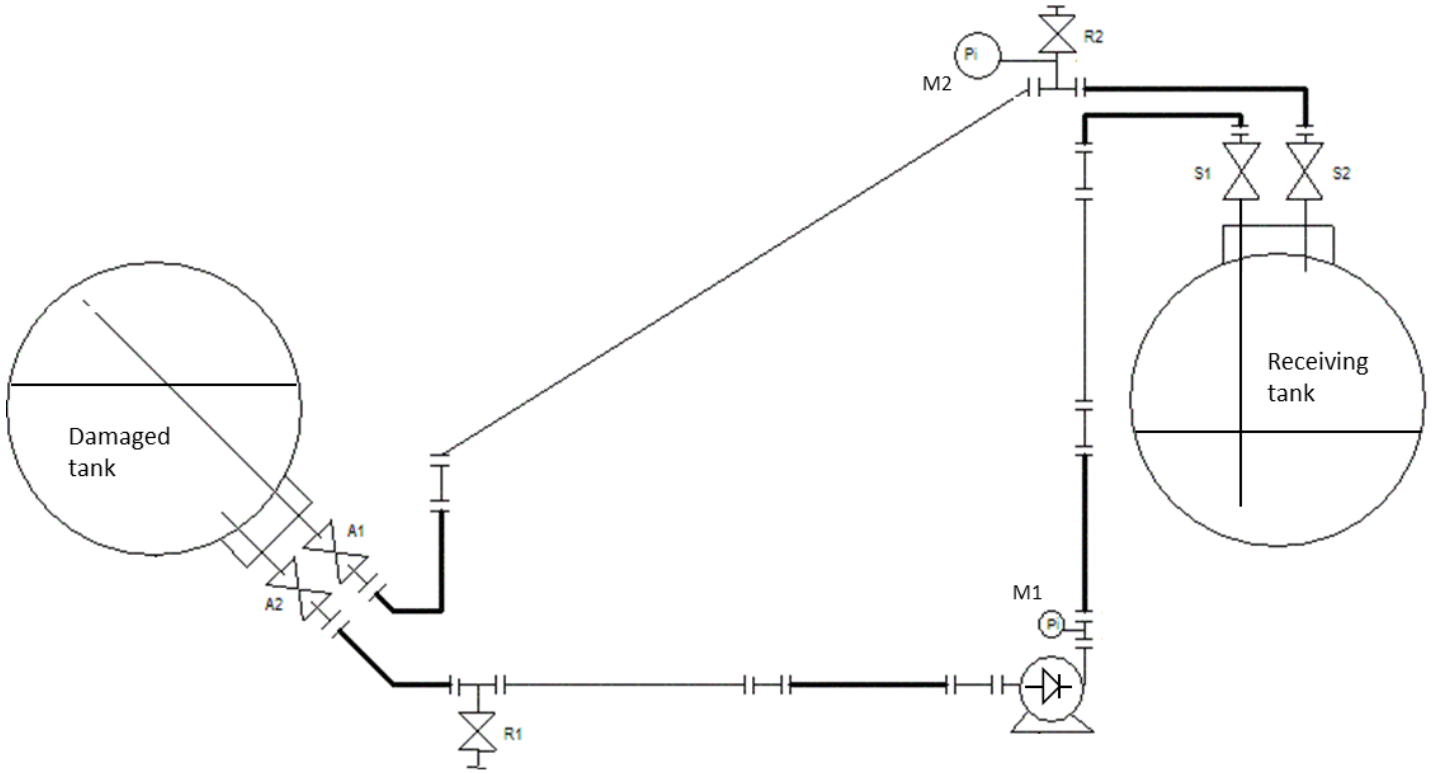
ACTIONS	COMMENTS	DANGER
❑ Check that valve S2 of the receiving tank (gas phase) is closed		
❑ Remove the blind flange and install a hose on the valve S2		
❑ Open the valve cover of the damaged tank		
❑ Check that valve A1 of the damaged tank is closed (liquid phase valve)	If the tank is upside down, the dip pipe of its liquid phase valve is actually in the gas phase	
❑ Remove the blind flange and install a hose on the valve A1		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece, manometer M2 and valve R2 (for pressure test)	Material suitable for AHF or aqueous HF	
❑ Check that valve S1 of the receiving tank (liquid phase) is closed		
❑ Remove the blind flange and install a hose on the valve S1		
❑ Install a hose on the discharge flange of the pump		
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece and manometer M1	Material suitable for AHF or aqueous HF	
❑ Check that valve A2 of the damaged tank (gas phase) is closed	If the tank is upside down, its gas phase valve is actually in the liquid HF phase	
❑ Remove the blind flange and install a hose on the valve A2		
❑ Install a hose on the suction flange of the pump		

