



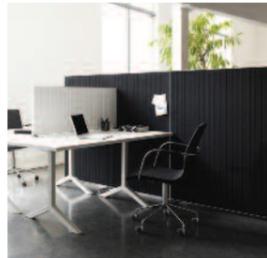
NORDIFA AB

Nordifa, the only dedicated manufacturer of technical textiles in the Nordic region, is located on Flygstaden industrial estate, close to the airport in Halmstad. The 14,000 square metre, state-of-the-art production plant meets the highest environmental standards.

OUR BUSINESS AREAS

ADVANCED INDUSTRIAL TEXTILES

Textiles can replace many traditional construction materials. The benefits include lower weight, increased service life and strength, simpler production and reduced costs. In addition, textiles make holistic design easier.



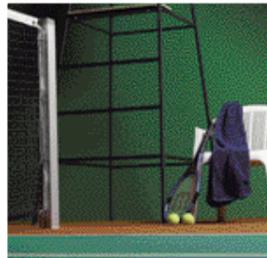
FILTRATION

Effective filter materials are frequently created using layers of fibres with different properties. The final finish is achieved through customised after-treatment. In this area, Nordifa's resources and experience are unique.



SPORTS FLOORING

Needled felt sports flooring is quick to lay and holds its dimensions well. The surface texture and colour can be customised to make it ideal for a range of uses. Outdoor products are, of course, made from weather, wind and UV-resistant filter material.



NORDIFA FILTRATION

DUST, FLUID AND VENTILATION FILTERS TO MEET YOUR MOST DEMANDING REQUIREMENTS



Head office: Nordifa AB, Kristinebergsvägen 19, Box 612, SE-301 16 Halmstad, Sweden. Tel. +46 (0)35-17 48 00. Fax +46 (0)35-17 48 01
E-mail: info@nordifa.se. Website: www.nordifa.se

For addresses and telephone numbers for companies outside Sweden, as well as our regional offices, please visit our website www.nordifa.se

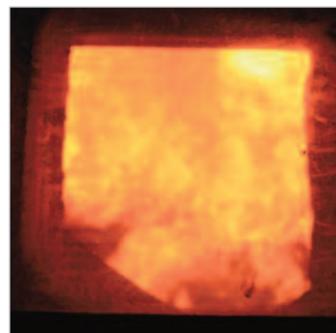
SMART TEXTILES FOR SMART CUSTOMERS - WWW.NORDIFA.SE

A DOZEN FILTRATION PROBLEMS WE HAVE SOLVED FOR OTHERS. SO, WHAT CAN WE DO FOR YOU?

Although every industrial operation is unique and the operating conditions vary significantly from one process to another, there are a number of problems and requirements which we come across again and again.

Here is a small selection. If you recognise any of them, don't hesitate to contact us. If your processes suffer from a

completely different set of problems, we are particularly keen to hear from you – we love a challenge. There is, however, a very good chance that we will already have come across something similar – it is one of the benefits of using a partner who was making textile filter materials and industrial textiles long before the concept was invented.



EXTREME OPERATING TEMPERATURES

Cleaning flue gases in waste incineration plants is one of many areas in which Nordifa specialises. We know better than most which materials will provide reliable service for many years, and which materials don't work at all. We don't take shortcuts, which is probably one of the explanations why more and more district heating power plants are turning to Nordifa.



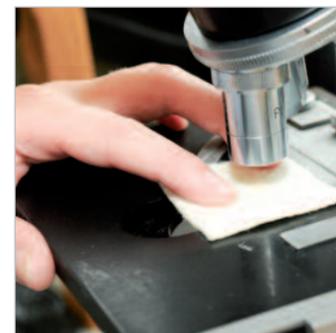
EXPRESS MANUFACTURING

We know only too well how much a breakdown can cost in the processing industry. So when something happens to one of our customers, e.g. a fire or something else causes a breakdown, it's Code Red at Nordifa. Everything else is put on hold, and once the products are ready, we deliver them as quickly as possible. This is where having an airport next door comes in handy!



SMOULDERING PARTICLES

In metal smelting processes, for example, it is not at all unusual for the gases to be cleaned to contain hot or smouldering particles. Using temperature resistant surface materials and the right surface treatment is essential, but it must not affect the service life or pressure drop of the filter material.



LONG SERVICE LIFE EXPECTED

When customers first use our filter materials, they are often surprised at how long it lasts. The explanation is our careful analysis of the operating situation, which we use as a starting point when we produce a material ideally suited for those precise conditions.



