CTG SW11 BR

STEEL WORK NOZZLES

CERTIFIED QUALITY SYSTEM UNI EN ISO 9001 SINCERT DNV

PNR

INTRODUCTION

INDEX

TECHNICAL PUBLICATIONS

PNR manufactures a complete range of spray nozzles for industrial application, and several products and systems based on spray technology.
Our complete product range is described by the following cutalogues:

PRODUCT RANGE	CTG TV 10 BR
GENERAL PURPOSE SPRAY NOZZLES	CTG UG 14 BR
AIR ASSISTED ATOMIZERS	CTG AZ 15 BR
COMPLEMENTARY PRODUCTS AND ASSEMBLY FITTINGS	CTG AC 15 BR
INDUSTRIAL TANK WASHING SYSTEMS	CTG LS 15 BR
EVAPORATIVE COOLING LANCES	CTG LN 15 BR
SPRAYDRY NOZZLES	CTG SP 10 BR
STEELWORK NOZZLES	CTG SW 11 BR

Our technical publications are continuously updated, and mailed to Customers whose name and address are registered into our Catalogue Mailing List.
We shall gladly register your name, if you mail to the nearest PNR office the form on page 21, duly filled with the required information.

NOTES

Our products are continuously reconsidered and modified to keep up with the latest state of technology. We regret not to be able to give our Customers previous advice about these modifications: for this reason the data and product specifications given in this Catalogue are to be understood as indications, and do not engage our Company. In case your application should imperatively, require that one or more characteristics of one of our products is strictly maintained, we ask you to obtain a written confirmation about your requirements before sending your order.

Dimensions in this Catalogue are given in mm.
All threads are manufactured according to the ISO 259 standards
(European norms BS 2779 - DIN 259 - UNI 338).
Explanations about the abbreviations used in the Catalogue are given at page 21.

CONTINUOUS CASTING

PRODUCT CHOICE

The products shown in this Catalogue are those commonly choosen for most continuous casting applications, Additional types are shown in our Catalogue **CTG UG14 BR** for general purpose spray nozzles for industrial processes.

Because of the number of casters we supply, we manufacture a wide additional variety of nozzles which are not included in our standard range and replace nozzles supplied by other manufacturers. We shall gladly quote you nozzles not included in this Catalogue, if given operating specifications about the Product you need.

HYDRAULIC NOZZLES

Our range of hydraulic nozzles, which has proven to be cost effective on continuous casting operations and is widely used worldwide, consists of the following nozzle types.

Male thread full cone nozzles, X-vane type
Our DB style, wide internal passages, cost effective and widely used in many plants. DB nozzles are normally available from stock or with short delivery times, at suitable prices.

Female thread full cone nozzles, disc vane type
Our AH style, very well known in the industry for being a simple construction, with good resistance to clogging and excellent water spray distribution, assure very uniform cooling processes.

Standard and slit type flat jet tips
With a narrow spray pattern flat jet tips are ideal to assure proper cooling in such places like foot rollers or in the bending and straightening sections. The wide range of water capacities assures that the proper nozzle for any installation is available.

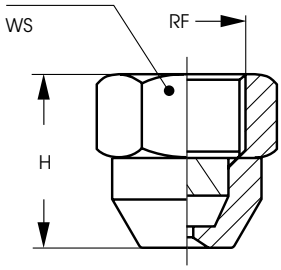
PRODUCT QUALITY

We keep tight controls on our manufacturing process in order to deliver quality products, but the care we put into our work does not stop here.
We want our products to give the best possible performance when assembled into your system, and for this reason we have selected and designed our packing materials so that our products reach their destination without damage due to handling, transportation and stocking.

CONTINUOUS CASTING

FULL CONE NOZZLES / DISC VANE

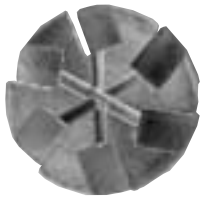
AH



AH nozzles produce a full cone spray pattern, with a very uniform liquid distribution over the entire coverage area. The special design of the internal vane, which do not show any small dimension passage, assures for an excellent resistance to clogging. Based on the above two features, AH series nozzles are widely used in continuous casting plants all over the world and have supplied years of trouble-free service.

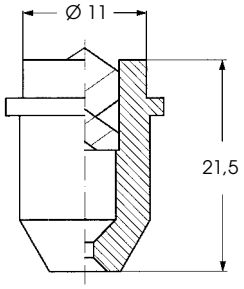
Material brass only
Thread 3/8" female BSP

	Nozzle code	RF	D	Nozzle flow values at different pressure values (lpm) (bar)					H	WS
				1	2	3	4	5		
65°	**AHR 1309 xx**	1/4"	1,9	1,8	2,5	3,1	3,6	4,1	25,0	19
	AHR 1362 xx		2,0	2,3	3,0	3,6	4,2	4,7		
	AHR 1409 xx		2,2	2,4	3,3	4,1	5,9	6,7		
	AHR 1517 xx		2,6	3,0	4,3	5,2	5,9	6,7		
	AHR 1207 xx	3/8"	1,0	1,2	1,7	2,1	2,4	2,7	27,0	22
	AHR 1310 xx		1,9	1,8	2,5	3,1	3,6	4,1		
	AHR 1340 xx		2,0	1,9	2,8	3,4	3,9	4,4		
	AHR 1363 xx		2,1	2,1	2,9	3,6	4,2	4,7		
	AHR 1415 xx		2,2	2,4	3,4	4,1	4,8	5,3		
	AHR 1470 xx		1,5	2,7	3,8	4,7	5,4	6,0		
	AHR 1518 xx		2,6	3,0	4,2	5,2	6,0	6,7		
	AHR 1621 xx		2,7	3,5	5,0	6,2	7,2	8,0		
	AHR 1780 xx		2,9	4,5	6,4	7,8	9,0	10,0		
	AHR 1828 xx		3,1	4,8	6,8	8,3	9,6	10,7		
	AHR 1873 xx		3,3	5,0	7,2	8,7	10,2	11,4		
	AHR 2110 xx	1/2"	4,2	6,5	9,1	11,0	12,7	14,2	36,0	27
	AHR 2144 xx		4,2	8,0	11,7	14,4	16,6	18,5		
	AHR 2154 xx		5,0	8,8	12,6	15,4	18,0	20,0		
80°	**AHT 1309 xx**	1/4"	2,2	1,8	2,5	3,1	3,6	4,1	25,0	19
	AHT 1362 xx		2,2	2,3	3,0	3,6	4,2	4,7		
	AHT 1409 xx		2,2	2,4	3,3	4,1	4,7	5,3		
	AHT 1517 xx		2,6	3,0	4,3	5,2	5,9	6,7		
	AHT 1310 xx	3/8"	2,0	1,8	2,5	3,1	3,6	4,1	27,0	22
	AHT 1340 xx		2,0	1,9	2,8	3,4	3,9	4,4		
	AHT 1363 xx		2,1	2,1	2,9	3,6	4,2	4,7		
	AHT 1415 xx		2,2	2,4	3,4	4,1	4,8	5,3		
	AHT 1518 xx		2,6	3,0	4,2	5,2	6,0	6,7		
	AHT 1621 xx		2,7	3,5	5,0	6,2	7,2	8,0		
	AHT 1780 xx		2,9	4,5	6,4	7,8	9,0	10,0		
	AHT 1828 xx		3,1	4,8	6,8	8,3	9,6	10,7		
	AHT 1873 xx		3,3	5,0	7,2	8,7	10,2	11,4		
	AHT 2110 xx	1/2"	4,2	6,5	9,1	11,0	12,7	14,2	36,0	27
	AHT 2144 xx		4,2	8,0	11,7	14,4	16,6	18,5		

