TECHNICAL REFERENCE

ABRASIVE BLASTING

Abrasive Blasting System Components Checklist
- Blasting Components
- Safety Components

Handy Hints and Tips that could help your profits
- Compressor Size
- Hose Lengths: Shorter is Better
- Air Hose Sizes
- Blast Hose: Whip Hose
- Blast Hose Sizing
- Checking Nozzle Pressure
- Abrasive Consumption: Metering Valve Settings

Abrasive Blasting Technical Data Tables
- Air Consumption per Blast Nozzle
- Nozzle Pressure vs Efficiency
- Hose Size Selection Guide
- Typical I.D-O.D. Relationship in Common Blast Hose Sizes
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Nozzle Pressure vs Blasting Efficiency Chart

Blast Cleaning Cost Calculation Formula

BLAST ONE

Abrasive Blasting System Component Checklist

BLAST COMPONENTS

B1. Air Compressor
- fully maintained and serviced on a regular basis.
- capable of 125psi discharge pressure.
- high volume output (typically 300+ cfm per nozzle) based on nozzle size requirements plus 50% wear allowance (plus 30 cfm of breathing air quality per operator)
- high temperature safety cut out.
- oil and particulate filter separator.
- located upwind and away from the blasting area.

B2. Blast Air Supply Hose
- large bore hose (4 times nozzle orifice minimum).
- large connector fittings with whipchecks and/or safety chains installed.

B3. Air Moisture Control
- Compressed air moisture removal system with final moisture separator.
- large porting.
- regularly cleaned and maintained.

B4. Blast Machine
- AS Standard Approved Design.
- Remote Control Valve System checked and maintained.
- Abrasive Metering Valve and fittings checked and maintained.
- Lid and screen (portable hoppers) fitted.

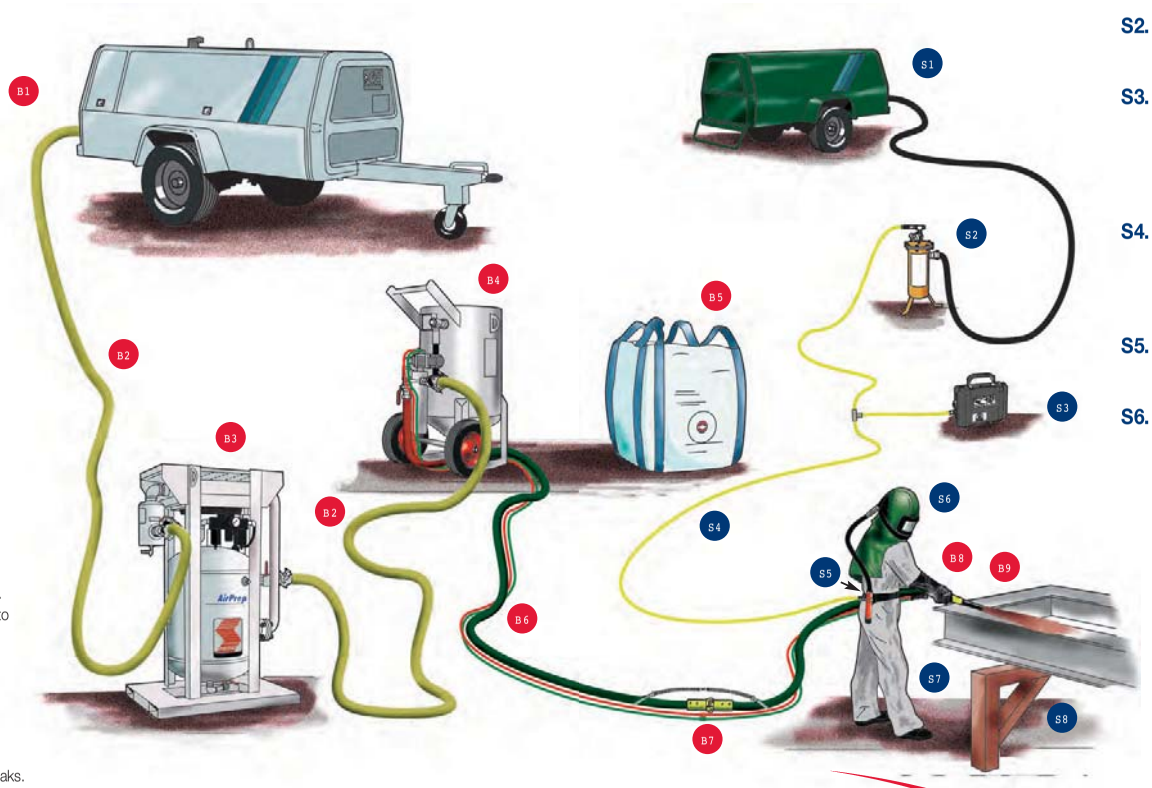
B5. Blasting Abrasive
- safe, approved, productive, abrasive media.
- free of harmful substances (health or environmental)
- kept dry and protected.
- small palletised bags or bulka bags.