RISK OF HYDROLYSIS

When faced with both high temperatures and atmospheric moisture content, e.g. in tarmac production operations, a filter material with no resistance to hydrolysis can break down quickly. Nordifa has a number of material grades which work well and have a long service life even in tough conditions.



MATERIALS CAUSING EXTREME WEAR DURING FLUID FILTRATION

The mining industry involves some of the most demanding operating conditions imaginable, e.g. when ore concentrate is dried, and slurry contains a high concentration of crushed, sharp particles, which cause extreme wear and tear. For this kind of operation, we use specially-designed filter material which combines strength and softness.



HIGH PRESSURE DROP

If the dust contains a large number of fine particles, then poorly-chosen filter material can become blocked in a very short space of time. This is why checking the operating conditions carefully and selecting the right material is so important. Nordifa has several specialist materials for fine particles, and is happy to provide advice.



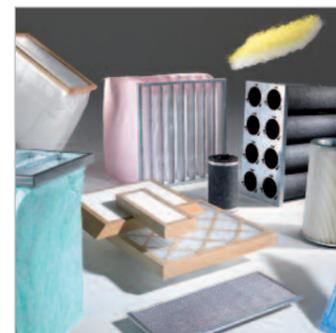
RISK OF DUST EXPLOSIONS

When the concentration of combustible material in a gas exceeds the explosion limit, a single spark is enough to destroy a silo or filter system. To prevent sparks caused by static electricity, we supply specially-made anti-static filter materials.



AGGRESSIVE ENVIRONMENTS

In the chemicals industry, as well as in smelting plants and in cellulose production, the gases or slurry to be filtered often contain aggressive substances. The solution is to use resistant raw materials. Read more about all our standard materials on page 11, and remember that we have even more up our sleeve.



DEMANDING ENVIRONMENT

Industrial ventilation filters lead a hard life, frequently having to cope with high concentrations of aggressive dust. That is why Nordifa has developed filters with particularly high dust-retaining capacity and wood frames for easy destruction. Another example is the Nordicarb carbon fibre cartridge which means that the ventilation service staff avoid handling dirty carbon powder.



CUSTOMISED ACCESSORIES

In dust filtration applications, for example, it is extremely important that the dimension and finish of the support sleeves are tailored to the filterbags and cleaning methods involved. If you want to be absolutely sure, choose your filter materials and accessories from Nordifa!



SERVICING DURING PLANNED SHUTDOWNS

We have a specialist team which deals with our customers' servicing and maintenance needs, including filter replacements, during summer shutdowns or auditing. We strongly suggest that customers plan ahead and notify us early! We can also help you with drawing up an appropriate maintenance routine.

ONLY NORDIFA CAN CUSTOMISE FILTER MATERIAL TO SUIT YOUR PRECISE PROCESS

We have been manufacturing textiles since the early 20th Century. Today, we are the only company in northern Europe with a comprehensive production chain for needled felt, pressed felt and woven specialist products.

Most filter material suppliers do not have their own production plants. Instead, they use material from major European manufacturers; standard materials which are produced quickly and cheaply in large quantities. The fibre

blend, product composition, structure or after-treatment cannot be customised.

Nordifa takes the opposite approach. We are well aware that every customer's operation is unique and that the best solution is always filter material tailored to the process. Our entire production process is designed to ensure maximum flexibility at all stages.

STEP 1 – ANALYSIS AND DEVELOPMENT

We always begin with a careful examination of the operating conditions, determine the functional requirements and test the material previously used. At this stage, close collaboration with the customer is essential.

When all the facts have been evaluated, we decide what filter materials should be used and how they should be blended, the surface weight and dimension of the product, what after-treatment to apply etc.

STEP 2 – FIBRE BLEND

Nordifa's unique, highly-accurate blending equipment guarantees that even very small quantities of specialist fibres are evenly distributed throughout the fibre volume. In many cases, this is essential to the function of the filter material.

We can, for example, blend fine and coarse fibres in the same material to optimise pore size, or add antistatic fibres which make the material conductive and reduce the risk of sparks and dust explosions.

Fibre materials for weaving yarn are blended equally carefully.

STEP 3 – CARDING AND WADDING

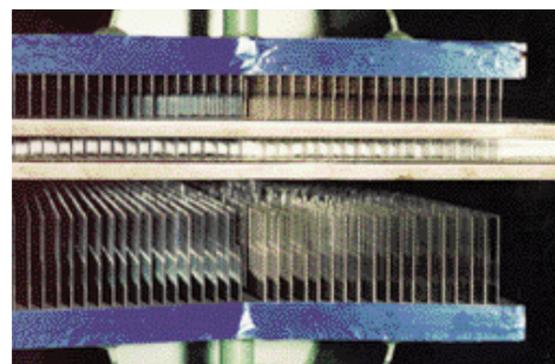
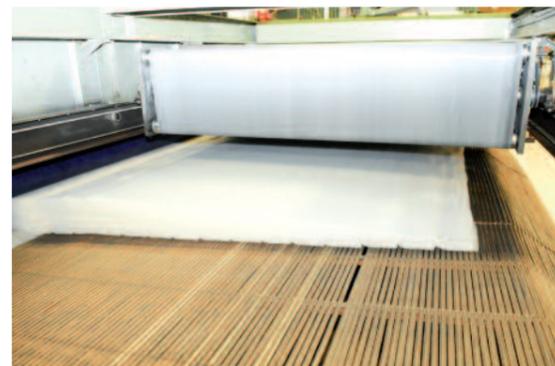
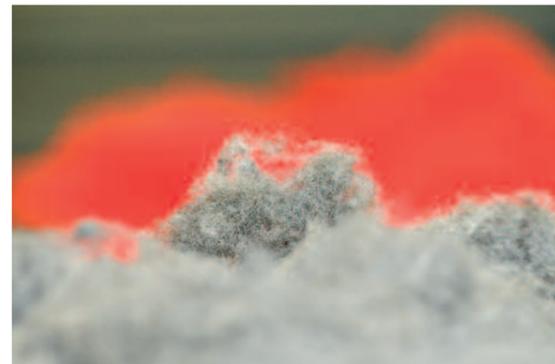
When making needled felt, we first card the fibres to create a thin fibre layer. To improve the strength of the material, we place several fibre layers on top of each other and card these to form wadding.

This technique is unique to Nordifa, making us the first to produce progressively layered products made from layers of fine and coarse fibres.

The wadding process is also unique – partly because our machines are wider than other producers', partly because we can select different laying patterns, which allows us to combine wadding materials to create an end product with exactly the right composition.

STEP 4 – NEEDLING/WEAVING/KNITTING

The wadding is processed several times, using barbed needles. Every time the felt passes the needles, it becomes more and more compacted. If additional mechanical strength is required, we will add a base layer made from needled felt. Our flexible processes enable us to move the



base layer in different directions from the centre of the felt to create products with different properties.

Specialist machines are used for weaving and knitting to guarantee that the finished filter material has the precise density, weight, surface structure and thickness required.

STEP 5 – AFTER-TREATMENT

Nordifa uses a range of different after-treatments, including thermo-fixing to create surface structure, dimensional stability and wear resistance. Singeing the surface gives a smooth, shell-like surface so that the filter cake can be removed easily. Calendaring gives a shiny surface and increases the density of the material.

Hydrophobic treatment is an environmentally-friendly proofing which makes the material water-resistant. It can also be coated to resist sparks and smouldering particles.

STEP 6 – SEWING

Once the material has been cut, the product is put together to the exact shape and dimension specifications using specialist sewing machines and other equipment. Durable reinforcements are added in areas particularly exposed to wear and tear.

STEP 7 – TESTING AND DOCUMENTATION

Finally, the quality and dimensions of the product are checked thoroughly. We follow the procedures required by our ISO-based quality assurance system. All stages of the manufacturing process, as well as the test results, are documented and filed for future reference.

STEP 8 – MAINTENANCE AND OUR TOTAL SERVICE PACKAGE

Customers who want to rest assured that their filter systems will work as intended for a long time choose Nordifa's total service package. This not only involves supplying the right filter material and appropriate accessories, but also includes removing existing filters and fitting new ones. Naturally, we will also be involved in assessing the performance of the new filter material.



DUST AND FLUID FILTER MATERIAL WAY ABOVE THE USUAL

Effective filtration has a huge impact on financial results, particularly in the process industries. In many sectors, including food processing and chemicals, filtration is used to produce the raw materials the producers sell.

That is why careful choice of the right supplier is the key

– a knowledgeable partner who keeps abreast of developments and ensures that customers are given rapid access to the latest technology is worth its weight in gold, particularly in these days of rapid technical innovation.



Filterbags, filter cartridges and filter material for dust filtration.



Woven filter cloth and needled felt for fluid filtration.

Nordifa has been around longer than all its competitors – we worked with industrial textiles long before the concept was invented.

In the filtration area, Nordifa has remained at the cutting edge of development. We were the first to introduce many of the innovations which are now regarded as standard. Nordifa is the company which others still compare themselves with and try to emulate. “Imitation is the greatest form of flattery”, as the saying goes ...