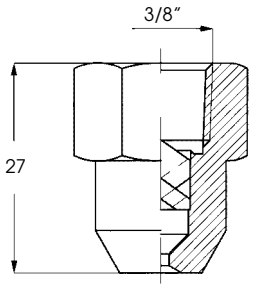


DISC VANE
The special design of this vane uses a series of peripheral passages to create the whirl action into the water flowing through the nozzle.
A series of milled grooves on the lower side of the vane, facing the inside of the whirl chamber, acts as an hydrodinamic brake over the fluid whirling at the center of the chamber, and provides for an evenly distributed full cone spray pattern.
All vanes are secured in place, so as not to exit from the nozzle body in case of dimensional change induced by high operation temperature.

FULL CONE NOZZLES / X-VANE



BX



BJ

BX & BJ

A typical continuous casting type, available as a nozzle tip or a female thread connection, BX and BJ series equip many casters around the world. They offer the same working specifications as the DB series nozzles, with the added flexibility of nipple-and-cap or female thread assembly. BJ nozzles are also available in a variety of spray angles and flow rates, in addition to the types listed below.

Material Brass

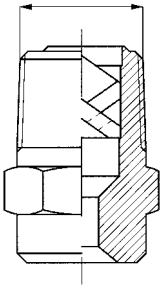
BX	BJ	Nozzle code	D	Nozzle capacity at different pressure values (lpm) (bar)					
				1	2	3	4	5	6
	•	**1149 T1**	1.2	0.91	1.25	1.49	1.72	1.90	2.11
	•	**1223 T1**	1.5	1.36	1.85	2.23	2.57	2.80	3.15
	•	**1262 T1**	1.6	1.59	2.14	2.62	3.02	3.30	3.70
•	•	**1372 T1**	2.0	2.27	3.03	3.72	4.30	4.70	5.26
•	•	**1508 T1**	2.3	2.95	4.07	5.08	5.86	6.10	7.18
•	•	**1626 T1**	2.9	4.14	5.30	6.26	7.23	8.17	8.85
•	•	**1743 T1**	2.9	4.91	6.29	7.43	8.60	9.70	10.5

X VANE

X vanes are a very popular design in steelworks as well as in many other industrial processes. Their simple design is based on two sloping flats which induce a whirl action into the fluid going through the nozzle, and two small slots cut into each flat to allow the full cone pattern to form correctly. All vanes are secured in place, so as not to exit from the nozzle body in case of dimensional change induced by high operation temperature.

DB series hydraulic nozzles are widely used in the first cooling zone of continuous casting machines, with overlapping patterns to minimize temperature gradients and reduce the risk of crack formation. Their simple two-piece construction, body and internal vane, good resistance to clogging, moderate price and short delivery times make them an excellent choice for the steelwork engineer.

Material Brass, Aisi 303 & 316 stainless steel
Thread 1/4" & 3/8" Male BSPT



DB

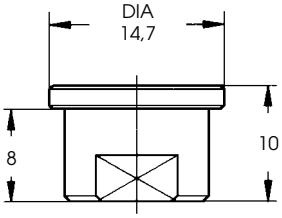
DBQ	DBU	DBW	Nozzle code	D	D1	Nozzle flow values at different pressure values (lpm) (bar)					
						0,5	1	2	3	4	5
•			**1294xx**	1,8	1,3	1,2	1,7	2,4	2,9	3,4	3,8
•			**1370xx**	2,05	1,4	1,5	2,1	3,0	3,7	4,3	4,8
•	•	•	**1470xx**	2,4	1,9	1,9	2,7	3,8	4,7	5,4	6,1
•	•	•	**1588xx**	2,6	2	2,4	3,4	4,8	5,9	6,8	7,6
•	•	•	**1659xx**	2,7	2	2,7	3,8	5,4	6,6	7,6	8,5
•	•	•	**1740xx**	2,9	2	3,0	4,3	6,0	7,4	8,5	9,6
	•		**1835xx**	3,3	1,9	3,4	4,8	6,8	8,4	9,6	10,8
		•	**1835xx**	3,3	1,9	3,4	4,8	6,8	8,4	9,6	10,8
		•	**1940xx**	3,3	1,9	3,8	5,4	7,7	9,4	10,9	12,1
		•	**2105xx**	3,6	2,3	4,3	6,1	8,6	10,6	12,2	13,7

CODE	ANGLE
DBQ	60°
DBU	90°
DBW	120°

CONTINUOUS CASTING

FLAT JET NOZZLE TIPS / SMALL SIZE

GX



These flat jet tips are the choice for those continuous casting machine sections where only limited space is available between two rollers. They offer a parabolic distribution and a finely atomized spray providing uniform coverage.

Material Brass, Aisi 303 & 316 stainless steel
Connection Cap & Nipple, several threads possiblel

CODE	ANGLE
GXQ	60°
GXU	90°
GXW	120°

GXQ	GXU	GXW	Nozzle code	D	Nozzle flow values at different pressure values (bar) (lpm)							
					1,0	1,5	2,0	3,0	4,0	5,0	7,0	10,0
•	•	•	**1190xx**	1,5	1,10	1,34	1,55	1,90	2,19	2,45	2,90	3,47
•	•	•	**1233xx**	1,65	1,35	1,65	1,90	2,33	2,69	3,01	3,56	4,25
•	•	•	**1310xx**	2,0	1,79	2,19	2,53	3,10	3,58	4,00	4,74	5,66
•	•	•	**1385xx**	2,2	2,11	2,58	2,98	3,65	4,21	4,71	5,58	6,66
•	•	•	**1490xx**	2,5	2,83	3,46	4,00	4,90	5,66	6,33	7,48	8,95
•	•	•	**1581xx**	2,7	3,35	4,11	4,74	5,81	6,71	7,50	8,87	10,6
•	•	•	**1780xx**	3,0	4,50	5,52	6,37	7,80	9,01	10,1	11,9	14,2
•	•	•	**1980xx**	3,5	5,66	6,93	8,00	9,80	11,3	12,7	15,0	17,9
•	•	•	**2124xx**	4,0	7,16	8,77	10,1	12,4	14,3	16,0	18,9	22,6
•	•	•	**2153xx**	4,5	8,83	10,8	12,5	15,3	17,7	19,8	23,4	27,9
•	•	•	**2194xx**	5,0	11,2	13,7	15,8	19,4	22,4	25,0	29,6	35,4
•		•	**2245xx**	5,5	14,1	17,3	20,0	24,5	28,3	31,6	37,4	44,7

HOW TO COMPOSE THE NOZZLE CODE

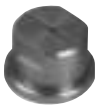
The nozzle tips shown on this page can be supplied with different spray angles, whose value is indicated by the third digit in the nozzle code. Therefore the tip code has to be specified as in the following.

GXQ **1780** **B3**

60° deg spray

The available codes for the different spray angles are indicated in the above of the page.

VAA 0038

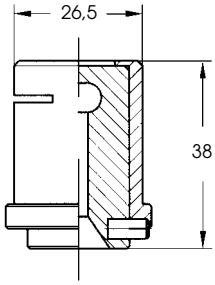


GX

ZAA 1738

ACCESSORIES
A wide range of accessories for assembling GX tips is shown in our Catalogue CTG AC14 BR.
For continuous casting applications we recommend ZAA welding nipples and VAA series locknuts.

FLAT JET NOZZLES / SLIT TYPE



GV

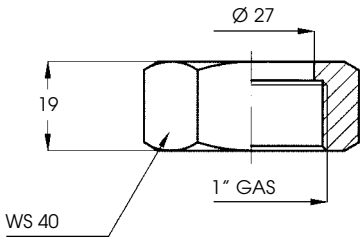
Size 1

Size 2

Slit flat jet tips offer a very wide coverage width, while their thin flat spray can be used in machines with limited space between rollers. They offer a remarkably even distribution and an inside profile which greatly reduces the danger of clogging, with finely atomized spray providing uniform coverage even with narrow gaps between rollers. They are assembled by means of a specific locknut.

Material Brass only
Connection 1" BSP female cap

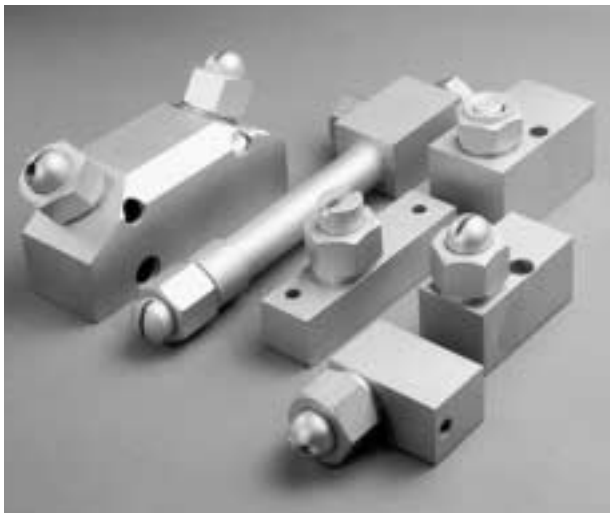
	GVT	GVU	GVV	Nozzle code	Capacities at different pressure values (bar) (lpm) 1.0	1.5	2.0	2.8	3.0	3.5	4.0	4.5	5.0
SIZE 1	•	•	•	**1500 T1**	2.90	3.70	4.20	5.00	5.18	5.59	6.00	6.36	6.70
	•	•	•	**1750 T1**	4.50	5.50	6.30	7.50	7.80	8.40	9.00	9.54	10.0
	•	•	•	**2100 T1**	6.00	7.30	8.40	10.0	10.3	11.2	12.0	12.7	13.4
	•	•	•	**2120 T1**	7.20	8.80	10.1	12.0	12.4	13.4	14.4	15.3	16.0
		•	•	**2150 T1**	9.00	11.0	12.7	15.0	15.6	16.8	17.9	19.0	20.0
		•	•	**2200 T1**	11.9	14.6	16.9	20.0	20.7	22.4	23.9	25.3	26.7
SIZE 2	•	•	•	**2300 T1**	17.9	22.0	25.3	30.0	31.1	33.5	35.9	37.1	40.1
	•	•	•	**2350 T1**	20.9	25.6	29.6	35.0	36.2	39.1	41.9	44.4	46.8
		•	•	**2450 T1**	26.9	32.9	38.0	45.0	46.6	50.3	53.8	27.1	60.2
		•	•	**2500 T1**	29.9	36.6	42.3	50.0	51.8	55.8	59.8	63.4	66.8



LOCKNUT
GV style nozzles are fixed by means of their specific locknut VAC 0100 T1, which can be ordered separately as a spare part.
Nozzles with capacity codes equal or higher than 2300 are fitted with an additional body lip, which makes it impossible to slip the nozzle inside the locknut. They are therefore delivered with a locknut which is pre-assemled at the factory.

CONTINUOUS CASTING

AIR ASSISTED ATOMIZERS



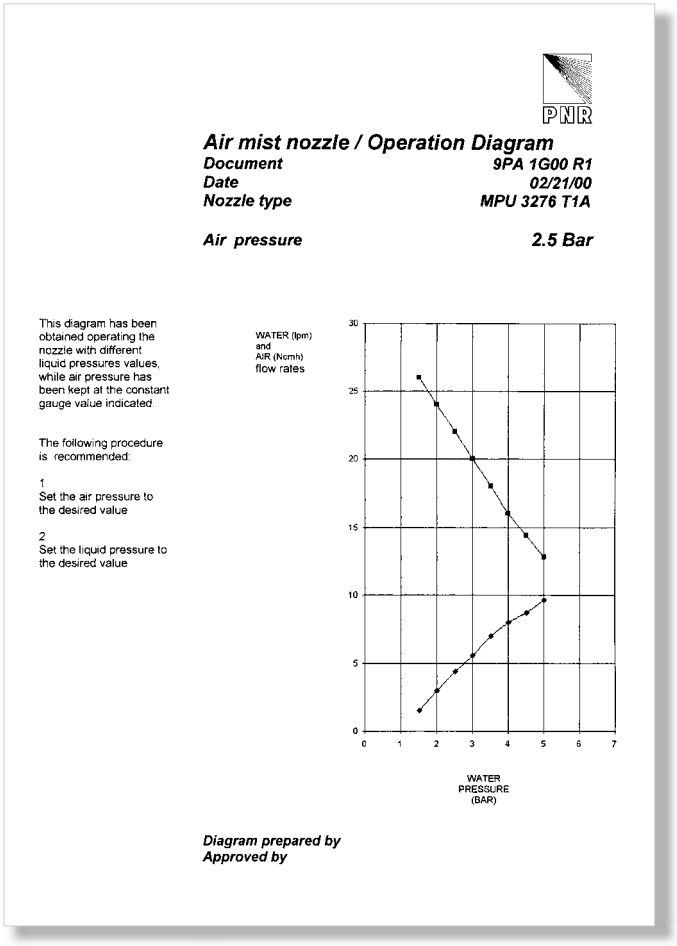
A development of recent years, air assisted atomizers have found wide acceptance in the continuous casting machines because of some advantages, which make them the best choice in some applications.

High resistance to clogging
An air assisted atomizer can deliver low water capacities and do so with large inside passages.

Higher heat transfer rates
By producing a finely atomized air-water mixture excellent heat transfer can be achieved with lower water volumes per unit weight of steel.

Even cooling at different machine speeds
Even cooling means better surface and edge quality, less cracks and less scrap. And this is possible for a wide range of dimensions and alloys, because of the wider turndown ratio of an air atomizer as compared to an hydraulic nozzle.