ACTIONS		COMMENTS	DANGER
❑ Make a connection between these hoses using a steel or PTFE-lined pipe, with a T-piece and valve R1 (for pressure test)			
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen) on R1 and pressure test the connection. If tight, disconnect the compressed air/nitrogen supply from R1.			
❑ Install the compressed air/nitrogen supply (manometer, check-valve and hose of compressed air/nitrogen) on R2 and pressure test the connection. If tight, disconnect the air supply from R2.			
❑ Move up to the stage	**TMD/HF/122: Unloading**		

TMD/HF/122 UNLOADING

TMD/HF/122 Fig. 18: Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/122 Unloading

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

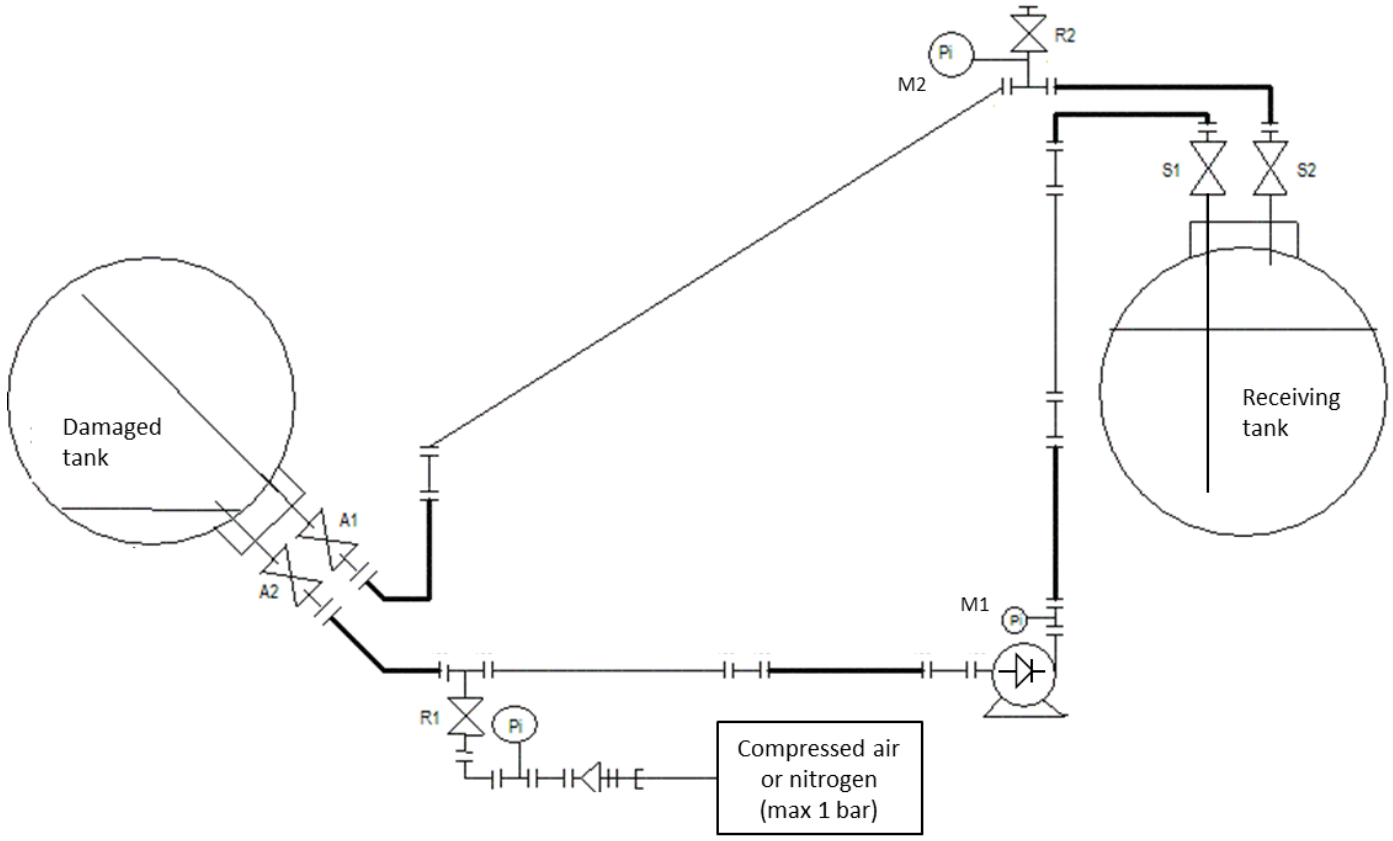
ACTIONS	COMMENTS	DANGER
❑ Check that valve R1 is closed		
❑ Check the presence of the blind flange on valve R1		
❑ Check that valve R2 is closed and check the presence of its blind flange		
❑ Open the valve A2 of the damaged tank		
❑ Open the valve S1 of the receiving tank		
❑ Open the valve S2 of the receiving tank		
❑ Start the pump		
❑ Check the correct operation of the pump	Listen to the sound of the pump	
➢ If the pump doesn't prime: move up to **TMD/HF/113: Priming of the Pump**		
➢ If the pump primes: open quickly the valve A1 of the damaged tank	Risk of further damage of the tank due to vacuum	
HF TRANSFER BEGINS AND MAY LAST FOR A FEW HOURS **Control the manometer M2:** ➢ **If it shows an overpressure or a vacuum, stop the pump and check the correct operation of valves A2 and S2**		
❑ A pressure drop on the manometer M1 will indicate the end of the transfer	Listen to the sound of the pump	
❑ Close the valve S1 about 10 minutes after the pressure drop		

ACTIONS		COMMENTS	DANGER
❑ Stop the pump			
❑ Close the valve S2			
❑ Close the valve A2			
❑ Close the valve A1			
❑ Move up to the stage	**TMD/HF/123: Sweeping up and cleaning of the pipes (liquid)**		

TMD/HF/123 SWEEPING UP AND CLEANING OF THE PIPES (LIQUID)

TMD/HF/123 Fig. 19: Sweeping up and cleaning of the pipes (liquid)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/123 Sweeping up and cleaning of the pipes (liquid)

