5

OPERATING INSTRUCTIONS

Negative Pressure-Jet System TORNADO ACS 30/35

Advanced Cleaning System

Aramsco®
A SAFEGUARD INDUSTRIAL COMPANY

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Please keep this instruction carefully!

We do expressly emphasize that any legal claim which refers to comments in these operating instructions cannot be asserted.

When it should be necessary to repair the machine use only original replacement parts. Only these are able to guarantee a perfect qualitity and reliable readiness for application of your machine. We do not assume liability for the usage of any replacement parts of other manufacturers.

Subject to alterations.

valid from 27.12.2006

Attention: Read and consider these operating instructions carefully before the first starting! Apart from the references in this operating instructions the general rules for safety and prevention of accidents of the legislator have to be considered.

These instructions describe function, application and handling of TORNADO ACS 30/35 and give advices for the selection of the appropriate jet medium as well as it helps with problems.

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Intended Application

The mobile jet-system TORNADO ACS 30/35 operates with the worldwide patented negative pressure jet principle and consists of only one compact mobile machine. By the use of suitable jet media (granulates) of different grain and structure it facilitates a radiation with retrieval of the jet grain being dust-free and noiseless.

The machine contains a generator for negative pressure with a filtering cartridge and dust separation as well as an appropriate container for the granulate. Further components of the system are the lighted jet cap and the jet lance being necessary for working.

The fields of application are various and are selected due to different criteria like:

Grounds e.g.: clinker, concrete, sandstone, wood, plastic, metal, NE-metal etc.

Abrasion e.g.: strong or in layers

Pollution e.g.: graffiti, rust, weathering, de-laying etc.

Possibilities for use could be: cleaning of buildings, craft of painting or lacquing, cooperate building associations, repair and maintenace of passenger cars, the building trade for cleaning, removal of layers and lacquer, derusting, roughening up and restoring of surfaces. The use of the system is possible in interiors, but also on hydraulic platforms or scaffolds without special preparation. Therefore a sufficient stability of the system has to be considered!

The application is not admissible in rooms or environments being endangered of explosion. There is no permission for using the system to clean animals or persons.

The compliance with conditions given by the manufacturer on maintenance, operation and repairing is part of the correct use. Due to improper application the liability will be exluded.

The regulations on preventing accidents and any further generally known safety technics and rules according to industrial medicine have to be sticked to. The manufacturer's liability is also excluded for damages which are the result of unauthorized changes on the system.

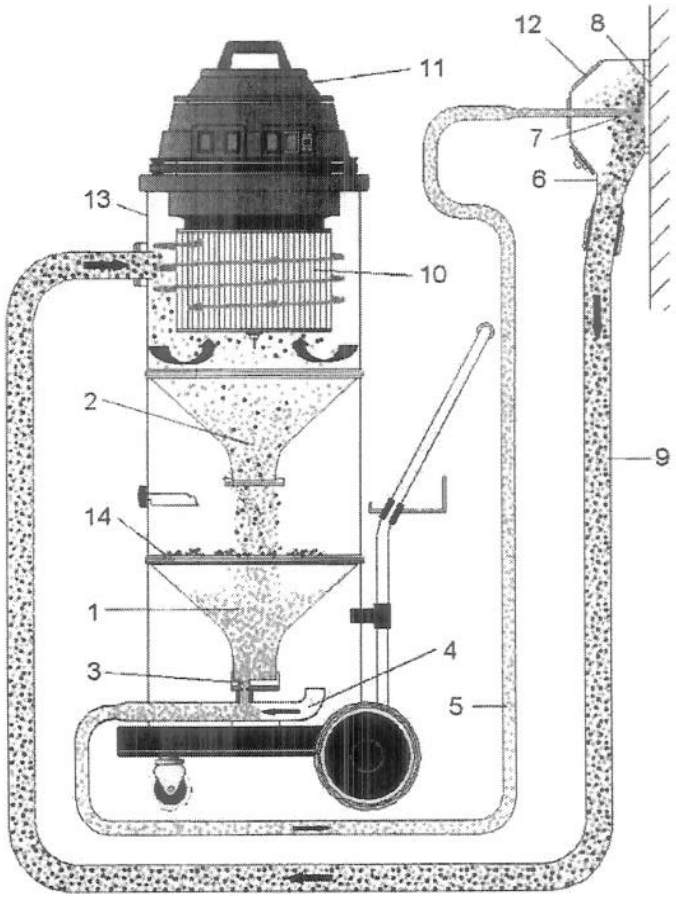
The user is responsible for third persons in the work area. If the equipment is not ready for use, it may not be used. It is essential to make oneself familiar with all mechanisms and controls as well as with their function before start-up .