Longer roll life
Water is not only sprayed in lower quantity, not only better evaporated because of the lower droplet dimensions, but also the little quantity not evaporated is also easily driven away from the slab, which extends roll life.



OPERATING DIAGRAMS

Since the typical regulation of these atomizers is made by means of water pressure changes, while the air pressure is kept at a fixed value, all diagrams are obtained for a given value of air pressure.

CAPACITY

The capacity tables serve as a guidance only, to define the basic operation range. Each atomizer is supplied with a set of operation diagrams, which allow for precise definition of all the conditions for any desired operation point in the atomizer range.

SPRAY COVERAGE

In addition to capacity diagrams we supply diagrams showing the width of the spray coverage at different water pressure values and for fixed air pressure values.

ATOMIZER COMPOSITION

Air atomizers are composed by a choice of different set-ups, which determine the spray pattern, the spray angle and the nozzle capacity, and different assembly bodies which allow connecting the atomizer to the water and air feed manifolds.

ASSEMBLY BODIES

There is a variety of possible designs for assembly bodies, depending upon the atomizer connections and the design of feed manifolds in the single continuous casting machines.

Most current designs are shown at page 9, while we deliver any possible assembly body according to customer requirement. Atomizer body families are available for different spray patterns

Full cone spray pattern / MP
Flat jet atomizers / MR
Long nose flat jet atomizers / MS (quoted on request)

SET-UP CODING

Since set-ups are available as spare parts, they are identified by their own coding, which is shown in the tables at page 8, where the set-up operating specification is given. The set-up coding consists of two first digit (SA,SB) which identify the product as a set-up, followed by other alphanumeric coding which identifies the spray angle and capacity.

As an example the set-up code SAU 3276 identifies
- a full cone set-up (SA)
- a spray angle of 90° (U)
- a capacity figure (3276)

COMPLETE ATOMIZER CODE

The complete code for an atomizer is then obtained by addition of the atomizer type, of the set-up code without the first two digits, and of the specific body stile suffix. Hence a flat jet atomizer (MR), assembled with a set-up SAU 3248 T1 and with a B body style, will be then identified by the code

MR	**U 3248 T1**	**B**
Flat jet body	set-up code	Body style

CONTINUOUS CASTING

AIR ATOMIZERS / SET-UP TABLES

FULL CONE SET-UPS
Full cone atomizers are preferably used for machines casting billets and show therefore a range of low water capacities, with spray angles between 30 and 90 degrees.

A = Air flow (Ncm/h)
W = water flow (lpm)

ATOMIZER SET-UPS
The atomizer set-ups determines the basic performances of the atomizer, that is spray angle, water capacity and air capacity. The assembly of a given set-up onto one of the different bodies available makes a complete atomizer.

Material
Normally delivered in brass, both body and set-up can be quoted in Aisi 303 and 316 stainless steel

Code	Air pressures (bar)								
		W	A		W	A		W	A
SAF 3276	2.0	4.20	16.0	2.0	5.20	15.0	2.0	6.50	14.0
	2.5	3.50	22.0	2.5	4.80	21.0	2.5	5.80	19.0
	3.0	2.60	30.0	3.0	3.60	26.0	3.0	4.80	26.0
SAQ 3276	2.0	4.20	17.8	2.0	5.20	15.0	2.0	6.50	14.0
	2.5	3.50	22.0	2.5	4.80	21.0	2.5	5.70	19.0
	3.0	2.60	30.0	3.0	3.60	26.0	3.0	4.80	27.0
SAU 3156	2.0	2.00	11.9	2.0	2.80	10.0	2.0	3.50	8.50
	2.5	1.50	16.0	2.5	2.20	12.0	2.5	3.00	10.5
	3.0	1.00	18.0	3.0	1.70	17.0	3.0	2.40	14.8
SAU 3276	2.0	4.10	17.8	2.0	5.10	15.0	2.0	6.40	14.0
	2.5	3.40	22.0	2.5	4.80	21.0	2.5	5.70	19.0
	3.0	2.50	30.0	3.0	3.60	26.5	3.0	4.80	28.0
Water pressure (bar)		*2,0*			*2,5*			*3,0*	

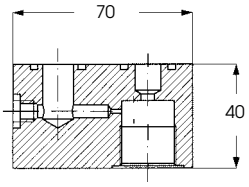
FLAT JET SET-UPS
Flat jet set-ups can offer a wider spray coverage, and therefore they can be used in several applications ranging from billets to blooms and slabs production.
For the widest coverage requirement, double atomizer bodies are available.

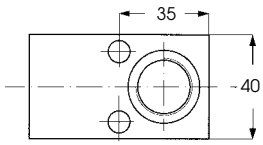
Code	Air pressures (bar)								
		W	A		W	A		W	A
SBQ 3114	2.0	1.60	12.7	2.0	2.10	12.0	2.0	2.45	11.0
	2.5	1.00	16.5	2.5	1.40	15.0	2.5	1.90	14.0
	3.0	0.60	19.0	3.0	0.90	17.5	3.0	1.25	16.5
SBQ 3120	2.0	1.70	9.70	2.0	2.15	8.50	2.0	2.95	7.80
	2.5	1.10	13.0	2.5	1.80	11.8	2.5	2.22	10.5
	3.0	0.70	16.5	3.0	1.50	14.5	3.0	2.00	13.8
SBQ 3132	2.0	2.30	9.50	2.0	2.80	8.00	2.0	3.40	7.00
	2.5	1.40	12.5	2.5	2.40	11.3	2.5	3.00	10.0
	3.0	0.65	15.2	3.0	1.40	14.0	3.0	2.20	12.8
SBU 3132	2.0	2.30	9.50	2.0	2.80	8.00	2.0	3.40	7.00
	2.5	1.40	12.5	2.5	2.40	11.3	2.5	3.00	10.0
	3.0	0.65	15.2	3.0	1.40	14.0	3.0	2.20	12.8
SBU 3276	2.0	3.80	14.5	2.0	6.00	11.8	2.0	7.40	10.0
	2.5	2.60	20.0	2.5	4.60	16.0	2.5	6.50	14.0
	3.0	1.10	26.0	3.0	2.80	22.0	3.0	4.60	19.0
SBU 3450	2.0	4.10	17.8	2.0	5.10	15.0	2.0	6.40	14.0
	2.5	3.40	22.0	2.5	4.80	21.0	2.5	5.70	19.0
	3.0	2.50	30.0	3.0	3.60	26.5	3.0	4.80	28.0
SBW 3132	2.0	2.30	9.50	2.0	2.80	8.00	2.0	3.40	7.00
	2.5	1.40	12.5	2.5	2.40	11.3	2.5	3.00	10.0
	3.0	0.65	15.2	3.0	1.40	14.0	3.0	2.20	12.8
SBW 3276	2.0	3.80	14.5	2.0	6.00	11.8	2.0	7.40	10.0
	2.5	2.60	20.0	2.5	4.60	16.0	2.5	6.50	14.0
	3.0	1.10	26.0	3.0	2.80	22.0	3.0	4.60	19.0
SBW 3450	2.0	4.10	17.8	2.0	5.10	15.0	2.0	6.40	14.0
	2.5	3.40	22.0	2.5	4.80	21.0	2.5	5.70	19.0
	3.0	2.50	30.0	3.0	3.60	26.5	3.0	4.80	28.0
Water pressure (bar)		*2,0*			*2,5*			*3,0*	

ATOMIZER BODIES

Several different atomizers bodies are available for the assembly of atomizer set-ups. In the following the most current body styles are shown, we can however manufacture any kind of atomizer bodies to suit specific application cases, including double jet atomizer bodies.

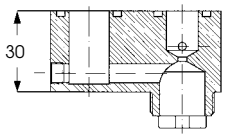
FULL CONE ATOMIZERS - XMP

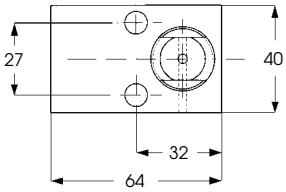




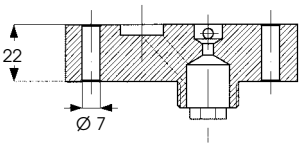
XMP 1A00 T1

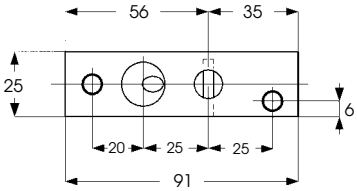
FLAT JET ATOMIZERS - XMR



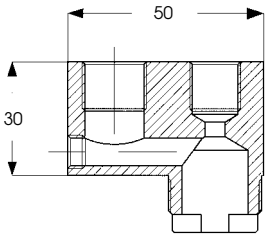


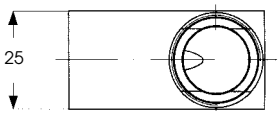
XMR 1B00 T1





XMR 1D00 T1





XMR 1G00 T1

ROLLING MILL

GW

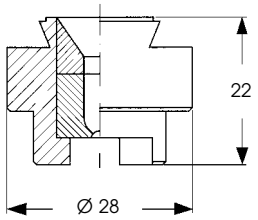
GW series nozzles have been the European standard for many years in the field of hot descaling mills.
The introduction of the hard metal insert and the nozzle orientation assured by the dove-tail coupling between nozzle tip and nipple have allowed for increased efficiency in the descaling process and higher steel quality, while careful studies on the nozzle inner profile have assured improved results for jet impact and evenness of water jet distribution.

HW

The continuous demand for higher efficiency has originated in recent years an increase in the descaling pressure values, which are today easily exceeding the 200 bar line.
The descaling nozzle assembly has been consequently entirely reconsidered, with new designs to take into account primarily the need of higher efficiency, while some inconveniences in the old designs have been eliminated.

HW type nozzle tips and accessories achieve therefore a streamlined inside profile, which results in lower energy losses due to turbulence and hence higher impact values on the steel surface.
In addition they offer a number of advantages like easy assembly operation and watertight connection between nipple and nozzle.

NOZZLE TIPS / CLASSIC DESCALER



GW

CODE	ANGLE
GWE	26°
GWF	30°
GWL	40°

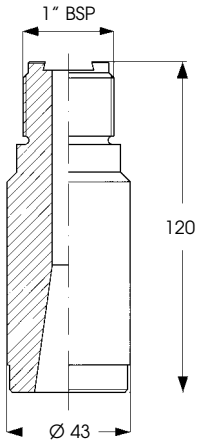
For a long time the worldwide standard in hot descaling of steel strips, they have undergone sensible improvements, specially on the inner orifice profile which assures a very even distribution of the water jet impact onto the steel surface. Their typical design with a dove-tail coupling between nipple and nozzle tip assures for fail-proof correct alignement of the nozzles onto the spray manifold.
Several nipples and a specific locknut assure for a wide choice of different assembly dimensions.

Material C1 Aisi 420 (hardened)
F1 Aisi 303 & tungsten Carbide spraytip

GWE	GWF	GWL	Nozzle code	D	D1	Capacity at different pressure values (bar) (lpm)							
						80	90	100	120	140	160	180	200
•	•	•	**2162xx**	2.0	1.5	16.2	17.1	18.0	19.5	21.3	22.8	24.0	25.0
•	•	•	**2250xx**	2.5	1.9	25.0	26.5	28.0	31.0	33.0	35.4	37.5	39.0
•	•	•	**2402xx**	3.0	2.5	40.2	42.7	45.0	49.0	53.0	57.0	60.0	63.0
•	•	•	**2642xx**	3.8	3.2	64.2	68.3	72.0	78.0	85.0	91.0	96.0	101
•	•	•	**2798xx**	4.3	3.6	79.8	84.4	89.0	98.0	105	112	119	126
•	•	•	**2996xx**	4.7	4.0	99.6	106	112	122	132	141	150	158
•	•	•	**3112xx**	5.0	4.2	112	119	125	137	148	158	168	177
•	•	•	**3120xx**	5.2	4.4	120	127	134	147	158	169	180	189

ASSEMBLY PARTS / CLASSIC DESCALER

ZBC

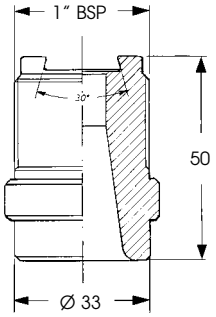


ZB NIPPLES
ZB series nipples have been designed for the assembling of GW descaling tips onto descaling plants main manifolds. The accurately machined dove-tail profile assures for precise alignement of the nozzle tip with respect to the axis of the spray manifold, while a precision machined surface prevents leakage between nipple and nozzle tip. ZB nipples are available in three different length to match different dimensional requirements.

Material Aisi 316

Code	L (mm)	RG	W (gr)
ZBB 0100 B3	40	1"	175
ZBC 0100 B3	120	1"	880
ZBD 0100 B3	50	1"	220

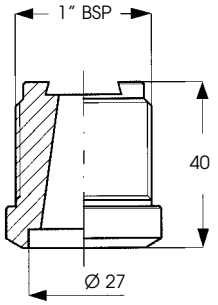
ZBD



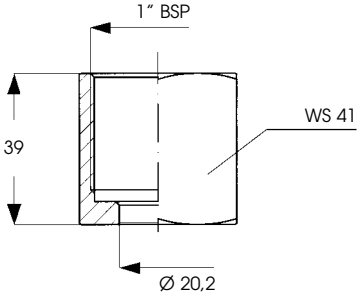
VAA 0100 B1
The VAA 0100 B1 cap is designed for the proper assembly between ZB nipples and GW descaling nozzle tips.
The strong design assures for a safe operation under the high pressure values typically used in hot descaling mill systems.

Material Aisi 303 stainless steel

ZBB

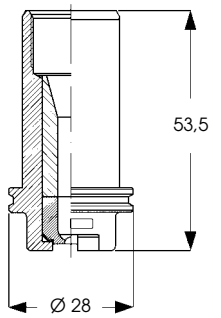


VAA 0100 B1



NOZZLE TIPS / FULL SIZE

CODE	ANGLE
HWE	26°
HWF	30°
HWL	40°



HW

The water path amont of the nozzle orifice has been completely redesigned in order to keep turbulent losses as low as possible, all sharp cross section changes have been eliminated with the result of a significant increase in water velocity at the nozzle orifice. The nozzle efficiency is further enhanced by a carefully designed flow stabilizer, which minimizes turbulence due to sharp flow direction change at the feed inlet from the main manifold. Finally a filter can be mounted at the nipple inlet, to avoid nozzle orifice to be clogged / damaged by foreign particles.