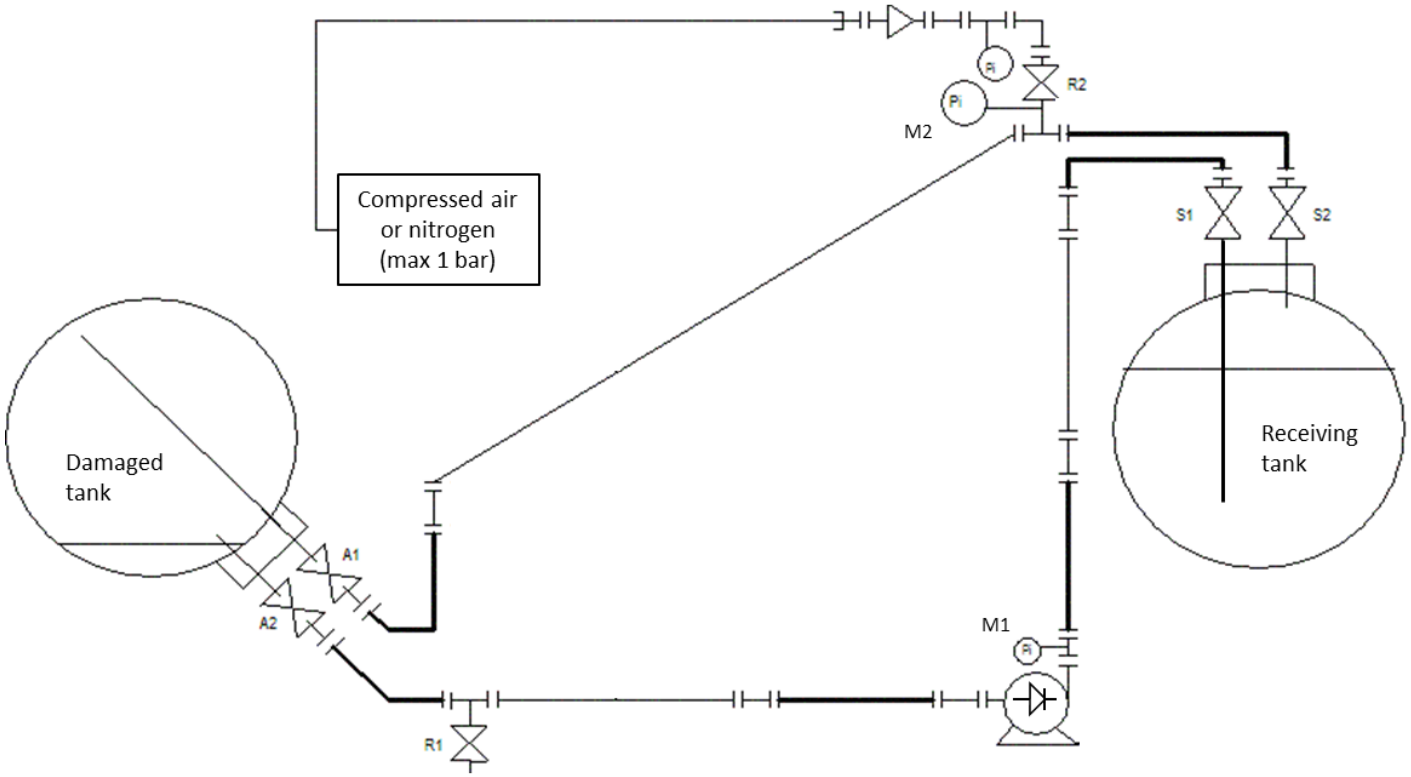
AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Remove the blind flange on valve R1		
❑ Install the compressed air/nitrogen supply (manometer, check-valve) on R1		
❑ Open the valve S1 of the receiving tank		
❑ Start the compressed air/nitrogen supply		
❑ Open the valve R1		
❑ Blow the pipe for a few minutes		
❑ Close the valve S1		
❑ Open the valve A2 of the damaged tank		
❑ Blow the pipe for a few minutes		
❑ Close the valve A2		
❑ Close the valve R1		
❑ Stop the compressed air/nitrogen supply		
❑ Disconnect the compressed air/nitrogen supply from valve R1		
❑ Open the valve R1 to depressurize the pipe		
❑ Close the valve R1 and reinstall its blind flange		
❑ Move up to the stage **TMD/HF/124: Sweeping up and cleaning of the pipes (gas)**		

TMD/HF/124 SWEEPING UP AND CLEANING OF THE PIPES (GAS)

TMD/HF/124 Fig. 20: Sweeping up and cleaning of the pipes (gas)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN



TMD/HF/124 Sweeping up and cleaning of the pipes (gas)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Install the compressed air/nitrogen supply (manometer, check-valve) on R2		
❑ Open the valve A1 of the damaged tank		
❑ Start the compressed air/nitrogen supply		
❑ Open the valve R2		
❑ Blow the pipe for a few minutes		
❑ Close the valve A1		
❑ Open the valve S2 of the receiving tank		
❑ Blow the pipe for a few minutes		
❑ Close the valve S2		
❑ Close the valve R2		
❑ Stop the compressed air/nitrogen supply		
❑ Disconnect the compressed air/nitrogen supply from valve R2		
❑ Open the valve R2 to depressurize the pipe		
❑ Close again the valve R2 and re-install its blind flange		
❑ Move up to the stage **TMD/HF/125: Disconnecting**		

TMD/HF/125 DISCONNECTING

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ Open the valve R1 in order to depressurize the pipe	HF gas possible	
❑ Close the valve R1		
❑ Remove the connection between the valve A2 of the damaged tank and the suction side of the pump	HF gas possible	
❑ Reinstall the blind flange on the valve A2		
❑ Remove the connection between the valve S1 of the receiving tank and the discharge side of the pump	HF gas possible	
❑ Reinstall the blind flange on the valve S1		
❑ Close the valve S2 of the receiving tank		
❑ Remove the connection between the valve S2 and the valve A1 of the damaged tank		
❑ Reinstall the blind flange on the valves A1 and S2		
❑ Clean hoses, pipes and valves in a container with carbonate solution and treat it correctly at the plant site	If not available, flush with water and discharge in an appropriate water treatment facility	
❑ Check that valves A1 and A2 are correctly closed		
❑ Check the presence of the blind flange on valves A1 and A2		
❑ Lift the tank with the help of jack or cranes to put it back in upright position		

❑ Move up to the stage	**TMD/HF/110: Unloading of the damaged tank by pumping (upright tank)**	And continue unloading according to TMD/HF/110	

TMD/HF/130 Final steps

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

ACTIONS	COMMENTS	DANGER
❑ In case of potential soil contamination, in agreement with authorities, consider any remediation of the ground		
❑ Neutralize and clean equipment and protective suits		
❑ Repatriate all tanks and the equipment		

TMD/HF/200 Transport of the full damaged tank (not transloaded)

AT ALL STAGES, APPROPRIATE PPE MUST BE WORN

The damaged tank will be transported to the closest suitable industrial facility, preferentially in upright position (valves in gas phase). Local authorities will organize security during transportation.