The equipment is never to be left unsupervised, as long as the suction machine is in use. In order to prevent an unauthorized using of the equipment, the power supply plug has to be taken off.

Taking over the Machine

The machine has to be checked on integrity and possible damages caused by transport immediately after its arrival. Such damages are replaced, when you send a confirmation of the forwarding agent together with the freight papers to us.

Structure of the Tornado ACS 30/35



From a funnel **(1)** the jet property **(2)** arrives at the air flow **(4)** over dosing equipment **(3)** by gravity. With a flexible suction hose **(5)** the blast grain is transported to the jet cap **(6)**. At the exit of the jet lance **(7)** it is accelerated to a very high rate and has an accordingly high jet energy. Protected by the jet cap the blast medium impinges on the polluted surface **(8)** and peels of dirt or clears away the surface fastly and dust-free. The jet process can be optimally observed and controlled over 3 vision panels **(12)**. Subsequently, the mixture of dirt and jet medium is sucked off by a hose **(9)** into the top of the blast grain container **(13)**. The reusable blast grain is separated and supplied to the cycle again. Ineffective fine types of dust are sucked through the dry-suction apparatus **(11)** into the fine dust filter **(10)** and can easily be disposed after termination of work. Coarse particles which are removed are kept back by the filter **(14)**.

Starting-up and Funtioning

a) put in plug (230 V or 110 V)
b) switch on lighting
c) fill or suck in jet medium
d) switch on suction (3 steps - one after the other)
a) take the jet cap in your hand and put it onto working surface – jet cap will suck itself up
b) insert jet lance into jet cap
e) jet process will start - by consistently moving the jet lance a continious removal is achieved
f) pay attention to the distance between working surface and jet lance which should be 3 to 5 cm
g) when the whole surface marked off by the jet cap is radiated, the jet cap has to be moved
h) therefore the air flap on the jet cap has to be actuated – the cap looses itself off the surface and can be shifted
i) the jet process automatically stops during movement
j) when the entire jet media is carried into the middle container with the flap the suction apparatus has to be switched off (see also Preparing the Machine)
k) when the operation is terminated the jet cap and jet lance have to be laid down and the suction apparatus and lighting have to be switched off

By switching on the negative pressure generator (industrial suction-head) a negative pressure of approximately 200 mbar is produced in the jet hood. The jet cap itself is set on the working surface and adheres to due to the negative pressure. By inserting the jet lance the cycle is closed. Jet medium is sucked in and accelerated in the jet lance to more than 400 km/h. Thus the operating surface is cleared as required, layers are removed or it is roughened up. Due to the 3-step operation of the negative pressure generator the results can be adapted to requirement.

Never fill the the container for granulates completely! Tense the containers tightly with the metal clamps which are supposed for that. After being a long time not in use the jet medium has to be removed of the medium container.

The dosing aperture has to be selected depending on grain and structure of jet medium. Aperture 5 is set by works (see also advices on the application chart for using jet media).

Preparing the Machine

a) switch off suction apparatus
b) loose flap and wait some seconds until jet medium got from middle container into dosing container
c) lock flap
d) switch on suction apparatus again (every step seperately)

Filling with Jet Medium

a) separate suction hose with hose coupling from jet hood
b) switch on suction apparatus (3 steps)
c) dip end of hose into jet medium container and suck up jet grain
d) switch off suction apparatus
e) connect suction hose with jet cap again
f) loose flap and arrest it again