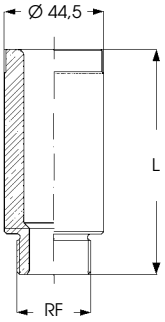
Materials C1 Aisi 420 (hardened)
F1 Tungsten carbide tip & 303 stainless steel body

HWE	HWF	HWL	Code	Capacity at different pressure values (lpm) (bar) 100	140	160	180	200
•	•	•	**2162 xx AK**	18,0	21,3	22,8	24,0	25,0
•	•	•	**2250 xx AK**	28,0	33,0	35,4	37,5	39,0
•	•	•	**2402 xx AK**	45,0	53,0	57,0	60,0	63,0
•	•	•	**2642 xx AK**	72,0	85,0	91,0	96,0	101
•	•	•	**2798 xx AK**	89,0	105	112	119	126
•	•	•	**2996 xx AK**	112	132	141	150	158
•	•	•	**3112 xx AK**	125	148	158	168	177
•	•	•	**3120 xx AK**	134	158	169	180	189

Complete code
Codes including the several options available as follows

Code	Assembly
HWE 1234 XX AK	bare nozzle
HWE 1234 XX CK	nozzle with flow stabilizer
HWE 1234 XX DK	nozzle with filter & flow stabilizer

ASSEMBLY PARTS / FULL SIZE

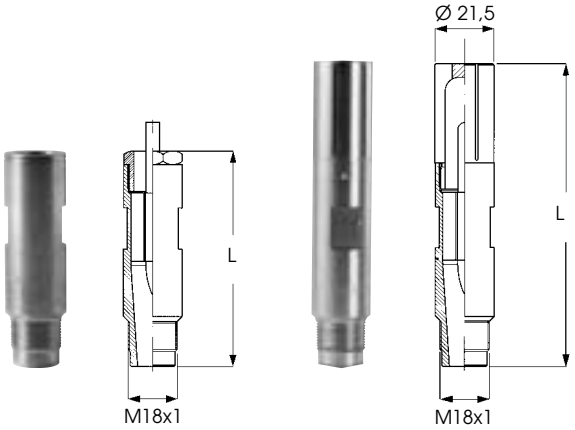


ZWB

Code	RF	L (mm)	W (kg)
ZWB 0073 B2	1"	73	0,49
ZWB 0100 B2	1"	100	0,71
ZWB 0120 B2	1"	120	0,85

WELDING NIPPLES
HW nozzles can be assembled on a series of three different nipples, with the same inlet and three different lengths. The precision machined nipple inlet port assures precise positioning of the nozzle flat jet to the specified offset angle value of 15° with regard to the manifold center line. This makes it possible to obtain uniform impact distribution and better descaling results.

Material Aisi 304 Stainless steel



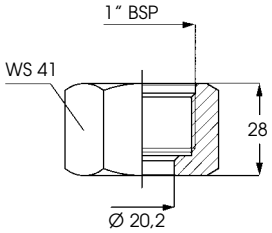
Code	Assy length (mm)	Weight (kg)	Notes
XHW DG 10 T1	75	0.08	without filter
XHW DG 13 T1	95	0.10	without filter
XHW DG 20 T1	109	0.11	with filter
XHW DG 21 T1	132	0.14	with filter
XHW DG 22 T1	152	0.16	with filter

FLOW STABILIZER
The flow stabilizer is the critical component for a perfect descaling job, since it maximizes the impact force on the surface to be descaled, for a given condition.
The codes beside always include the multifin flow improver (XHW DL00 B3).

Material	Nozzle inlet	T1	Brass
	Filter	T1	Brass
	Flow stabilizer	B3	Aisi 316 stainless steel

XHW DL00 B3

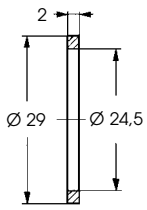
VAW D100 B1



LOCKNUT
The locknut for ZWB series descaling nipples has been designed profiting from a long experience on the field. The sturdy design and the generous dimensions give the maximum protection to the nozzle and the nipple thread, so as to avoid such abrasion wear who often occur in the rolling mill. One locknut size fits all the ZWB series nipples, for any length.

Material B1 Aisi 303 stainless steel

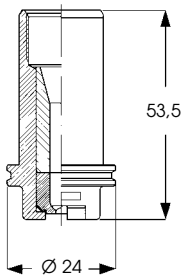
XHW DE00 T3



SEAL
The round seal provides proper assembly between nozzle and nipple. One size fits all nipple types.

Material T3 Copper

NOZZLE TIPS / SMALL SIZE



HW

Small size nozzle tips also feature a new inside profile completely redesigned in order to keep turbulent losses as low as possible : all sharp cross section changes have been eliminated with the result of is significantly higher water velocity at the orifice. The performances are further enhanced by a flow stabilizer, abating turbulence inducted by the sharp change of flow direction when the water flow leaves the main manifold to enter the nipple. Finally a filter can be mounted at the nipple inlet, to avoid nozzle orifice to be clogged / damaged by foreign particles.

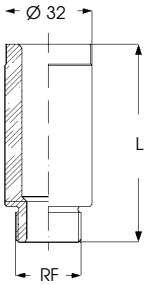
Materials C1 Aisi 420 (hardened)
F1 Tungsten carbide tip & 303 stainless steel body

HWL	HWF	HWE	Code	Capacity at different pressure values (lpm) (bar) 100	140	160	180	200
•	•	•	**2162 xx AB**	18,0	21,3	22,8	24,0	25,0
•	•	•	**2250 xx AB**	28,0	33,0	35,4	37,5	39,0
•	•	•	**2402 xx AB**	45,0	53,0	57,0	60,0	63,0
•	•	•	**2642 xx AB**	72,0	85,0	91,0	96,0	101
•	•	•	**2798 xx AB**	89,0	105	112	119	126
•	•	•	**2996 xx AB**	112	132	141	150	158
•	•	•	**3112 xx AB**	125	148	158	168	177
•	•	•	**3120 xx AB**	134	158	169	180	189

Complete code
Codes including the several options available as follows

Code	Assembly
HWE 1234 XX AB	bare nozzle
HWE 1234 XX CB	nozzle with flow stabilizer
HWE 1234 XX DB	nozzle with filter & flow stabilizer

ASSEMBLY PARTS / SMALL SIZE

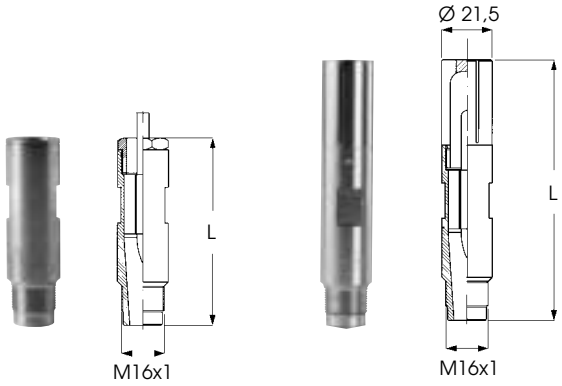


ZWB

Code	RF	L (mm)	W
ZWB 0032 B2	3/4"	32	0,08
ZWB 0039 B2	3/4"	39	0,10
ZWB 0080 B2	3/4"	80	0,23

WELDING NIPPLES
HW nozzles can be assembled on a series of three different nipples, with the same inlet and three different lengths. The precision machined nipple inlet port assures precise positioning of the nozzle flat jet to the specified offset angle value of 15° with regard to the manifold center line. This makes it possible to obtain uniform impact distribution and better descaling results.