B6. Blast Hose
- Abrasive resistant hose sized 3-5 times the nozzle orifice.
- kept as straight and as short as possible (drawn curved to show perspective). Checked daily for wear or soft spots.
- Heavy wall hose for extension lengths,
- Superflex for nozzle end flexibility.

B7. Blast Couplings, Connectors
- external connectors properly fitted.
- lockpins and whipchecks installed.
- checked daily for gasket and component wear, and air leaks.

B8. Remote Control Handle
- fast acting, under direct positive control of the operator.
- pneumatic or electric operation.
- critically checked and maintained for operation and safety lockout.
- optional abrasive cut off control.

B9. Blast Nozzle
- long venturi (and other designs) with durable wear liner.
- sized to suit air and workpiece requirements.
- checked routinely for air pressure and liner/thread wear or damage.



Use these handy reference checklists to analyse key requirements.

OPERATOR SAFETY COMPONENTS

S1. Breathing Air Source
- approved air compressor or dedicated breathing air compressor or air pump or bottled breathing air or other approved supply.
- checked and maintained on a regular basis.
- located in a clean air atmosphere, upwind and away from the blast area and engine exhaust fumes.

S2. Breathing Air Filter
- filters and regulates the breathing air supply.
- cartridges require regular programmed replacement.

S3. Carbon Monoxide Monitor or Converter Monitor
- samples air and safeguards against highly toxic, carbon monoxide.
- checked, tested and calibrated on a routine basis.
- ensures carbon monoxide level is safely below 10ppm (11 milligram/m^3) as per AS1715.

S4. Breathing Air Line
- AS Standard approved and marked.
- fitted with threaded screw-type connector or AS 1715 approved 'Safety Type' coupling with two distinct actions required for disconnection.