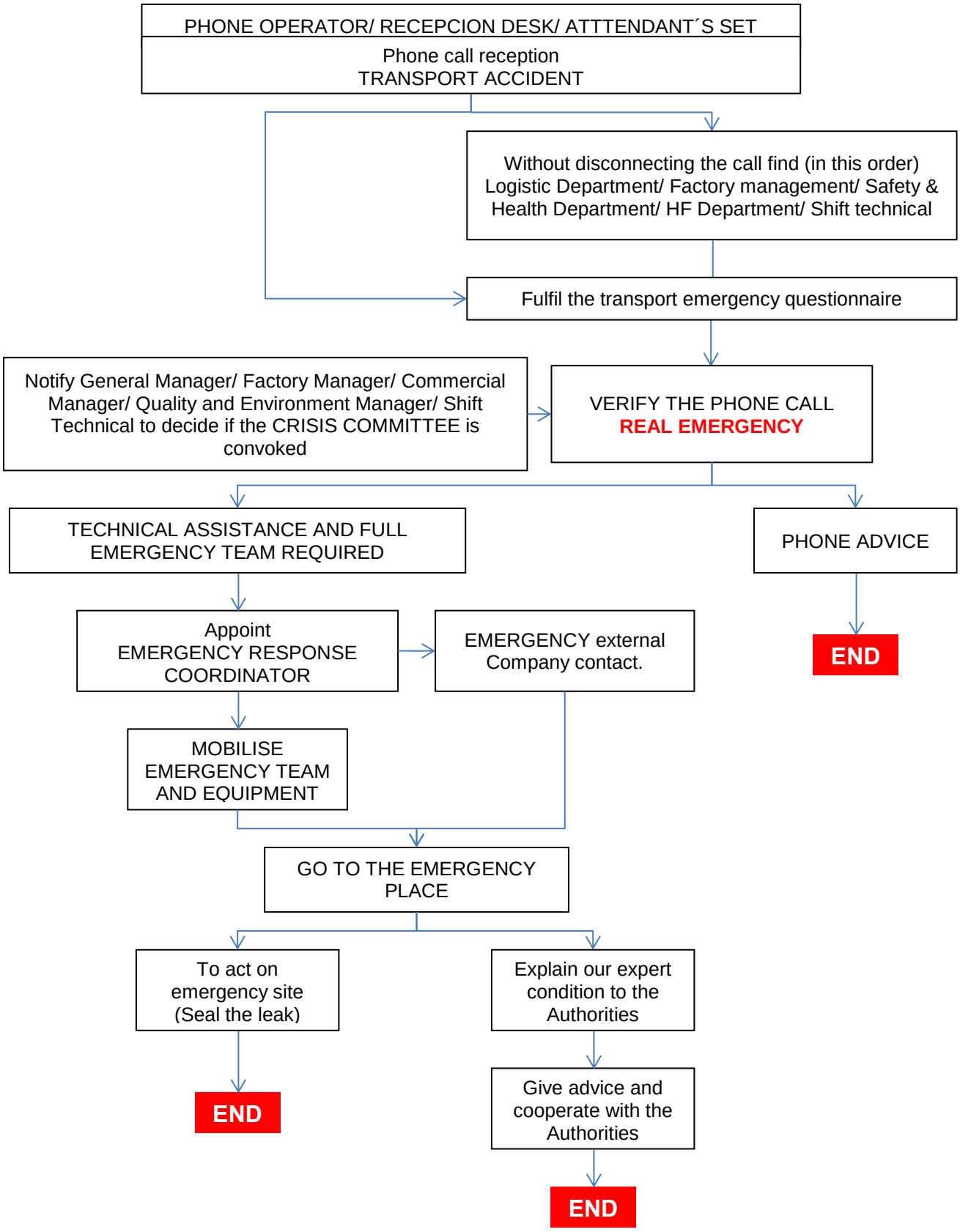
It is strongly recommended to escort the damaged tank during transportation. In case a leak occurs during transportation, all the necessary equipment has to be prepared to face the situation:

- suitable PPE
- neutralization agent
- equipment to seal the leak
- equipment to transfer the product

If a leak occurs during transportation, move up to the stage

TMD/HF/050: Sealing of the leak

ANNEX I: TRANSPORT EMERGENCY FLOWCHART AND QUESTIONNAIRE



1. WHO IS CALLING?
Name and Surname
Address
Phone number where the caller can be located
Job title, company, Official Agency
Who has been informed of the accident (press/ local administration…?)
Date and hour

2. ACCIDENT LOCATION
Date and hour
In which road? Kilometre point? Direction of the traffic?
Town, nearest town, province
Train kilometre point
Nearest Train station
Accessibility

3. ACCIDENT ASSESSMENT
Driver Health Status (conscious/ unconscious, injured…)
Is there any people injured?
Which kind of injures?

Do you know which product is?
Can you see the UN number? What is the UN number? UN1790 (Aqueous HF), UN 1052 (AHF)
And the Labels?
Kind of vessel? (tank, tank container, drum, jerrican…)
Is there any leak?
Do you see fumes? Do you see Liquid?
What kind of accident was it? (Truck breakdown/ dump truck/ output road/ loss of load…)
Is there any fire in the surroundings?
Situation of the truck (road/ shoulder/ landfill etc…)
Weather conditions (rain, snow, fog, wind)
The area has been sealed off?
Is there the Traffic Police on the scene?
Are there the Firemen on the scene?
Others: