



GESTRA Steam Driers and Purifiers TD

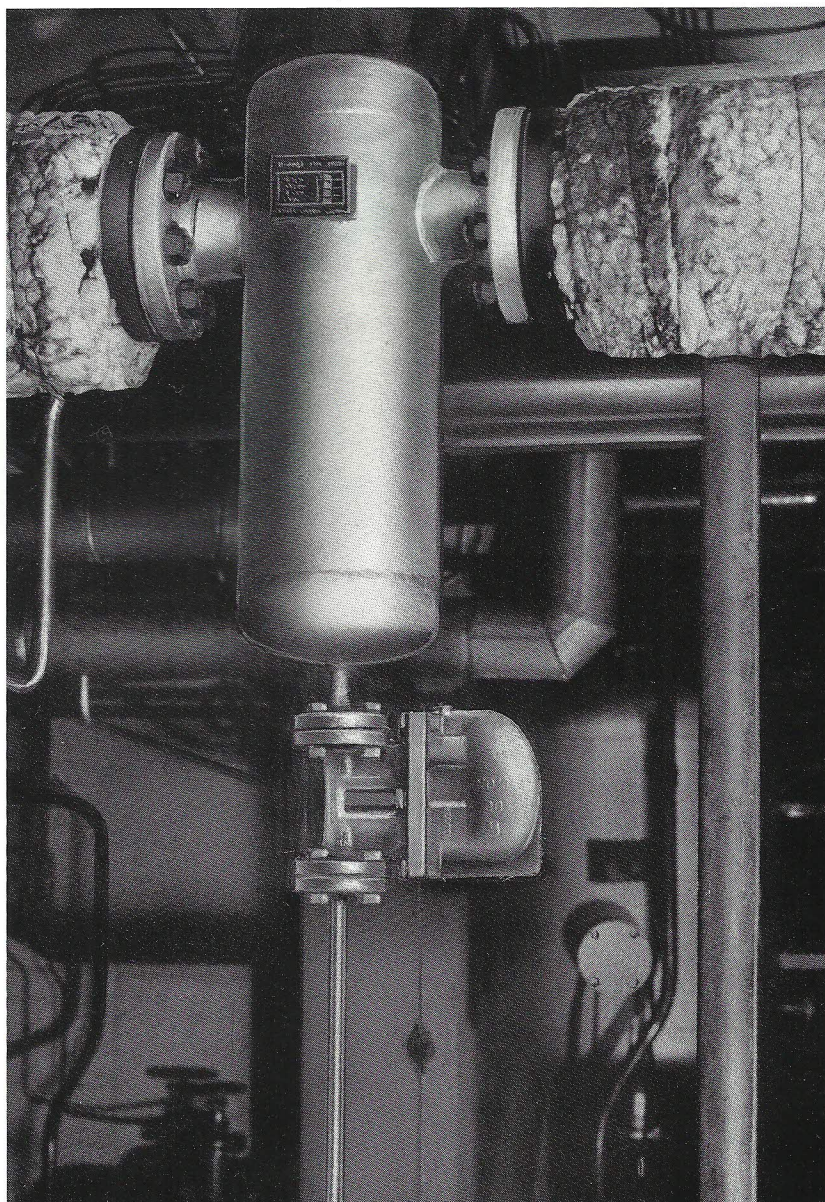
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GESTRA Steam Driers and Purifiers

1. General

Dry and pure steam is an absolute necessity if optimum operating safety, trouble-free and economic operation and a long service life of heat exchangers and steam users are to be obtained. This applies equally to land and marine installations.

GESTRA steam driers and purifiers are ideal for their task. They can either dry and clean the steam simultaneously or act solely as steam driers or as steam purifiers.



Steam drier
with automatic condensate discharge
through a GESTRA float trap
type UNA 2

2. Applications

A few typical examples of the many possible applications for steam driers and purifiers:

2.1 In land installations

Inside or immediately downstream of steam boilers.

Between boiler and superheater.

In steamlines upstream of branches or low points, in district-heating lines and flash-steam lines.

Upstream of turbines, steam engines, steam tools such as steam hammers etc..

Upstream of large control valves.

For direct heating with steam, in spray-vapour humidifier systems for air-conditioning plants.

In laundries and dry-cleaning shops.

2.2 On ships

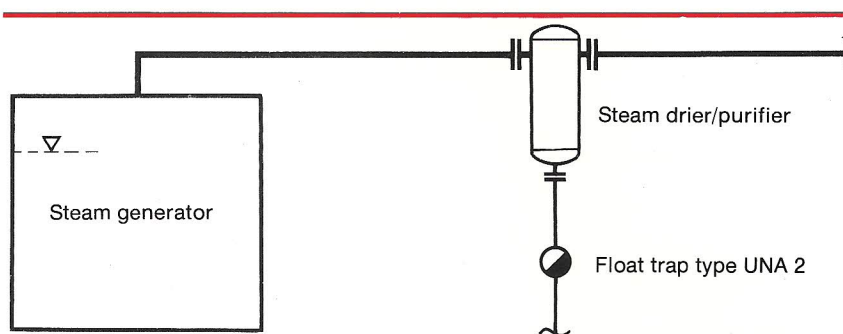
Upstream of turbines, steam pumps, main and auxiliary ejectors.

In bleed lines from the main turbine.

Upstream of ships' sirens and soot blowers.

Upstream of capstans and windlasses.

Upstream of steam engines, such as winches, pumps, etc.



Steam drier mounted immediately downstream of a steam generator

2.3 Steam driers immediately downstream of steam boilers

The steam demand in a plant is not generally constant, but the amount required varies, since the number of steam consumers with intermittent demand is normally quite significant. Peak steam extraction from a boiler leads to a pressure drop, so that part of the water evaporates very rapidly. Because of this rapid evaporation and extraction, water is carried over with the steam. The amount can be quite considerable.

The water carried over into the superheater or the steamlines can cause considerable damage: The temperature required in the superheater cannot be maintained, pitting, erosion or even waterhammer in the steam spaces might occur. The water will carry over salts which will form deposits in pipelines etc., reducing the cross-sectional areas and heat transfer and producing corrosion and dangerous overheating of the superheater tubes.

All these hazards are eliminated by a steam drier mounted downstream of the boiler.

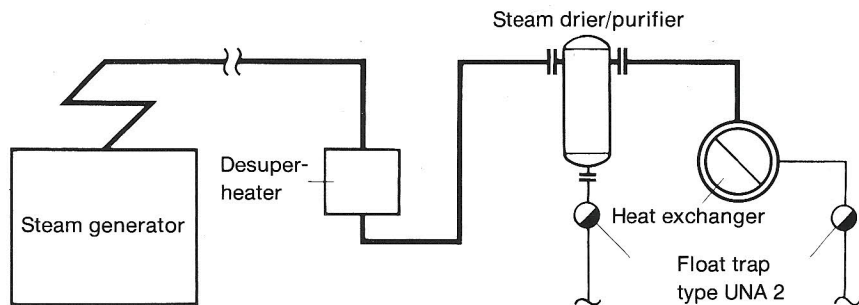
Water is also carried over with the steam, if the steam consumption is too high. With a steam drier mounted immediately downstream of the boiler (or inside) a larger capacity of dry steam can be obtained.

2.4 Steam driers in steamlines

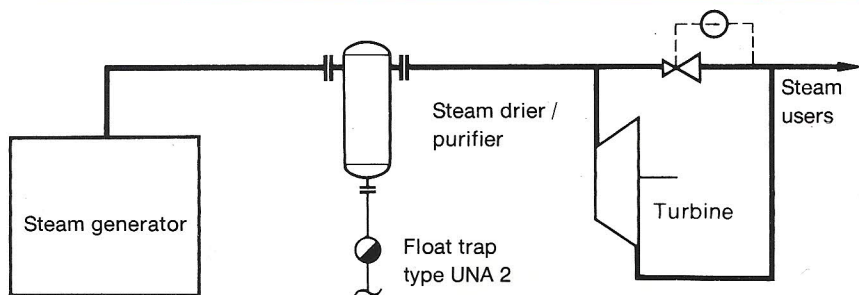
Condensate formation in saturated steamlines is inevitable, even if the pipelines are well insulated, as heat is always radiated.

Condensate is mainly formed during start-up of a plant, as long as the pipelines are cold. If the steam is required for driving a turbine or engine, normal pipeline drainage quite often is not sufficient, the steam has in addition to be dried.

Condensate carried over with the steam might — because of its high velocity — lead to erosion and pitting in elbows, reducers, valves and steam users. Furthermore there is the danger of waterhammer. The heating capacity is reduced by the water in the steam spaces.



Steam drier mounted upstream of a heat exchanger



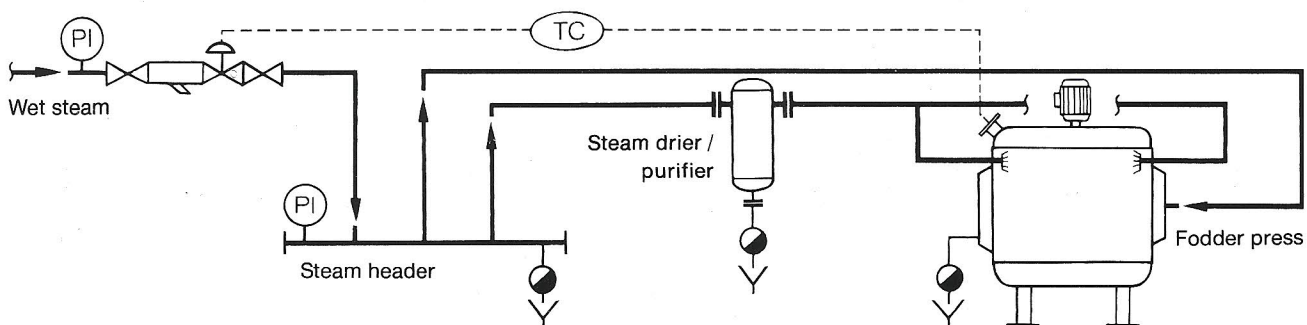
Steam drier mounted upstream of a turbine

Even steam lines carrying superheated steam might require a steam drier, e. g. upstream of a turbine to avoid damage by wet steam as a result of a faulty operation.

2.5 Steam purifiers

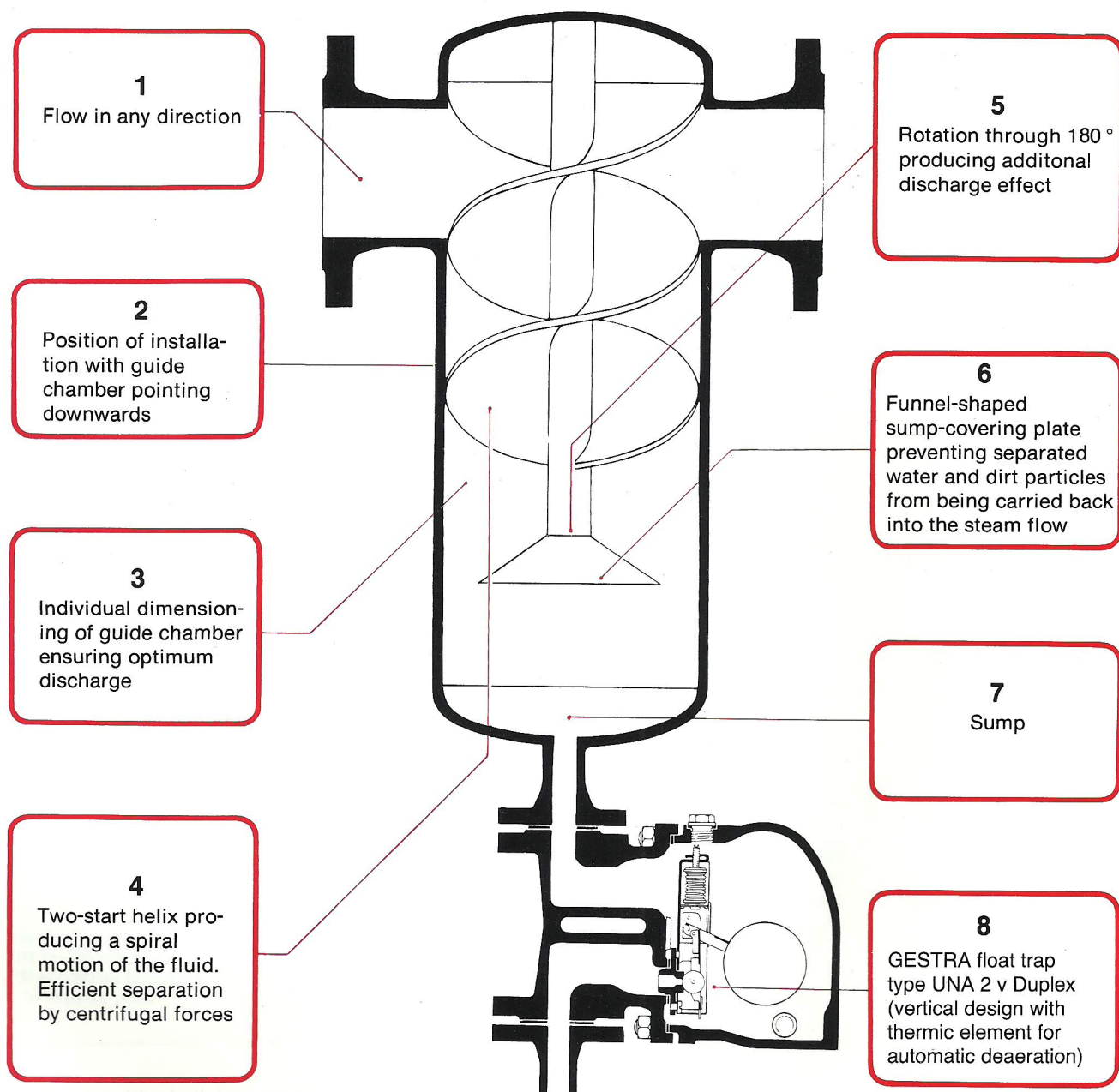
A considerable number of plants require absolutely pure steam, the degree of dryness being not so important, for example heating or humidifying of products by direct steam injection. In these cases the apparatus is mainly used for purifying the steam, but simultaneously acts as a steam drier.

The use of a steam purifier upstream of turbines or engines operated with superheated steam is also recommended. Foreign particles carried forward with the superheated steam would cause severe damage to the turbine or engine.



Steam purifier mounted upstream of a fodder press

3. Design and operation



The steam drier and purifier has no moving parts. The guide element (a two-start helix) is welded to the body. One passage of the helix is joined to the inlet and the other to the outlet port.

The wet, unpurified steam enters the steam drier, flows down the guide element in a spiral motion and, after a rotation through 180° above the sump-covering plate, passes to the outlet. The centrifugal forces, as well as the impact and swirling effects, separate the particles with a heavier specific gravity,

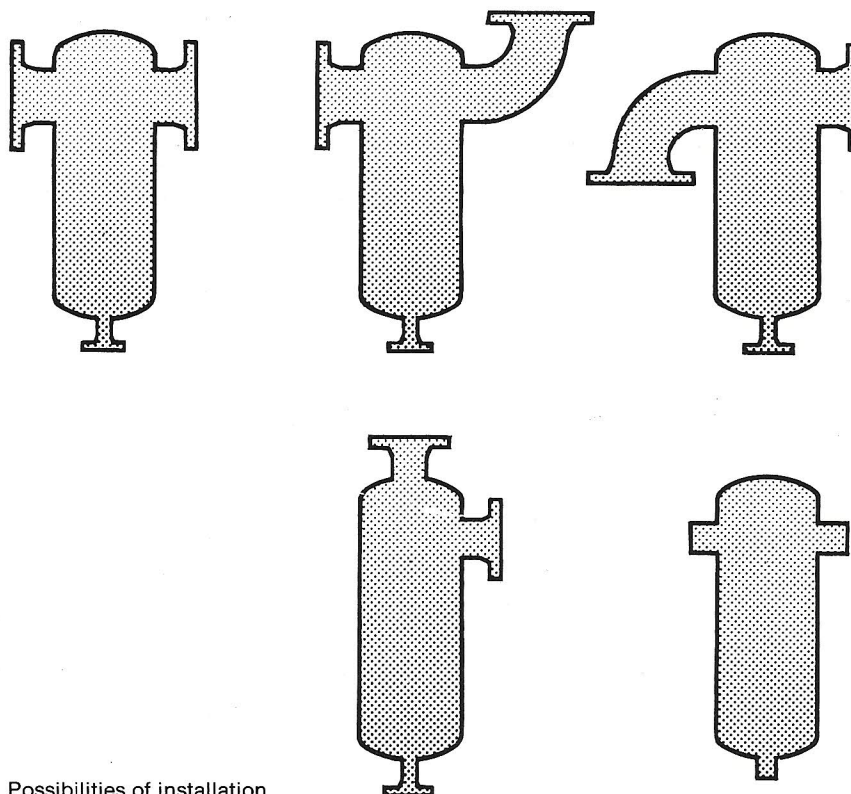
such as condensate, moisture in suspension, boiler sludge, dirt, scale etc., from the lighter fluid steam. The separated heavier particles are deposited in the sump. The abrupt rotation of the steam flow path from one passage of the helix to the other, prevents the particles from being carried back into the steam flow.

The guide chamber individually dimensioned in accordance with the operating conditions produces an optimum discharge effect. The humidity remaining in the steam lies

generally far below 1 per cent, the dirt particles are completely discharged. Even with partial load or overload the steam drier and purifier reaches a high efficiency.

The heavier particles (water and dirt) are deposited in the sump below the sump-covering plate from where they have to be discharged. GESTRA float traps are ideally suited for this purpose, as their operation is unaffected by dirt and independent of the temperature.

4. Installation



Possibilities of installation

The steam driers and purifiers must always be installed with the guide chamber pointing downwards, so that the heavier particles to be discharged are deposited in the sump. There are, however, several possibilities of connecting the steam drier to the pipeline.

Inlet and outlet port horizontal (inline connection).

With elbow for vertical inlet/horizontal outlet or horizontal inlet/vertical outlet.

Direct vertical inlet and outlet horizontal or vice versa.

If the steam is to be dried immediately after its generation, it is recommended that the steam drier is installed directly downstream of the boiler or between boiler and superheater.

If the steam required by a particular user has to be really dry, the steam drier should be installed immediately upstream of this user. In widely spread steam systems one steam drier should be installed upstream of each steam user.

In many plants provided with a drier inside or directly downstream of the steam generator additional steam driers might be required upstream of the individual steam users.

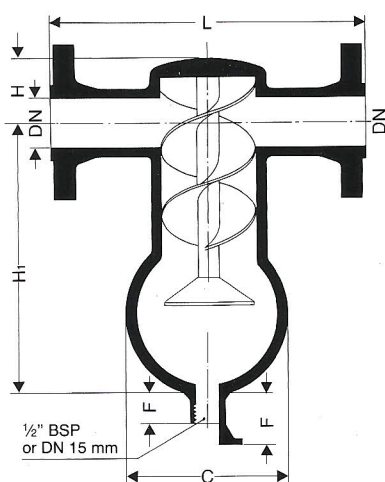
5. Selection of steam driers, dimensions

GESTRA steam driers and purifiers are made to customers' specifications in accordance with the operating conditions at the place of installation. The guide chamber is dimensioned so that an optimum discharge effect is obtained.

The chart on the following page can be used to determine the NGr Nr.¹⁾ of the steam drier. In cases of doubt, please consult us.

The materials used for GESTRA steam driers and purifiers and their pressure ratings are chosen in accordance with the operating conditions. The standard range comprises steam driers and purifiers up to PN 40. Higher pressure ratings are possible. They are available in nominal sizes (DN) 15–500 mm ($\frac{1}{2}$ –20") with flanges to DIN (flanges to ANSI and screwed sockets on request). All steam driers and purifiers are provided with a socket for the drain connection, with female thread or flange, as requested.

1) The NGr Nr. indicates the size of the guide chamber and is independent of the pipe size.

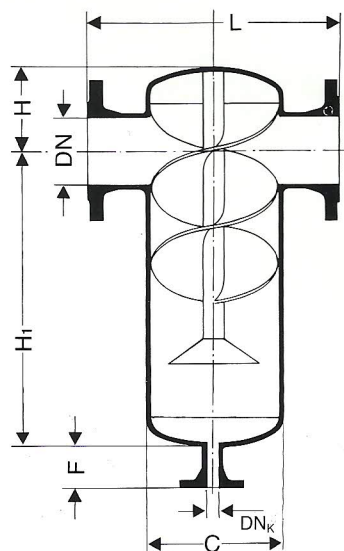


Steam drier/purifier,
DN 15–50 mm ($\frac{1}{2}$ –2")
PN according to requirements
and material used

NGr Nr.		15	20	25	32	40	50
DN ²⁾	mm	15	20	25	32	40	50
	in	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
Dimensions in mm	L	210	220	220	220	270	270
	H	36	36	36	36	50	50
	H ₁	234	234	234	234	300	300
	C~	100	100	120	120	136	136
	F/Socket	20	20	20	20	20	20
	F/Flange	70	70	70	70	70	70
Volume	l	0.6	0.6	1.2	1.2	2.3	2.3

Alternatively: Cylindrical design

NGr Nr.		15	20	25	32	40	50
DN ²⁾	mm	15	20	25	32	40	50
	in	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
Dimensions in mm	L	210	220	220	220	270	270
	H	80	90	100	100	110	110
	H ₁	380	380	380	380	390	390
	C~	76	83	83	83	114	114
	F/Flange	70	70	70	70	70	70
	F/Socket	20	20	20	20	20	20
Volume	l	0.6	1.1	1.4	1.5	3.6	3.7