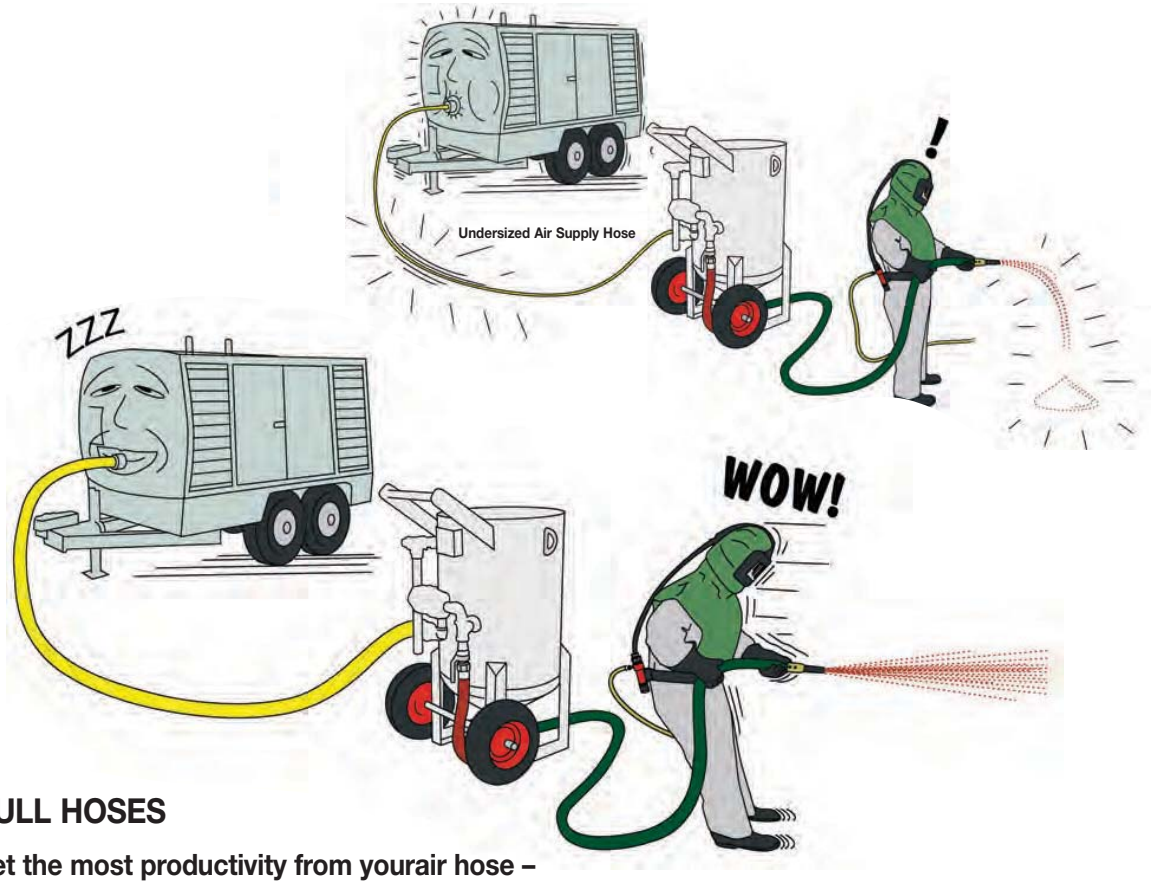
S5. Climate Control Tube
- air temperature control within 15°C - 25°C range for operator comfort and to comply with requirements of AS 1715.

S6. Blast Helmet (Respirator)
- issued on an exclusive use basis (or shared use only with an AS 1715 approved progamme for extensive and stringent cleaning, disinfecting, and recording).
- inspected and maintained for wear and tear to the cape, collar, head gear and visor as per AS 1715 requirements.
- inner lens in place for impact protection.
- supplied with minimum 170 litres/minute breathing quality air as per AS 1715.
- air quality regularly tested and test records maintained as per AS 1715 requirements to check the following levels of contaminants Oil below 1 milligram/m^3 Carbon Monoxide below 10 ppm (11 milligrams/m^3), Carbon Dioxide below 800 ppm (1400 milligrams/m^3), Oxygen between 19.5 and 22.0%.
- earplugs and/or earmuffs essential for hearing protection.
- optional communication equipment.
- optional blast light illumination kit.

S7. Other protective clothing
- leather gloves/gauntlets.
- blast suit/protective overalls.
- safety footwear.

S8. Work Hazards
Check, control and eliminate wherever possible.
- Physical dangers – tripping, falling, crushing.
- toxic substances eg. lead, arsenic, cyanide, heavy metals, chromates, free silica, etc. present either in the abrasive, the coating, the substrate or the environment.

Handy Hints & Tips that could help your profits...



BULL HOSES

Get the most productivity from yourair hose –

Use a large I.D. size. When it comes to air compressor hose, bigger is always better. Running large I.D. air line (1 1/2" or 2") from your compressor to your blast pot reduces the friction pressure loss caused in smaller, more restrictive sizes. Air pressure drops have a large impact on production. One 2" hose is better than 4 x 1" hoses!

COMPRESSOR SIZE IS VERY IMPORTANT

Keep your productivity up –

Maximize compressed air volume and pressure. A blast cleaning operation's productivity level directly depends on the volume and pressure of the air passing through the nozzle. In operations with slow production rates, there's usually not enough air volume (cfm) and pressure (psi). A larger compressor will provide moreair to support a larger nozzle, and a larger nozzle gets the job done faster.

SHORTER IS BETTER

Don't lose pressure –

Keep your air hose and blast hose lengths short. Put your compressor as close to the blast pot as possible, and keep your pot near your blasters to shorten the distance the air has to travel and keep pressure drops to a minimum. It's especially helpful to keep blast hose length short since pressure drops are even greater than in air hose because you're pushing abrasive and compressed air through the line.

Minimum Compressor Air Line Sizes

Nozzle Orifice size	Minimum Air Line ID
1/4" (6.5mm)	1" (25mm)
5/16" (8mm)	1-1/4" (32mm)
3/8" (9.5mm)	1-1/2" (38mm)
7/16" (11mm)	2" (50mm)
1/2" (12.5mm)	2" (50mm)
5/8" (16mm)	2-1/2" (64mm)
3/4" (19mm)	3" (76mm)

Handy Hints & Tips that could help your profits...

BLAST HOSE

Get the best production possible –

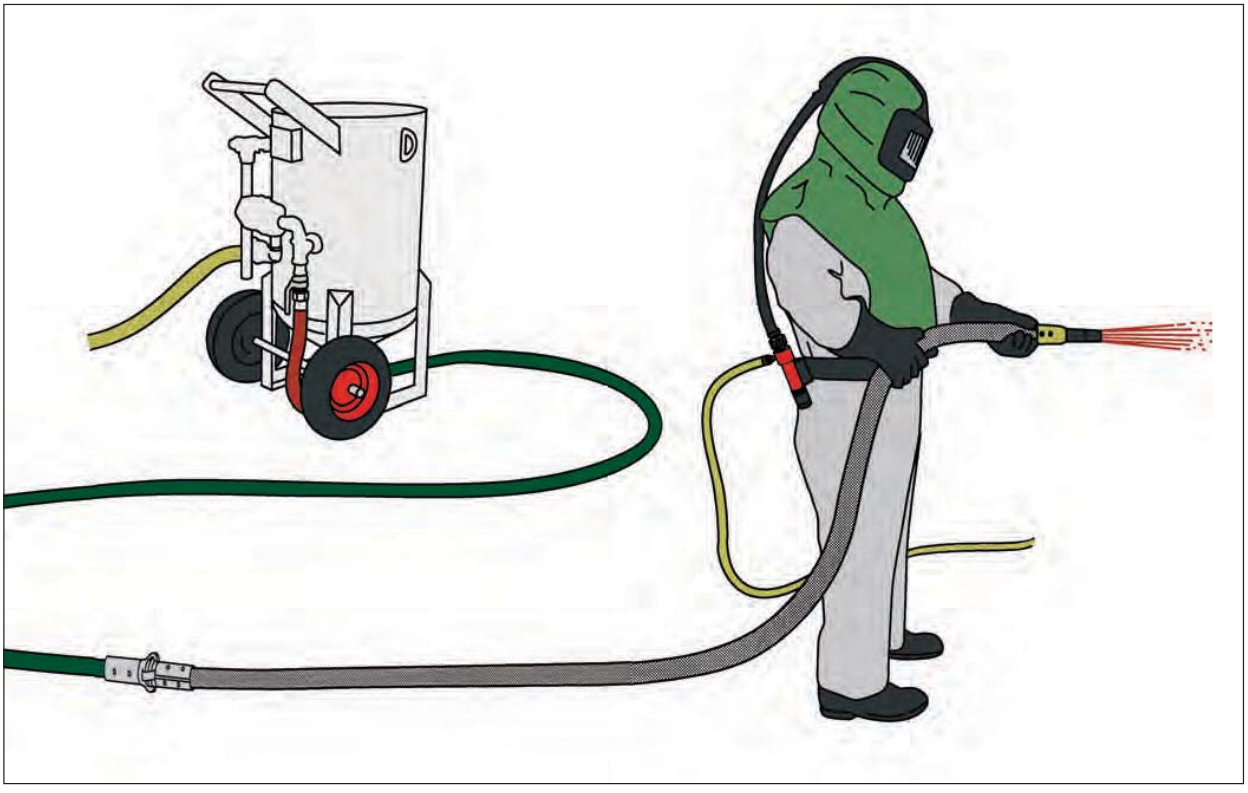
Make sure your blast hose is large enough to make the most of your nozzle. You know that to get the highest, fastest production out of your blasting set-up you need to run the largest blast nozzle that your air source can support. But, don't forget the blast hose. It won't do you much good to run small blast hose to a large nozzle or vice versa.

Comparative Percentage Hose Area Reduction		
Main Blast Hose Size	**Whip hose Size**	**% of reduction of internal area**
1 1/2" (38mm)	1 1/4" (32mm)	31%
1 1/2" (38mm)	1" (25mm)	56%
1 1/4" (32mm)	1" (25mm)	36%
1 1/4" (32mm)	3/4" (19mm)	64%
1" (25mm)	3/4" (19mm	44%

WHIP HOSES

Don't go too small on your whip –

If the operator finds the standard blast hose too heavy to work with all day, a short length of flexible, lighter weight, blast hose – called a whip - can be used near the nozzle. But be careful of using hose which is too small. By decreasing the I.D. of the blast hose, you increase friction losses and decrease productivity.

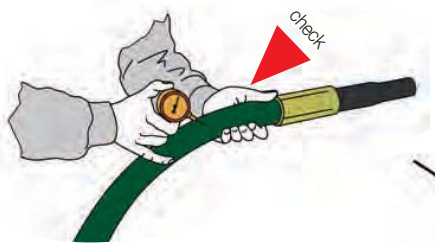


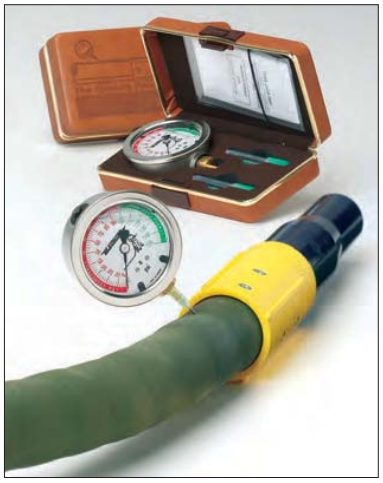
Handy Hints & Tips that could help your profits...

WORK UNDER PRESSURE

Check nozzle pressure for productivity –

Use a hypodermic needle pressure gauge kit, and insert the needle into the blast hose slowly, a few inches back from the nozzle. Point the needle toward the nozzle, and at a slight angle. Insert slowly until you get a constant reading. Are you getting 100psi?





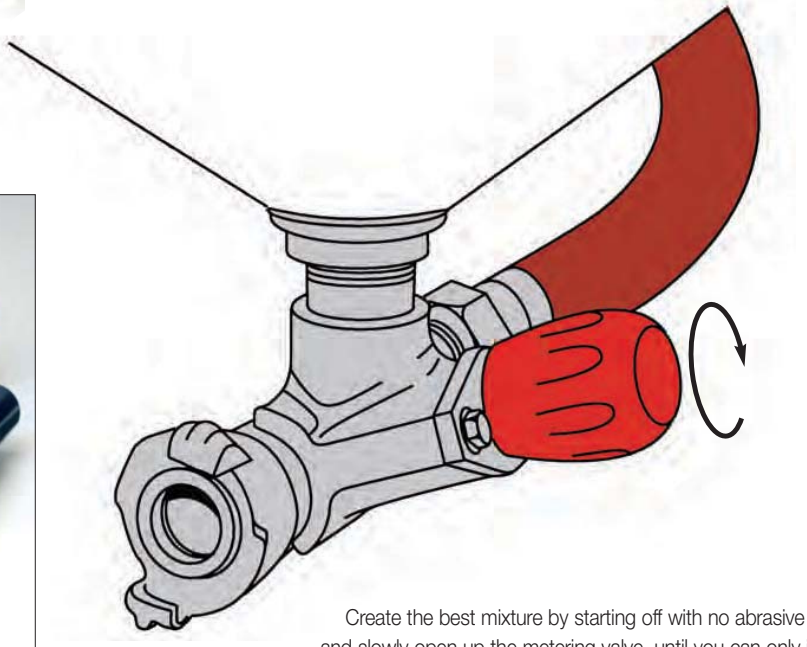
See page 45 for ordering details

ABRASIVE SETTINGS

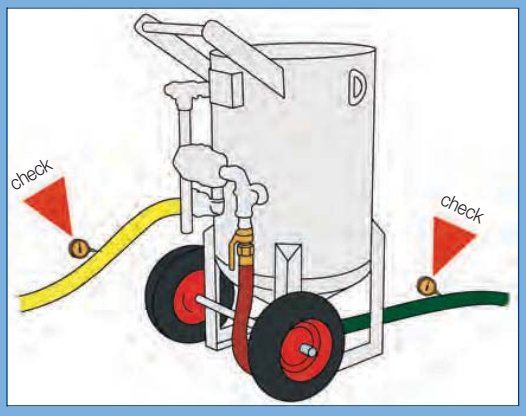
Don't lose valuable abrasive –

Make sure your abrasive metering valve is set properly.
How can you tell? Look at the abrasive flow coming out of your nozzle. An efficient air/abrasive mixture will be only slightly visible, appearing as a coloured haze in the air stream.

If you see a lot of colour in this flow, there's too much abrasive (and not enough air) in the mixture. Why? Your abrasive metering valve is open too far. When this happens, your cleaning efficiency is lowered, valuable abrasive is wasted and you're losing money.



Create the best mixture by starting off with no abrasive and slowly open up the metering valve, until you can only just start to see the colour change in the air exiting the nozzle.
That's all the abrasive you need for fast blasting.



Check your Blasting system right through and find where your pressure losses are located.

Test the pressure at both ends of a long length of hose - you'll be amazed to see how much pressure can drop!

We recommend getting two pressure test kits, to test air going into your blast pot versus air pressure coming out.

If you are losing excessive pressure, it may be equipment, accessory or compressor related.

Technical Data

AIR CONSUMPTION (CFM) PER BLAST NOZZLE USING GARNET ABRASIVE

Nozzle Size		Nozzle Pressure							
		50 psi	60 psi	70 psi	80 psi	90 psi	100 psi	120 psi*	140 psi*
No. 2	1/8"	14	17	19	21	24	26	30	34
No. 3	3/16"	32	37	42	47	52	57	67	77
No. 4	1/4"	57	66	75	84	93	103	119	136
No. 5	5/16"	89	103	117	131	145	158	186	214
No. 6	3/8"	129	149	169	189	209	229	269	309
No. 7	7/16"	176	203	230	258	285	312	367	422
No. 8	1/2"	229	265	300	336	371	407	478	549
No. 10	5/8"	356	412	468	524	580	632	744	856
No. 12	3/4"	516	596	676	756	836	916	1076	1236
Efficiency		**47%**	**55%**	**64%**	**74%**	**86%**	**100%**	**130%**	**165%**

**Ensure equipment is rated for these pressures.*

NOZZLE PRESSURE VS EFFICIENCY

Blast Nozzle Pressure	Approximate Abrasive Velocity	Approximate Efficiency Factor
100 psi	675 kph	100%
95 psi	640 kph	93%
90 psi	585 kph	86%
85 psi	530 kph	80%
80 psi	430 kph	74%
75 psi	225 kph	69%
70 psi	300 kph	64%