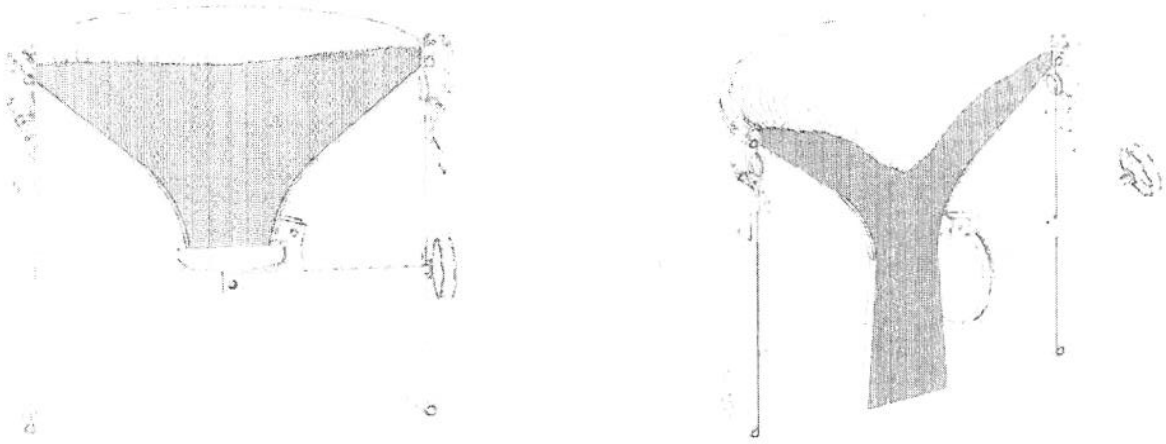
or

c) take suction head off media tower
a) fill in jet grain
b) put on suction head
c) loose flap and arrest it again

Emptying of used Jet Medium

a) operate until jet medium is completely transported into container above the flap
b) separate media tower below the flap
c) suck off jet medium of the bottom container with the suction hose until it is empty
d) remove upper section of the media tower
e) place the funnel of the lower container into granulate bucket
f) set the middle container with flap onto the funnel
g) open flap and fill back the granulate into the bucket
h) assemble media tower again

middle container with funnel and pneumatic division (flap)



For opening flap, loose radial handle (2-3 turns) and hold it slightly up. The reusable or new blast grain will get into jet medium container (lower container). Hold the radial handle up and press it in direction of container again for closing the flap. Tighten radial handle.

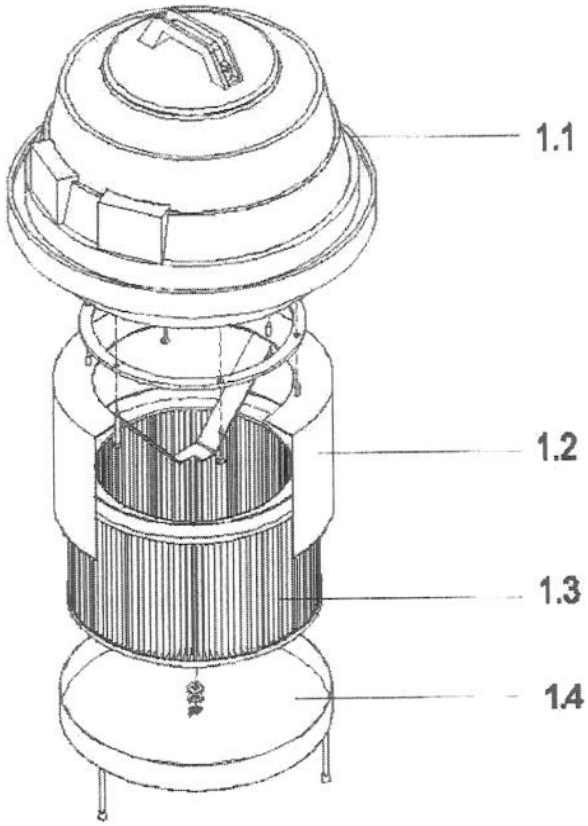
Special advices:
When changing the blast medium the whole system has to be cleaned off the jet medium used so far, otherwise damages on sensitive surfaces could occur. The cleaning is necessary for all suction hoses, jet hood and –lance as well as containers and dosing equipment.

Keep blast grain always dry and closed. Remove possibly escaped jet grain of the floor (sweep or suck up).

