



THE NEXT GENERATION OF INDUSTRIAL ELEVATOR BUCKETS

Industrial elevator bucket designs have not changed significantly since the 1950s. However, the introduction of Nylathane™, by 4B Group, brings a new technology to the industry. Nylathane™ is a unique polymer that combines Nylon 6 with an elastomer. It has the durability of nylon with the slick release surfaces associated with polyurethane. This combination makes it ideal for bucket elevators in the cement industry where impact tolerance and discharge efficiency of sticky or powdery products are required to minimize downtime and maintain production efficiency. Prior to its use in elevator buckets, Nylathane™ has been field proven in even more demanding applications such as track pads for tractors.



Nylathane™ tractor pads used on an excavator

Iron or steel elevator buckets can be prone to deformation or breakage due to impact from foreign objects or operational issues. Once deformed their capacity and efficiency is diminished. Deformed elevator buckets pose a risk to further damaging the bucket elevator system as they move through the system. Heavy iron or steel elevator buckets are difficult to manage when being repaired or replaced. Their weight is also a drain on system efficiency due to the amount of energy required to move the heavy bucket assembly. Should a bucket become detached from the elevator belt or chain, it is unforgiving in the collateral damage that it can cause to the system. Some metals in certain applications are prone to become brittle over time. Sticky powders have a tendency to collect in metal elevator buckets, reducing their capacity and clogging vent/drainage holes. Nylathane™ elevator buckets alleviate these problematic issues.

The characteristic advantages of Nylathane™ buckets are:

- > Up to 75% lighter than steel or iron
- > Outstanding wear resistance
- > Superior impact strength
- > Self-cleaning surfaces
- > Static Dissipative (<108 Ohms)
- > Non-sparking & non-corroding

The practical advantages of Nylathane™ buckets are:

- > Resists impact and retains original shape while metal buckets deform and lose efficiency
- > Reduced weight, thereby reducing overall Amp load
- > Lighter buckets means less wear and tear on other components
- > Lighter buckets are easier and safer to install and handle
- > Lighter weight and better impact absorption means that Nylathane™ buckets are less likely to pull through the belt or chain than heavier steel buckets
- > Compatible with both belt and chain elevators
- > Ideal for handling wet or sticky materials
- > Static dissipative for use with combustible dust



Metal buckets distorted and broken



For bucket elevators conveying sticky products, such as slag, the flexibility and low coefficient of friction of Nylathane™ help prevent product build up and loss in capacity.

In one case study performed by 4B Group in the potash industry, the Nylathane™ buckets exhibited better impact resistance due to their flexibility than solid abrasion resistant (AR) steel buckets. Deposits of salt based marine evaporate minerals occur naturally throughout the world. These minerals are high in potassium, calcium and magnesium along with other valuable trace elements. Often deep mined, they are used in the agricultural industry and industrial applications. The mineral is very hard, abrasive and hygroscopic making it difficult to handle efficiently. Once mined the mineral is crushed, graded, blended and stored, often utilizing expensive wear resistant steels in the process. Initially the user installed solid abrasion resistant (AR) steel elevator buckets which were expensive, and due to their rigidity and the aggressive hygroscopic nature of the mineral, caused loss of production along with frequent and expensive downtime. Industrial injection moulded nylon elevator buckets were tried and although they improved the discharge of the material from the buckets they wore out in a few months. The Nylathane™ buckets deformed or flexed rather than exhibiting brittle micro-breaks in the material. 4B Group also added AR steel wear lips to the Nylathane™ buckets for additional wear resistance, thereby delivering a hybrid elevator bucket with the best characteristics for the application. The 4B engineers devised a best of both worlds scenario by using the unique benefits of Nylathane™ affording better impact resistance due to flexibility (rather than brittle breaks on a micro level) and self cleaning properties due to the low coefficient of friction of buckets. This in addition to the abrasion resistant steel wearband, originally developed for the glass cullet industry, gave excellent wear and impact resistance.

The results were:

- > Improved tonnage through the plant
- > Extended belt life
- > Extended bucket life
- > Reduction in downtime
- > Reduction in planned maintenance
- > Savings on electricity costs
- > Improved manual handling
- > Better health and safety compliance



Nylathane™ bucket with bolt-on AR steel wear lip (front view)



Nylathane™ bucket with bolt-on AR steel wear lip (side view)

In another industrial application, moving glass cullet, the replacement of heavy steel buckets with the lighter Nylathane™ buckets provided a nearly 80% reduction in startup current. Saving both energy and electrical component costs. The installation was also quicker and safer with the lighter Nylathane™ buckets taking just one day to install compared to the usual three days with the steel.

The customer had been using 3mm to 4mm thick fabricated steel buckets supported by a steel fixing plate fitted with M16 bolts. The total unloaded steel bucket weight was 20kg and they were experiencing belt breakages and long downtime due to the constant repairs and maintenance required on the elevator.

4B replaced the heavy fabricated steel elevator buckets with lighter Nylathane™ elevator buckets weighing just 3kg. The original steel buckets weighed 3.25 tons in total whereas the Nylathane™ buckets only weighted 0.48 tons. Weighing nearly 2.8 tons lighter than the original bucket system was a huge improvement. The system was more reliable with fewer breakages and less downtime.

This new Nylathane™ substitution gave the customer:

- > Extended belt life
- > Reduction in downtime
- > Reduction in planned maintenance
- > Savings on electricity costs
- > Better health and safety compliance



Nylathane™ buckets installed in glass cullet elevator



Nylathane™ buckets from 4B Group are available in the traditional industrial styles of AA, AC and MF.