HOSE SELECTION GUIDE FOR BLASTING AT 100 PSI NOZZLE PRESSURE

Nozzle Number	No. 4	No. 5	No. 6	No. 7	No. 8
Nozzle Size	1/4"	5/16"	3/8"	7/16"	1/2"
CFM at 100 psi	103	158	229	312	407
Air Hose ID – minimum	25mm (1")	38mm (1 1/2")	38mm (1 1/2")	50mm (2")	50mm (2")
Blast Hose ID – minimum	20mm (3/4")	25mm (1")	32mm (1 1/4")	32mm (1 1/4")	38mm (1 1/2")

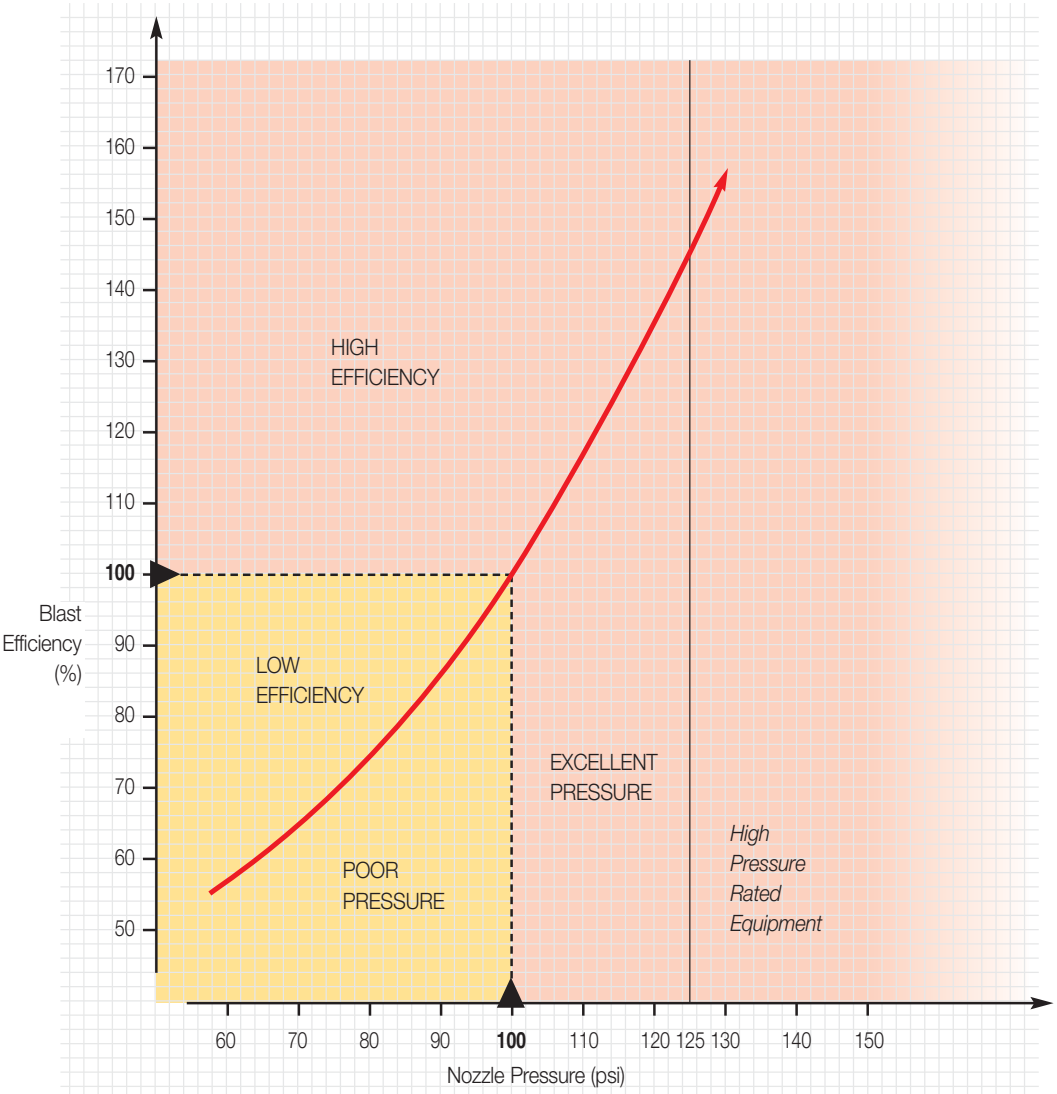
TYPICAL ID - OD RELATIONSHIP IN COMMON BLAST HOSE

Standard Hose				Supa/Whip Hose			
ID		OD		ID		OD	
mm	inch	mm	inch	mm	inch	mm	inch
13	1/2"	33	1-5/16"	13	1/2"	30	1-3/16"
19	3/4"	40	1-1/2"	19	3/4"	33	1-5/16"
25	1	48	1-7/8"	25	1	40	1-1/2"
32	1-1/4"	55	1-5/32"	32	1-1/4"	48	1-7/8"
38	1-1/2"	60	2-3/8"	38	1-1/2"	55	2-5/32"

Imperial/Metric CONVERSION CHART

3/16"	5mm	1-1/4"	32mm
1/4"	6mm	1-5/16"	33mm
5/16"	8mm	1-1/2"	38mm
3/8"	10mm	1-9/16"	40mm
7/16"	11mm	1-3/4"	44mm
1/2"	13mm	1-7/8"	48mm
5/8"	16mm	2"	51mm
3/4"	19mm	2-5/32"	55mm
1"	25mm	2-3/8"	60mm
1-3/16"	30mm	2-1/2"	64mm

Nozzle pressure vs Blasting Efficiency



The Golden Rule of Thumb
Every 1 psi below 100 psi pressure at the nozzle equates to a 1.5% LOSS of blasting efficiency*

from	94 psi	to	100 psi	achieves*	9.4% increase
	90 psi		100 psi		16%
	80 psi		100 psi		35%
	70 psi		100 psi		57%

... it's quite amazing!!

Did you know??? ... increasing your nozzle pressure to 100 psi will boost your efficiency substantially!