Please consider local conditions for disposal of colour residues or granulates.

Important Advices for Maintenance and Operation

- Mind the flap to be closed before switching on suction apparatus.
- The filtering cartridge **1.3** being arrested at the suction head **1.1** should be cleaned or exchanged depending on requirement. Clean it by sweeping or blowing out.
- The used granulates being in the collecting bowl **1.4** and rests of dirt have to be removed regularly.
- The jet medium wears out due to longer use. Depending on the kind of granulate it can be reused 40 to 100 times. The wear is possible to recognize by the condition of the jet medium. When it is weared it is necessary to exchange it completely for new grain.
- The vision panels at the jet cap will become blind after approx. 40 to 100 working hours depending on the used granulate. They have to be exchanged according to requirement (poor visibility).



- The time for radiation depends on the size of operating surfaces, strength of lacquer and its structure and on the jet medium which is applied. This time can be substantially shortened by periodically working with the machine and the experience which will be gained.

Changing the filtering cartridge

Switch off suction apparatus and pull out power supply plug. Remove suction head **1.1** by opening the metal clamps at the top container. The filtering cartridge **1.3** is easily accessible now and can be removed, cleaned and exchanged respectively by loosening the wing nut. The installation has to take place in reverse order.

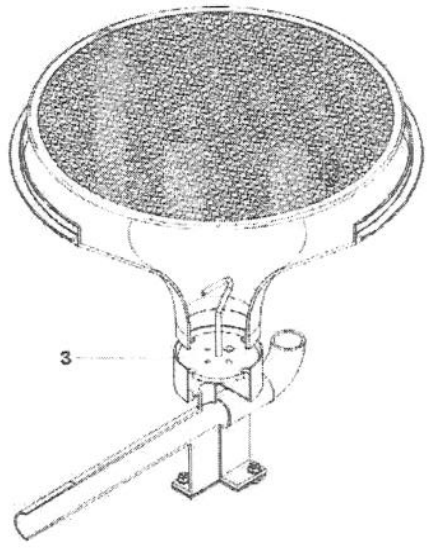
When installing the filter cartridge it has to be ensured strictly that the sealing ring of the filter cartridge rests upon the immersion tube flatly. This can be examined easily by turning the filter cartridge while it is inserted. The wing nut has to be tightened strongly. If the filter cartridge is not installed correctly, dirt and granulates can get into the engines, which can lead to the destruction of the engine head.

Change of dosage

The dosage **3** is situated in the bottom container. By loosening the metal clamps at the bottom container the rest of the machine can be lifted off. The dosing equipment is accessible after taking off the filter **1**. Before adjusting the dosing device the funnel **2** has to be empty! For changing the aperture hold up the dosing equipment **3** slightly and turn it into required position. Dosing engages. Put on filter **1** and the complete upper part and lock it with metal clamps. (which dosage has to be used you may see in the application chart for using jet media)

Installing filter

The delivery contains one coarse and one fine filter. The filter protects the dosing equipment **3** from pollution which could lead to defects or complete breakdown of the system.
The installation or exchange has to be done by analogy with change of dosing apertures.
Pay attention to the fact that there is always just one filter **1** on duty! When using jet medium with a grain of more than 1 mm the coarse filter should be applied. For grain sized less than 1 mm use the fine filter.



Times for preparation and dismantling

The suction head has a 230 V or 110 V mains connection and has to be attached to electricity mains before start-up. For the application 2 suction steps have to be switched on at least.

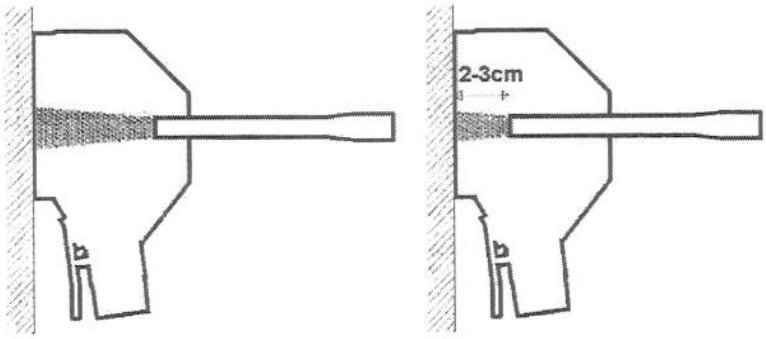
When damaged the connection cable must be changed by an electrical specialist. The use of a minimum cross section of 1.5 mm² for 230 V and 2.5 mm² for 110 V has to be ensured.

When using a power supply of 230 V for the suction machine together with an extension cord of more than 10 m, the cord must have a diamater of 2,5 mm² at least. It is recommended to run out the cable drum completely, to avoid a superheating and damages or break-downs as a result of this.

Application of jet hood

Set jet hood on the working surface like the illustration shows. By the negative pressure the jet cap adheres to it immediately. Insert jet lance and bring it to the surface. The optimum distance to the operating surface is approx. 2 – 3 cm. Through the vision panels in the cap the process can be controlled continiously. Move the lance steadily until the result you like is achieved.

Remove jet cap of the surface by opening the air flap at the bottom – the blasting process is interrupted automatically.

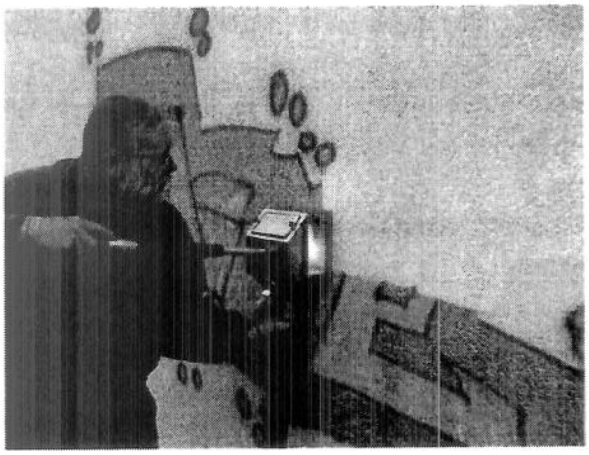


Hint: Tilt the cap at the top first, so that rests of jet grain are collected and sucked off.

Examples for practical use

In the following examples some possible applications are described. They show you the selection of the granulate as well as the setting of the dosing. These information are guidelines for the optimum use.

Application on rough finery



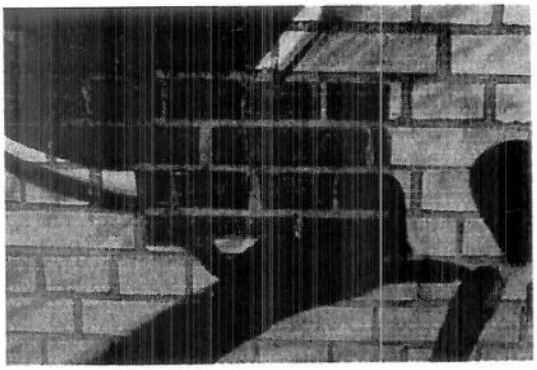
All finery infiltrated with colour can be worked without problems. If the front is painted it depends on the quality of the colour. Above all heat compound systems can be cleaned very well.

granulate	:	jet glass SG 150
dosage	:	nozzle 5 - 6
filling	:	10 liters (1 bucket)
usage	:	approx. 80 - 100 times
achievement	:	2 - 3 qm per hour

Application on clinker bricks

Clinker fronts can be cleaned particularly easy with the help of Tornado ACS 35. The work can be done very fastly and the interstices are cleaned without a rest.

With this procedure the surface of the bricks will not be corroded no matter whether graffitis, discolourations or efflo-resce should be removed.