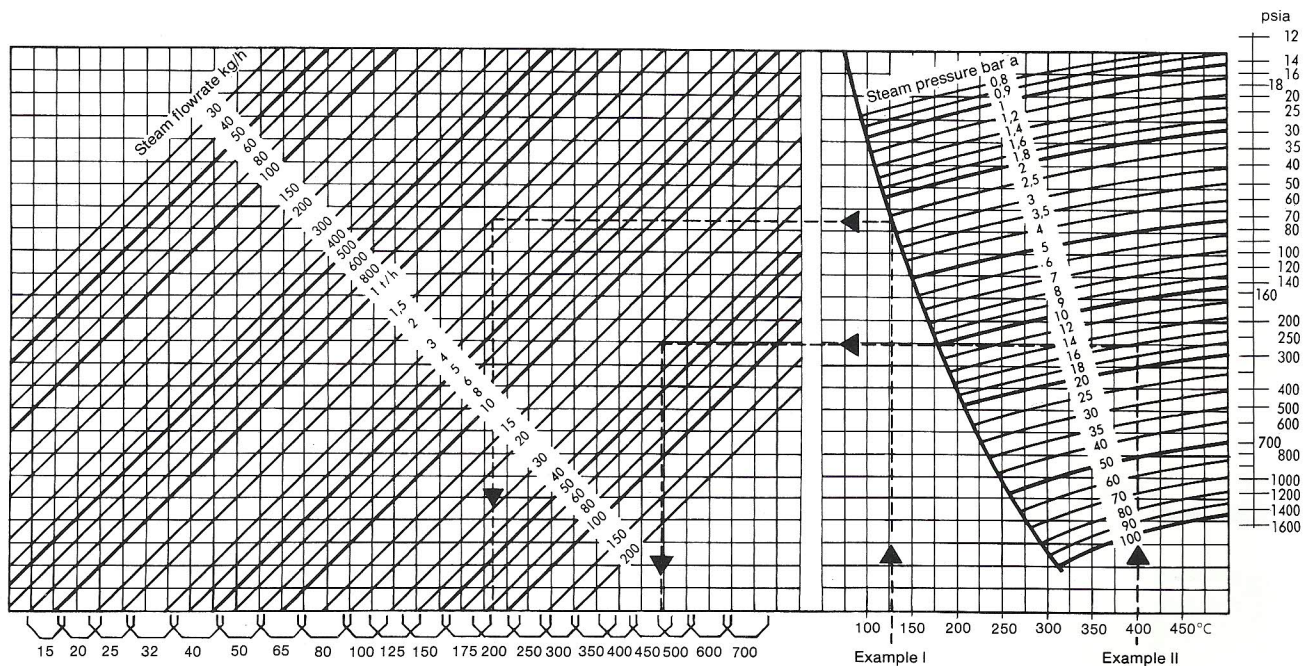
Steam drier/purifier,
DN 65–500 mm (2 $\frac{1}{2}$ –20")
PN according to requirements
and material used

NGr Nr.		65	80	100	125	150	175	200
DN ²⁾	mm	65	80	100	125	150	175	200
	in	2 $\frac{1}{2}$	3	4	5	6	7	8
DN _K	mm	15	15	20	20	25	25	25
	in	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1
Dimensions in mm	L	320	360	400	440	480	540	640
	H	140	150	165	190	215	235	260
	H ₁	470	510	595	680	755	875	1080
	C~	153	194	220	245	267	324	368
	F	70	70	70	70	70	70	70
Volume	l	9.8	14.3	22.8	32.8	46.0	74.8	120.0
NGr Nr.		250	300	350	400	450	500	
DN ²⁾	mm	250	300	350	400	450	500	
	in	10	12	14	16	18	20	
DN _K	mm	25	25	40	40	40	40	
	in	1	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	
Dimensions in mm	L	690	790	840	940	1100	1160	
	H	300	350	385	430	485	530	
	H ₁	1200	1310	1515	1660	1795	1970	
	C~	420	500	550	650	750	800	
	F	70	70	70	70	70	70	
Volume	l	165	300	391	532	890	1075	

2) Nominal sizes can be supplied to suit the pipe sizes.

Chart for determining the NGr Nr.

The chart shows the NGr Nr. to be chosen and the operating range as a function of steam temperature, steam pressure and steam flowrate.



NGr Nr.

Example I:

Given: saturated steam at 2.7 bar a
steam flowrate 1.5 t/h

Choose: NGr Nr. 200

Example II:

Given: superheated steam at 400° C, 16 bar a
steam flowrate 30 t/h

Choose: NGr Nr. 450

(Final determination of NGr Nr. reserved)

6. Materials, certificates of acceptance

Steam driers and purifiers are available in the following materials:

St 35, St 37—2, St 35.8,
boiler plate H II,
high-alloy steel 15 Mo 3 and 13 CrMo 4 4,
materials of higher quality on request.
X 10 CrNiTi 18 9 (DIN Nr. 1.4541)
X 10 CrNiMoTi 18 10 (1.4571)

GESTRA steam driers and purifiers are manufactured in accordance with standards set up by the following inspecting authorities:

German Technical Supervisory Association,
Lloyd's Register of Shipping,
Det Norske Veritas,
Bureau Veritas,
American bureau of shipping,
Germanischer Lloyd, etc.



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