* approximate calculated efficiency – actual efficiency realised will vary, depending on abrasive type, abrasive size, nozzle size, nozzle type, nozzle wear, hose size, hose wear, moisture content of compressed air, temperature of the compressed air, etc...

Cost Effective Blast Cleaning

CALCULATING THE TRUE COST OF BLAST CLEANING IN DOLLARS PER SQUARE METRE.

$$\text{Blast Cleaning True Cost } (\$/m^2) = \frac{A.(B+C) + D + E}{x}$$

where	A	=	Abrasive consumption rate (tonne/hour)
	B	=	Abrasive cost delivered to site ($/tonne)
	C	=	Abrasive cleanup and disposal cost ($/tonne) including cartage, landfill
	D	=	Blasting labour cost ($/hour) including holidays, super, WorkCover, etc.
	E	=	Equipment cost ($/hour) compressor, blast unit, truck, safety, access equipment, fuel, power, insurance etc.
	x	=	Cleaning production rate (m^2/hour)

Comparative Example

Abrasive **A** costs $90/tonne, a 6 cu ft pot lasts for 30 minutes
(ie 600kg per hour)
and blasts 15m^2 steel in an hour

Abrasive **B** costs $300/tonne, a 6 cu ft pot lasts 1 hour
(ie 300kg per hour)
and blasts 20m^2 steel in an hour

common costs are : cleanup and disposal $40/tonne (conservative)
labour cost $40/hour (conservative)
equipment costs $60/hour (conservative)

True Cost (Abrasive A) = 0.6(90+40) + 40 + 60 / 15 = $11.86/$m^2$
True Cost (Abrasive B) = 0.3(300+40) + 40 + 60 / 20 = $10.10/$m^2$

CALCULATE THE TRUE COST USING YOUR FIGURES AND OVERHEADS

$$\text{True Cost} = \frac{\text{consumption x (abrasive cost + disposal cost) + labour + equipment}}{\text{cleaning speed}}$$

= $ /m2