Material Aisi 304 Stainless steel

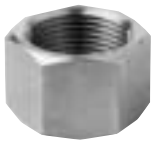


Code	Assy length (mm)	Weight (kg)	Notes
XHW BG 10 T1	73	0.08	without filter
XHW BG 21 T1	109	0.12	with filter
XHW BG 22 T1	132	0.15	with filter

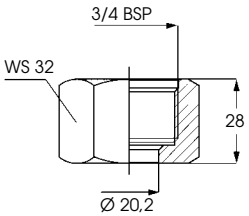
FLOW STABILIZER
The flow stabilizer is the critical component for a perfect descaling job, since it maximizes the impact force on the surface to be descaled, for a given condition.
The codes beside always include the multifin flow improver (XHW DL00 B3).

Material	Nozzle inlet	T1	Brass
	Filter	T1	Brass
	Flow stabilizer	B3	Aisi 316 stainless steel

XHW DL00 B3



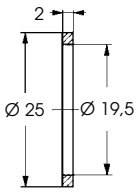
VAW B075 B1



LOCKNUT
The locknut for ZWB series descaling nipples has been designed profiting from a long experience on the field. The sturdy design and the generous dimensions give the maximum protection to the nozzle and the nipple thread, so as to avoid such abrasion wear who often occur in the rolling mill. One locknut size fits all the ZWB series nipples, for any length.

Material B1 Aisi 303 stainless steel

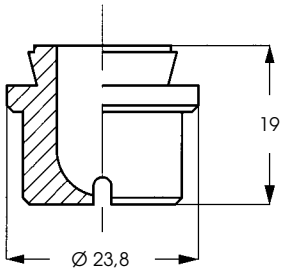
XHW BE00 T3



SEAL
The round seal provides proper assembly between nozzle and nipple. One size fits all nipple types.

Material T3 Copper

ROLL COOLING NOZZLES



GY

Proper roll cooling assures uniform strip thickness, and requires even water coverage. The even spray distribution of the GY series tips avoids sudden temperature changes and consequent expansion or contraction, which results in the need for roll re-grinding. The final result of a proper roll cooling is then a more even roll wear, longer life, longer production runs with more consistent steel quality.

Material T1 Brass
B1 Aisi 303 Stainless steel

GYC	GYF	GYM	GYQ	Nozzle code	Capacity at different pressure values (bar) (lpm) 1.0	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	**1781xx**	4.50	6.30	7.80	9.00	10.0	11.8	14.1
•	•	•	•	**1981xx**	5.70	8.00	9.80	11.3	12.6	15.0	17.9
•	•	•	•	**2125xx**	7.20	10.1	12.4	14.3	16.0	18.9	22.4
•	•	•	•	**2154xx**	8.80	12.5	15.3	17.7	19.8	23.4	28.0
•	•	•	•	**2195xx**	11.2	15.8	19.4	22.4	25.0	29.6	35.4
•	•	•	•	**2246xx**	14.2	20.0	24.5	28.3	31.5	37.4	44.8
•	•	•	•	**2311xx**	17.8	25.0	31.0	35.8	40.0	47.4	56.6
•	•	•	•	**2490xx**	28.0	40.0	49.0	56.0	63.0	75.0	90.0
		•	•	**2610xx**	35.3	50.0	61.0	70.7	79.1	93.5	112
•	•	•	•	**2760xx**	45.0	63.0	76.0	90.0	100	118	141

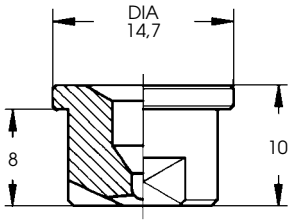
ASSEMBLY PARTS
See our catalogue **CTG AC14 BR** for welding nipples and locknuts.

ZAC NIPPLES

ROLLING MILL

COLD ROLLING MILL LUBRICATION

GX



Lubrication of steel strip after cold rolling must be performed by the spray of very low quantities of lubricant, with an outstanding uniform spray distribution. Pnr low-flow flat jet tips, manufactured by high precision machine tools, assure very small tolerance on nozzle capacity and perfect spray pattern.

Material Aisi 303 & 316 (See chart below)

GXR	GXT	GXV	GXJ	Nozzle code	Nozzle flow values at different pressure values (lpm) (bar)						
					0,5	1	2	3	5	7	10
•				**0060xx**	-	-	0,05	0,06	0,08	0,10	0,12
•				**0100xx**	-	-	0,08	0,10	0,13	0,15	0,17
•				**0130xx**	-	-	0,11	0,13	0,16	0,20	0,24
•				**0150xx**	-	0,10	0,13	0,15	0,20	0,25	0,28
•	•	•		**0200xx**	-	0,11	0,16	0,20	0,25	0,30	0,36
•	•			**0260xx**	-	0,15	0,21	0,26	0,33	0,40	0,47
•	•	•	•	**0390xx**	-	0,23	0,32	0,39	0,51	0,60	0,72
•	•	•	•	**0590xx**	-	0,34	0,48	0,59	0,76	0,90	1,10
•	•	•	•	**0780xx**	0,32	0,46	064	0,78	1,00	1,20	1,40
•	•	•	•	**1120xx**	0,48	0,68	0,97	1,20	1,50	1,80	2,20
•	•	•	•	**1160xx**	0,64	0,91	1,30	1,60	2,00	2,40	2,90

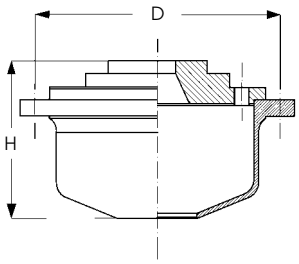
MATERIAL	0060	0100	0130	0150	0200	0260	0390	0590	0780	1120	1160
BRASS	•	•	•	•	•	•	•	•	•	•	•
AISI 303	-	-	-	-	•	•	•	•	•	•	•
AISI 316								•	•	•	•

ASSEMBLY PARTS
Small capacity GX flat jet tips can be easily assembled by means of our standard welding nipples in the ZAA series and matching VAA 0038 caps.
See our Accessories Catalogue **CTG AC14 BR.**

ZLA NIPPLES

VAA 0038 XX

COKE OVEN NOZZLES



AF

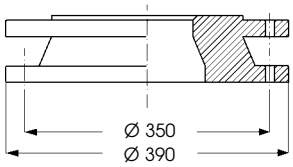
AE are designed for coke quenching processes. Thanks to their very uniform spray distribution, a rapid quench is obtained without hot spots. Their wide chamber and multi-orifice disc shaped vane provide excellent velocity distribution inside the nozzle, which results in a fast and uniform cooling : low values for process water and coke moisture percentage are easily obtained. The wide inside passages exclude the possibility of any clogging danger.