The Tornado ACS can be applied for in-door work on clinker or tiles as well. The advantages of dustfree working are es-pecially useful for that.

granulate	:	jet glass SG 150/300
dosage	:	nozzle 5 - 6
usage	:	approx. 80 - 100 times
achievement	:	3 - 5 qm per hour

Application on coloured finery

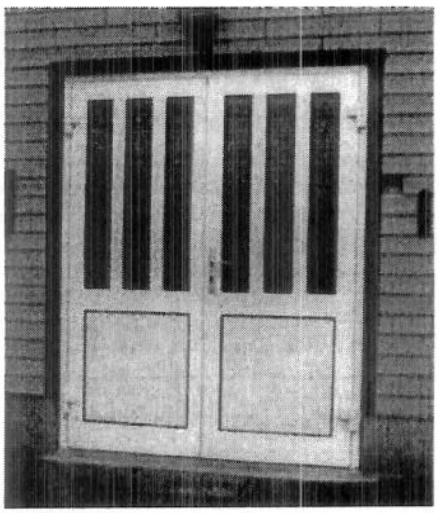
Coloured fronts are treatened depending on the kind of surface and its background. Basically: The more uneven the surface the worse it can be cleaned without damaging the colour. In this example a coloured clinker wall is cleaned. The grey colour is of a good quality. The graffiti is removed restlessly.

granulate	:	jet glass SG 150
dosage	:	nozzle 5 - 6
usage	:	approx. 80 - 100 times
achievement	:	2 - 4 qm per hour

Application on glass and plastics

All sensitive surfaces may only be treatened with soft granulates, which are nutshell or Jet-Plast. In this example a door with a frame from glass and plastic was cleaned. One has to pay attention to clean transport hoses. It is recommended to use a separate hose package for the application of soft granulates, because it is not possible to remove rests of other granulates completely off the hose.

For this surface nutshell was used. Jet-Plast may also be applied. The rubber seals for the glass panes were not cleaned and had to be worked over seperately. All soft materials are absorbing the energy so that they can not be cleaned with the negative-pressure system.



granulate	:	nutshell NS 450
dosage	:	nozzle 6 - 8
usage	:	approx. 50 - 70 times
achievement	:	2 - 3 qm per hour

Working on surfaces with foil

In this example a steel door is cleaned of a graffiti. On the door text foils are sticked on. Despite using hard grains, the foil is not damaged. It is soft and absorbes the energy of the hitting garnulate.

Particularly on shop windows, which are decorated with foil, the Tornado can be applied very well.

granulate	:	jet glass SG 300
dosage	:	nozzle 5 - 6
usage	:	approx. 80 - 100 times
achievement	:	3 - 4 qm per hour

Application on natural stone

In the example a front from natural stone is freed from a graffiti. Unevenness up to 3 cm can be compensated with the jet hood without problems.

granulate	:	jet glass SG 150
dosage	:	nozzle 5 - 6
usage	:	approx. 80 - 100 times
achievement	:	3 - 4 qm per hour

Removing lacquer of boat hulls

Small boats can easily be freed from lacquer with Tornado ACS. One can set clear edges. The boat does not have to be brought into a hall. One can work with very hard granulates.

granulate	:	Testra TS 700
dosage	:	nozzle 8 - 11
usage	:	approx. 80 - 100 times
achievement	:	1 - 2 qm per hour

Possible reasons for Failures

fault:	possible reason:
⇒ suction apparatus does not start up	⇒ electricity supply (230 V or 110 V) is not correct
⇒ substantial deterioration of radiation times	⇒ filter at the suction apparatus is very dirty ⇒ jet medium is extensively worn ⇒ leaks at jet cap, connections or tubes ⇒ only 2 steps switched on ⇒ one motor broke down
⇒ no visible transport of jet grain	⇒ leaks at jet cap, connections or tubes ⇒ no jet medium in the dosing container ⇒ no jet medium filled in at all ⇒ open flap ⇒ large foreign bodies in the dosing ⇒ suction engine broke down ⇒ wrong adjustment of dosing aperture
⇒ not any or insufficient abrasion	⇒ use of wrong jet medium (not abrasive enough)
⇒ abrasion is too strong	⇒ use of wrong jet medium (too abrasive)

Specifications

AC:	230 V/50 Hz or 110 V / 50Hz
Input:	ACS 30 max. 3000 W ACS 35 max. 3500 W
Air output:	3 x 60 l/sec
Cable length:	7,0 m
Tare weight:	ca. 41 kg
Height incl. mobile car:	1.350 mm
Length overall:	750 mm
Width overall:	560 mm
Length of suction hose:	4.5 m
Length of jet tube:	4.0 m
Filling quantity:	approx. 10 liters (max.)
Dimension of working surface:	130 x 130 mm (standard-cap)
Granulates throughput per hour:	according to ray means approx. 20-80 liters
Granulates consumption per hour:	according to ray means approx. 0.4-1 liters