4B AA NYLATHANE™



4B AC NYLATHANE™



4B MF NYLATHANE™



In AA Nylathane™ Centrifugal style elevator buckets, there are now new sizes not previously available in the range allowing designers much more flexibility to achieve the capacities they need. Full table of bucket sizes below:

No.	Nominal Size (mm)	A (mm)	B (mm)	C (mm)	D (mm)	T (mm)	X°	Estimated Weight (kg)	Capacity (Litres) Z3 (water)
AA43/NY	110 x 80	104	78	79	52	5.00	37	0.10	0.21
AA54/NY	130 x 100	135	106	106	74	5.00	35	0.25	0.55
AA64/NY	150 x 100	160	106	106	74	5.00	35	0.29	0.67
AA74/NY	180 x 100	185	106	106	74	5.00	35	0.32	0.79
AA75/NY	180 x 130	184	135	134	95	8.00	35	0.47	1.26
AA85/NY	200 x 130	210	135	134	95	8.00	35	0.52	1.46
AA95/NY	230 x 130	236	135	134	95	8.00	35	0.57	1.66
AA96/NY	230 x 150	238	165	160	108	8.50	37	0.86	2.21
AA106/NY	250 x 150	264	165	160	108	8.50	37	0.94	2.50
AA116/NY	280 x 150	290	165	160	108	8.50	37	1.02	2.78
AA126/NY	300 x 150	316	165	160	108	8.50	37	1.09	3.07
AA127/NY	300 x 180	316	184	184	126	8.00	36	1.33	4.00
AA147/NY	350 x 180	367	184	184	126	8.00	36	1.50	4.75
AA148/NY	350 x 200	365	210	210	143	10.00	37	2.32	5.70
AA168/NY	400 x 200	416	210	210	143	10.00	37	2.60	6.60
AA188/NY	450 x 200	467	210	210	143	10.00	37	2.90	7.50
AA208/NY	500 x 200	517	210	210	143	10.00	37	3.14	8.44
AA228/NY	550 x 200	568	212	211	143	12.00	37	3.65	9.35
AA248/NY	600 x 200	619	212	211	143	12.00	37	3.93	10.26
AA1810/NY	450 x 250	466	260	260	170	12.50	37	4.37	11.02
AA2010/NY	500 x 250	517	260	260	170	12.50	37	4.77	12.37
AA2210/NY	550 x 250	568	260	260	170	12.50	37	5.19	13.73
AA2410/NY	600 x 250	619	260	260	170	12.50	37	5.60	15.08

The AC Nylathane™ Slow Centrifugal style elevator bucket is a direct replacement for the old BUDD and Cast Nylon versions which are no longer produced. Two new sizes are also now available

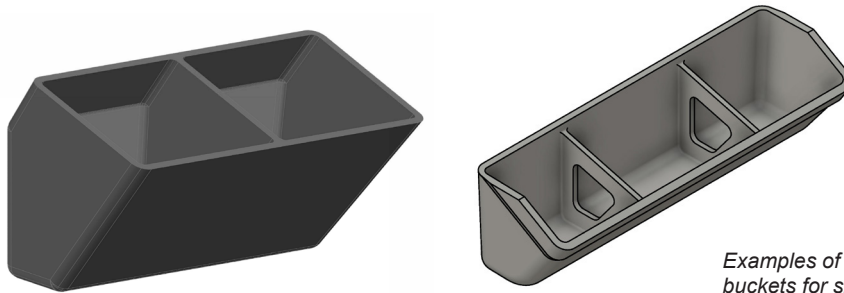
No.	A (mm)	B (mm)	C (mm)	D (mm)	T (mm)	X°	Estimated Weight (kg)	Capacity (Litres) Z2 (total)	Capacity (Litres) Z3 (water)
AC18x10/NY	482	281	281	182	12.7	12.7	5.48	17.96	13.09
AC20x10/NY	533	281	281	182	12.7	12.7	5.98	20.09	14.65
AC22x10/NY	584	281	281	182	12.7	12.7	6.46	22.22	16.22
AC24x10/NY	635	281	281	182	12.7	12.7	6.94	24.35	17.79



In MF Nylathane™ Continuous style elevator buckets there are also two new sizes now available.

No.	Nominal Size (mm)	A (mm)	B (mm)	C (mm)	D (mm)	T (mm)	X°	Estimated Weight (kg)	Capacity (Litres) Z3 (water)
MF85	200 x 130	210	140	184	110	8.26	48	0.97	1.31
MF105	250 x 130	260	140	184	110	8.26	48	1.14	1.65
MF127	300 x 190	311	190	286	155	8.26	48	2.15	3.98
MF147	350 x 190	362	190	286	155	8.26	48	2.40	4.67
MF167	400 x 190	413	190	286	155	8.26	48	2.65	5.37
MF187	450 x 190	463	190	286	155	8.26	48	2.90	6.06
MF128	300 x 200	311	216	286	178	8.26	48	2.34	5.18
MF148	350 x 200	362	216	286	178	8.26	48	2.61	6.08
MF168	400 x 200	413	216	286	178	8.26	48	2.87	6.99
MF188	450 x 200	463	216	286	178	8.26	48	3.14	7.89
MF208	500 x 200	514	216	286	178	8.26	48	3.51	8.70
MF248	600 x 200	616	216	286	178	8.26	48	4.05	10.51

Custom sizes and designs are also possible. Any metal bucket design, even complex ones incorporating center braces, can be produced in Nylathane™.



Examples of custom designed Nylathane™ buckets for slag cement

The new Nylathane™ bucket lines from 4B Group offer the opportunity to replace traditional steel and ductile iron elevator buckets with a similarly durable but lighter weight option. The expansion of sizes, along with custom designs, offers bucket elevator designers more options to generate additional capacity which was not available to them in the past.