Materials B3 Aisi 316 stainless steel
G1 Cast Iron

Code	D1	Nozzle capacity at pressure values (lpm)							Spray Coverage (mm) at pressure values (bar)		
		0.3	0.4	0.5	1.0	1.5	2.0	3.0	0.5	1.0	1,5
AFU 4110 xx	9.5	348	400	450	636	780	900	1100	3300	3500	3650
AFU 4171 xx	11.9	542	626	700	985	1210	1400	1715	3350	3550	3700
AFU 4275 xx	13.1	870	1000	1120	1580	1940	2240	2745	3500	3700	2800
AFU 4435 xx	13.5	1380	1590	1770	2500	3070	3550	4350	3700	3800	3750
AFU 4686 xx	16.9	2170	2500	2800	3960	4850	5600	6860	3700	3800	3750

ADAPTING FLANGES

AE nozzles can be supplied complete with an adapting flange for connection to the plant existing piping.
Our offices will quote these flanges on request.

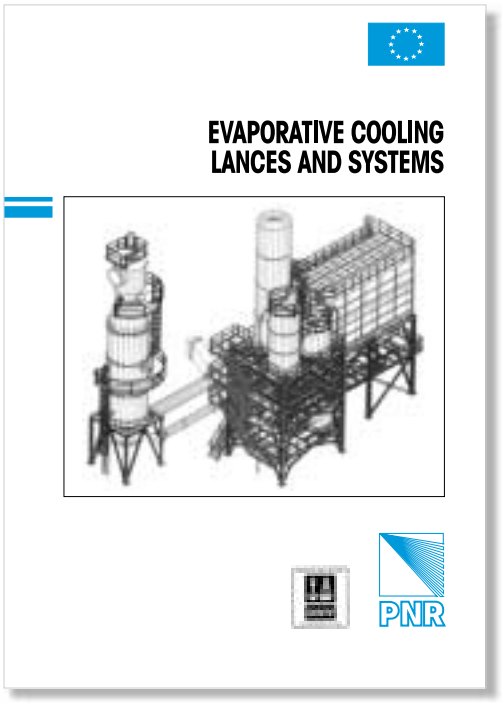


NOZZLE DIMENSIONS

Code	D	H
AFU 4110 xx	180	100
AFU 4171 xx	210	121
AFU 4275 xx	240	150
AFU 4435 xx	295	190
AFU 4686 xx	350	240

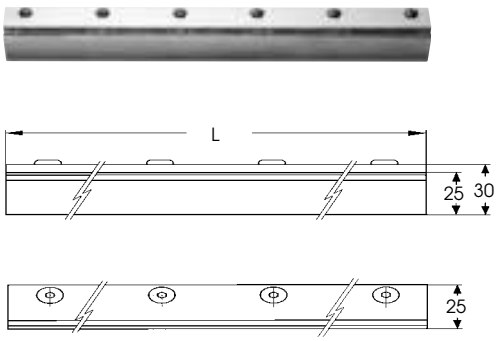
GENERAL APPLICATIONS

GAS COOLING LANCES



Gas cooling lances serve the purpose of cooling furnace gases prior to their inlet inside the ESP (Electrostatic Precipitator).
Our Catalogue **CTG LN14 BR** gives complete information about the gas cooling process and the several types of gas cooling lances. Our offices will be glad to supply any further information and to assist you in the choice of the proper product.

UEB



Modern technology offers low-noise and high impact air blowers for satisfying process requirements in many different industries. UE air blowers find several applications in a steelwork for cleaning, cooling and drying applications. The aluminum body and the mild steel cover are given a though electroless nickel coating for excellent protection against steelwork working conditions. Additional types of air blowers can be found in our cataloguie **CTG AC14 BR**.

Material	Body	Aluminum
	Top cover	Mild steel

Code	RF	Air capacity (Nm³/min)										H	L	W
		IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	mm	mm	kg
UEB 0150 V1	1/4"	0,26	4,70	0,34	6,00	0,42	7,10	0,51	8,60	0,60	10,6	30	150	0,3
UEB 0300 V1	1/4"	0,52	9,40	0,68	12,0	0,84	14,2	1,02	17,2	1,20	21,2	30	300	0,7
UEB 0600 V1	1/4"	1,03	18,7	1,40	24,0	1,68	28,4	2,04	34,4	2,40	42,4	30	600	1,4
Pressure (bar)		***2,0***		***3,0***		***4,0***		***5,0***		***6,0***				

UEB airblowers use a small quantity of air (air IN) to entrain ambient air from around the outlet orifice.
The resulting air flow produced from the blower is therefore the addition of feed air and entrained air, and is shown in the table as (air OUT) value.

ADDITIONAL INFORMATION

ABBREVIATIONS

D	Equivalent orifice dia	mm	L	Length	mm
D1	Smallest nozzle passage	mm	RF	Female thread	-
DI1	Diameter	mm	RG	Male thread	-
DI2	Diameter	mm	W	Weight	g./kg

PRODUCT WARRANTY

Pnr products will be replaced or repaired, at the option of Pnr and free of charges, if found defective in manufacturing, labeling or packaging.
The above warranty conditions will apply if notice of defect is received by Pnr within 30 days from date of product installation or one year from date of shipment.
The cost of above said replacement or repair shall be the exclusive remedy for any breach of any warranty, and Pnr shall not be held liable for any damage due to personal injuries or commercial losses coming from product malfunction.

Our Company Procedure for warranty requires the following steps:
1 Contact our Quality Manager and obtain from Pnr a return authorization number
2 Return the products together with our form 3DA A04 duly filled
3 We shall issue a test report, send you a copy and return the product (replaced or repaired).

Our Company scope is obtaining full Customer satisfaction, and we are fully aware of the inconvenience which can be originated from a defective product.
Please be assured we shall do our best to make available a perfect product in the shortest possible time.

We also provide, for products which are not defective, a product return policy as follows.

PRODUCTS DELIVERED IN ERROR FROM PNR
1 Obtain from Pnr a return authorization number
2 Return the products together with our form duly filled
3 Pnr shall issue a Credit Note for full product and shipping costs.

PRODUCTS ORDERED INCORRECTLY TO PNR
1 Obtain from Pnr a return authorization number
2 Return the products, at your expense, together with our form duly filled
3 Products shall be in original conditions, inside the original packing
4 A re-stocking charge of 15% applies.
5 Pnr shall issue a credit note for 85% of the original product cost

NON CATALOG PRODUCTS
Can only be returned after a quotation from Pnr is obtained.

SENDING LIST

In order to receive automatically updates of our Catalogues, please photocopy the card below and mail it to any Pnr Office in a sealed envelope. Your details will be recorded into our permanent mailing list.

CTG SW11 BR

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