EU-Statement of Conformity

in compliance with EG-directive for machines 98/37/EG, addendum II A

states that the machine/system being produced

Type:	Jet machine
Model:	USC 04
Designation:	**TORNADO ACS 30/35**

matches in this version with the product being examined on conformity by TÜV Rheinland/Berlin-Brandenburg. Moreover it is conform with the following EG guidelines and harmonized standards:

98/37/EG	**machine guideline**
89/336/EWG	**EMV-guideline in the version 93/68/EWG**
73/23/EWG	**low-voltage guideline in the version 93/68/EWG**

DIN EN 296-1;-2 **DIN EN 294** **DIN EN 349** **DIN EN 418** **DIN EN 60204-1**

Furthermore the application of appropriate national standards and specifications is confirmed.

The technical documentation is completely present.

The according manual is present.

Lübbenau, 27.12.2005

Dipl. –Ing. Uwe Dyballa
CEO

steco
technologie für Oberflächen

Application chart for selected granulates

	granulate	nutshell walnut	jetglass white glass	jetglass white glass	asilit aluminum silicate	asilit aluminum silicate	asilit Aluminiumsilikat	jet plast * plastic	jet plast * plastic
	technical name	NS 450	SG 150	SG 300	AS 90	AS 250	AS 500	DP 200	DP 600
round	grain size [mm]	0,2 - 0,45	0,09 - 0,15	0,15 - 0,30	0,04 - 0,09	0,09 - 0,25	0,25 - 0,50	0,1 - 0,2	0,3 - 0,6
stone	granite polished	5 - 6						3 - 4	
	granite unpolished	5 - 6	4 - 5	5 - 6	4 - 5	5 - 6	6 - 8		
	marble	5 - 6	4 - 5		4 - 5	5 - 6		3 - 4	
	lime stone		4 - 5		4 - 5			3 - 4	
	sandstone		4 - 5		4 - 5				
l stone	ceramics - unglazed	5 - 6	4 - 5		4 - 5			3 - 4	5 - 6
	ceramics - glazed	5 - 6						3 - 4	5 - 6
	clinker		4 - 5	5 - 6	4 - 5	5 - 6			5 - 6
	clay brick - glazed	5 - 6	4 - 5		4 - 5			3 - 4	5 - 6
	clay brick - unglazed		4 - 5		4 - 5				
	lime sandstone		4 - 5						
	spray plaster	5 - 6	4 - 5	5 - 6	4 - 5				5 - 6
	scratched plaster		4 - 5		4 - 5				5 - 6
	concrete			5 - 6		5 - 6	6 - 8		
	gas concrete		4 - 5						
	copper		4 - 5		4 - 5				5 - 6
	iron/steel (derusted)			5 - 6		5 - 6	6 -8		
	aluminum	5 - 6	4 - 5		4 - 5			3 - 4	5 - 6
	bronze	5 - 6	4 - 5						
	brass	5 - 6	4 - 5						
	high-grade steel	5 - 6	4 - 5						
material	advertisement board							3 - 4	
	advertisement foil	5 - 6						3 - 4	
	spretacart	5 - 6						3 - 4	5 - 6
	oak	5 - 6	4 - 5		4 - 5				5 - 6
	beech	5 - 6	4 - 5						5 - 6
	chip board	5 - 6	4 - 5		4 - 5				5 - 6
l insulatior	all kinds of plaster		4 - 5		4 - 5				
	clinker	5 - 6	4 - 5	5 - 6	4 - 5	5 - 6			5 - 6

adjustment 2 = Ø 2 mm 3 = Ø 3 mm 4 = Ø 4 mm 5 = Ø 5 mm 6 = Ø 6 mm 8 = Ø 8 mm

: This table shows general recommendations for the application of granulates. Due to the interactions between colours and background as well as fluctuations of quality, we cannot make any guarantees for this chart.

21.01.2009