



Operating Instructions
in compliance with
Pressure Equipment Directive 2014/68/EU

Sight Glasses



Please read these operating instructions carefully to ensure a safe operation and keep the same for further use.



Contents

Safety.....	4
Authorized personnel.....	4
Residual dangers.....	4
Symbols used for safety information	4
General safety information	5
Other information.....	5
Description of sight glass.....	6
Types – Principle of operation	6
Product description.....	6
Identification	6
Technical parameters.....	7
Design features	7
Transport and Storage.....	7
Mounting.....	8
Principles	8
Mounting preparation.....	8
Connecting the sight glass	8
Commissioning	9
Principles	9
Steps of commissioning.....	10
Operating, Maintenance and Repair	10
Principles	10
Repair	11
Dismantling and Disposal.....	11
Principles	11

Safety

The sight glass is designed for use in refrigeration/air conditioning systems referred to as systems hereinafter. It may only be put into service if installed into the system unchanged in accordance with these instructions and as a whole is compliance with the statutory provisions.

The sight glass incorporates state-of-the-art technology and has been built according to the applicable regulations. Great value has been set upon the user's safety.

These operating instructions are integral part of the contract and shall be kept throughout the entire life of the sight glass.

Authorized personnel

Only trained and instructed personnel shall be allowed to do any work on the sight glass. As regards the qualification and expertise of the personnel the applicable rules and guidelines shall apply.





Residual dangers

Unavoidable residual dangers may emanate from the sight glass. Every person working on this device shall therefore carefully read these instructions.

To be observed are for example:

- the generally accepted safety regulations,
- EC directives,
- Norms (e.g. EN 378) and all national provisions.







Symbols used for safety information

	<p>DANGER! Instructions on preventing imminent serious danger to persons. Imminent most serious injuries or death as a possible consequence. Any non-observance may lead to an immediate failure of the sight glass.</p>
	<p>WARNING! Instructions on preventing potential serious danger to persons. Avoidable serious to very serious injuries or death as a possible consequence. Any non-observance can cause the sight glass to fail.</p>
	<p>CAUTION! Instructions on preventing a minor danger to persons. Minor, reversible injuries cannot be excluded. Any non-observance may lead to a medium-term failure of the sight glass.</p>
	<p>ATTENTION! Instructions on preventing potential damage to equipment. Minor, reversible injuries cannot be excluded. Any non-observance may lead to a medium-term failure of the sight glass.</p>

General safety information

These operating instructions are based on the safety requirements of DIN EN 378-2 and DIN EN 12178.

Instructions to prevent dangers in all cycles of service life:

	<p>DANGER! Risk of bursting if operated beyond the technical parameters. Most severe injuries and immediate system failure possible. Observe the technical parameters!</p>
	<p>DANGER! Risk of the sight glass disc bursting. Most severe injuries and immediate system failure possible. No shock-like cooling or heating of the sight glass disc!</p>
	<p>WARNING! Damage due to improper handling. Serious injuries and system failure possible. Never use the sight glass as transport, lifting or lashing point.</p>
	<p>WARNING! Any non-observance of the instructions may cause the sight glass to fail. Avoidable serious to very serious injuries or death possible. Installation, operation and maintenance by authorized trained personnel only.</p>
	<p>WARNING! Risk of service fluid to be released. Depending on the kind of service fluid serious to very serious injuries or death possible. Wear personal protective equipment (e.g. respirators, gloves).</p>
	<p>CAUTION! Very cold or very hot surface temperatures possible. Frostbites/burns possible. Wear personal protective equipment (e.g. respirators, gloves).</p>

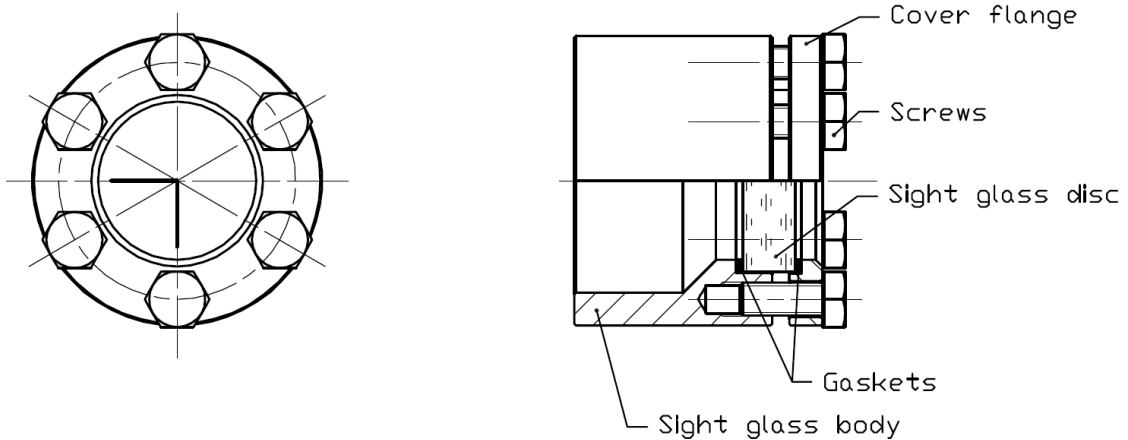
Other information

The information contained herein represents to the best of our belief our knowledge at the time when these instructions were prepared. It shall serve as code of practice to ensure a safe handling of the sight glass in transport, storage, installation, commissioning, maintenance and dismantling/disposal. A final decision as to whether the sight glass suits the purpose is to be taken by the user. This information shall not be deemed a warranty of quality.

Any modification of the sight glass and operation under other than the prescribed parameters shall not be allowed and will result in the loss of the conformity declaration and all liability claims.

Description of sight glass

Types – Principle of operation



Installation dimensions can be gathered from the AWA product catalogue or the technical documents.

Product description

The sight glass is used for direct visual display of the liquid level in components of refrigeration or air conditioning systems. The sight glass can be welded on liquid receivers, containers or pipes.

The sight glass consists of a sight glass body, sight glass disc, gaskets and a cover flange and screws.

The sight glass is in conformity with DIN 28120 / DIN 7080 and the Pressure Equipment Directive 2014/68/EU.

Identification

The sight glass is marked according to DIN EN 12178:2016 on the sight glass body and cover flange:

- Mark of sight glass manufacturer
- Type
- Year of make coded
- Allowable operating pressure and temperature range
- TUEV
- Part number
- Material number of sight glass body and clamping flange

Technical parameters

Pressure/temperature allocation:

As indicated in the technical documents.

Media used:

Refrigerants according to EN378-1 (2016): Safety Group A1 to A2, B1 and B2L (PED Fluid Group 1 and 2) and appropriate refrigerating machine oils according to DIN 51503-1.

Other refrigerants (e.g. R290) can be permitted depending on what has been indicated in the technical documents.

Leak tightness with proper mounting:

according to DIN 8964-3 (<4,1 g/a R134a at 10bar)

Classification based on the Pressure Equipment Directive 2014/68/EU:

The sight glass is a pressure-retaining component.

Approval according to the Pressure Equipment Directive 2014/68/EU:

EC design examination (test report 0662/1938/14)

Manufacturer's approval according to Modules A2 and C2 available.

Design features

- The sight glass body is designed so that it can be welded directly to the container or steel pipes.
- The sight glass consists of a sight glass disc, which is protected by gaskets, is mounted pressure tight between the sight glass body and a cover flange by with screws.
- The sight glass is designed in accordance with the AD 2000 Codes of Practice, series B and DIN 28120.
- The material of the metal sight glass components were selected in accordance with the AD 2000 Codes of Practice, series W in conformity with the EN 12178 and the Pressure Equipment Directive 2014/68/EU, thus guaranteeing the reliability over the range of application indicated.
- The sight glass disc according to DIN 7080 is made of borosilicate glass.
- The sight glass comes with a temporary anticorrosive coating. It provides corrosion protection until installation if transported and stored in dry condition.
- The service-friendly design makes it possible to purchase spare parts separately (e.g. gaskets, sight glass pane, cover flange).


Transport and Storage

Transport the sight glass in its original packing protected against weather influences in closed means of transport and store it in dry areas.


Mounting

Principles


- The sight glass and/or the connecting piece shall be arranged in the system so that it can be operated properly and that it is and protected from possible hazards.

	DANGER!
	<p>Damage of sight glass possible. Serious injuries and system failure possible during operation. Sight glass to be installed without additional loads (forces, vibrations, etc.).</p>

- Removal space shall be so that the sight glass can be properly mounted by use of a tool and at the necessary torque.
- Only authorized personnel shall be allowed to mount the sight glass.

	DANGER!
	<p>Any non-observance of these instructions may cause the sight glass to fail. Most serious injuries and death possible. Mounting by personnel trained in refrigeration systems only.</p>

- No modifications of the sight glass are permitted. If modifications become necessary, they have to be agreed with the manufacturer prior to mounting.


	WARNING!
	<p>Product features may change. Avoidable serious to very serious injuries or death possible. Any modification has to be agreed with manufacturer in advance.</p>


Mounting preparation

- The sight glass is finger-tight when supplied.
- The sight glass must be dismantled before mounting (screws, sight glass disc, cover flange, gaskets). The components, in particular the sight glass disc and the gaskets, must be stored protected against damage until later use.

Connecting the sight glass

- The dimension of the connecting piece must fit that of the sight glass body. If not, use adapters.
- Prepare the connections so (metallic bright and grease-free) that a high-quality joint can be made.
- Scavenge the relevant pipe sections with shielding gas during welding. Then allow the connection to cool down in the air.

	WARNING!
	<p>Damage of the sight glass body due to excessive heating possible. Serious injuries and system failure during operation possible. Avoid excessive heating of the system connection.</p>

	WARNING!
	<p>Damage of sight glass body (e.g. crack formation) due to rapid cooling possible. Serious injuries and system failure during operation possible. Allow the joint to cool down in the air.</p>



WARNING!

Risk of damage of sight glass disc by welding distortion on the sight glass body. Serious injuries and system failure during operation possible. Minimize welding distortion by suitable actions.

4. Clean the welded connection.



CAUTION!

Risk of increased corrosion and component damage. Serious injuries and system failure during operation possible. Thoroughly clean the joint when the work has been finished.

5. Cleaning of all components before installation, removal of contaminant (e.g. metal chips, welding splashes)
6. Mount the sight glass components on the sight glass body in the following order:
 1. Sight glass body – gasket – sight glass disc – gasket – clamping flange – screws. Ensure that the components are correctly positioned. The inscription on the sight glass disc must point to the pressureless side, the inscription of the clamping flange must be legible. Damaged components must not be mounted.
 2. Initially screw the screws finger-tight. The general technical rules for preventing seizing must be observed for stainless steel screw connections (use anti-seize).
 3. Then, tighten the screws crosswise in min. 2 steps apply the given torques (in Nm).

Thread	1 st step	2 nd step	Final torque
M 8	finger-tight	10	20 +5
M 10	finger-tight	25	50 +5

Note on mounting sequence: see figure in chapter "Types – Principles of operation".



WARNING!

Any excessive torque or non-observance of the mounting order may cause failures. Serious injuries and system failures possible during operation. Observe the mounting order, screwing order and torque.

Commissioning

Principles

- The sight glass is an additional unit. Due to its design any leak test of the unit cannot be done before the connection and assembly.
- The sight glass and the system into which it is installed, may only be commissioned if they have been checked, with due regard to the intended mode of operation, for proper condition as to assembly, installation, set-up conditions and safe functioning.
- After mounting and initial start-up according to DIN EN 378-2:2016 the end user shall check again for leakage and strength and an effective corrosion protection.

Steps of commissioning

1. Check the system with suitable media (e.g. helium, dry nitrogen) for tightness and pressure resistance.


DANGER!

Danger of sight glass bursting.
Most serious injuries possible.
The test pressure must not exceed the maximum allowable pressure (PS).
Strictly observe the safety information (e.g. DIN EN 378).

2. The application of a corrosion protection adapted to the operating conditions is always necessary for sight glasses made of steel and under certain circumstances for sight glasses made of stainless steel. Make sure that the fabrication data remain legible.


CAUTION!

Delayed failures due to corrosion possible.
Serious injuries and system failure during operation possible.
Apply a suitable anticorrosive coating.


ATTENTION!

Loss of product conformity if lettering becomes illegible.
Loss of warranty.
Lettering must remain legible.

3. Evacuating and filling the system with refrigerant


DANGER!

Danger of bursting if operated beyond the technical parameters.
Most serious injuries possible.
Observe the technical parameters of the sight glass.
Make sure the system is not filled with an excessive amount of refrigerant.

4. Never cool down or heat up abruptly. The temperature gradient of the sight glass shall not exceed 30K.


CAUTION!

Cracks and resulting leakage of the glass lens possible.
Injuries and system failure during operation possible.
Observe the temperature differences.

Operating, Maintenance and Repair

Principles


- The sight glass is maintenance-free.
- The sight glass must not be cool or heated in a shock-like manner.
- The regular system inspection should include checks for corrosion, damage and proper functioning of the sight glass. If necessary, proper condition should be restored.


WARNING!


Media contact possible, contact with hot/cold surfaces.
Burns, frostbites
Wear personal protective equipment as prescribed by national regulations during maintenance and inspections.

Repair


- If the sight glass needs repair, shut down the system, drain the refrigerant from the system (or system section) in an environmentally friendly manner and ventilate the system.

	DANGER!
	<p>Refrigerant may escape. Leaking refrigerant may cause most serious injuries. For repairs the system must have the right temperature, free from refrigerant and sufficiently ventilated.</p>

- Do not reuse sight glass disc after operation.

	DANGER!
	<p>Risk of the sight glass disc bursting. Most severe injuries and immediate system failure possible. Use a new sight glass disc.</p>


- For repairs use no other than original spare parts. For mounting/start-up follow these operating instructions. It is indispensable to do a leakage and strength test once again. AWA assumes no warranty for tightness after repairs.


	WARNING!
	<p>Sight glass damage due to defective spare parts/mounting. Avoidable serious injuries and system failure possible. Use no other than original spare parts for repairs.</p>

Dismantling and Disposal

Principles

- To dismantle the sight glass, shut off the system, remove the refrigerant from the system (or system section) in an environmentally friendly manner and sufficiently ventilate the system (or system section).

	DANGER!
	<p>Possible escape of refrigerant. Escaping refrigerant may cause most serious injuries. For repairs the system must have the right temperature, free from refrigerant and sufficiently ventilated</p>

	WARNING!
	<p>Media contact possible, contact with hot/cold surfaces. Burns, frostbites Wear personal protective equipment as prescribed by national regulations during maintenance and inspections.</p>

- The sight glass and its components can be recycled:

Metal parts:	stainless steel/steel scrap
Glass lens:	used glass
Dust caps:	plastics (PE)



Armaturenwerk Altenburg GmbH

Am Weißen Berg 30
D-04600 Altenburg
Germany

Telefon +49 (0) 3447-893-0
Telefax +49 (0) 3447-811-10

Internet: <http://www.awa-armaturenwerk.de>
E-Mail: info@awa-armaturenwerk.de

Subject to change as of: 08.2019
Document 90000712 Revision 01