But not everything can be copied. Thanks to our unique, start-to-finish production process described earlier, we remain the only company able to tailor solutions down to the tiniest detail to suit the most demanding applications. Combining fine and coarse fibres in a single filter material, creating a progressively layered filter material or supplying a material made solely from fine fibres is all in a day’s work for us.

Naturally, we also have a broad range of after-treatments, many of them specially developed to solve the problems production engineers in the process industry have to wrestle with.

NORDIFA’S SECRET

As a market leader, we obviously have unique knowledge of textiles and substantial resources at our disposal. But when it comes to filtration, this doesn’t get you very far. Our real strength is that we know at least as much about our customers’ processes as they do themselves, and what is required for effective filtration.

When a mobile asphalt mixer moves to a new location, the stone material used usually changes. This affects the drying process and may also play a part in the choice of filter material. Obviously, this is something which we recommend is checked.

The same applies when we analyse used filter material. Naturally, the investigation we carry out is thorough enough for us to be pretty certain what has had a limiting effect on the service life – clogging, mechanical wear, chemical breakdown, high temperatures etc. Or maybe a combination of all these factors.

MORE THAN JUST PRODUCTS

Accurate analysis, the right material, correct installation – even so, a filter material can break down far too quickly if the accessories are not up to scratch.

This means that accessories must be designed and selected every bit as carefully as the filter material. Materials, tolerances, durability and surface treatment are factors which have a real impact on service life and corrosion resistance. This is why Nordifa’s accessories are specially designed to have the minimum possible impact on the filtration process.

Finally; if you want to be absolutely sure that your installation is as efficient as it can be, leave the removal and fitting to us. We will take full responsibility for the work and logistics, something which is much appreciated by operations and maintenance managers.

SELECTING THE BEST IS NOT CHEAP

In many respects, Nordifa is unique – in raw materials, manufacturing techniques, textile know-how and understanding of the customers’ processes. Naturally, this is reflected in Nordifa’s products – we are rarely the cheapest, but our customers know that they are getting solutions with the best overall economy. It is no coincidence that more and more filter users are choosing Nordifa.

TOUGH FILTERS FOR INDUSTRIAL AIR CONDITIONING

Industrial operations place exceptional demands on ventilation filters. Quite simply, the air quality in general is poorer and there is more dust in the air. In some cases, hazardous substances will also be present.

Industrial operations also have to cope with completely different requirements when it comes to overall economy, cost control and waste management. In other words – the ideal situation for Nordifa!



Full range of products for industrial air conditioning.

Industrial operations are Nordifa's home territory. Just as with fluid and dust filtration, we know what our customers need – technically, financially and environmentally. That is why our ventilation filters virtually have the field to themselves in industrial operations.

OWN DESIGN AND OWN PRODUCTION FACILITIES

For the types of filters most commonly used in industrial operations, we have invested in our own production facilities. Naturally, we work closely with leading international ventilation filter manufacturers, both to ensure that we are at the cutting edge of development and to complement our own products.

This means that we can offer ventilation filters specially designed for demanding industrial environments where requirements relating to pressure drop, dust holding capacity and service life are at the top of the list. Our filters are specially designed to be stable, retain their shape and hold large quantities of dust.

IDEAL FOR RECYCLING

Environmental requirements are becoming increasingly stringent, and it is no longer as easy to dispose of used ventilation filters as it used to be. Most users want to be able to incinerate the filters, but this cannot be done if the filter has a metal frame. That is why Nordifa's filters can be supplied with wooden frames – simple disposal; just throw it in the incinerator.

EVERYTHING FROM ONE SUPPLIER

Keeping tabs on several different suppliers isn't easy. That is why customers who buy fluid and dust filters from us also buy our ventilation filters.

We examine our customers' needs, recommend suitable filters and supply them at intervals which suit our customers. Naturally, we stock the full range, from basic standard filters to specialist solutions. Quick, simple and painless!



NORDICARB

Using carbon filters to remove contaminants from air and eliminate nasty smells is an effective and well-tried method. The technique is used in many contexts – from air terminals and process industries to offices, hospitals, catering kitchens and data centres.

The Nordicarb carbon filter cartridge, developed in-house by Nordifa, offers many benefits, including an even flow of air to ensure that the activated carbon is used to its full potential. Pressure drop is reduced, and an even level is maintained throughout the service life of the filter. It takes longer for the air to pass through the carbon, which makes the filter more effective.

The design means that no carbon is released from the filter, so in most installations, afterfilters are not required. This saves money and reduces pressure drop throughout the installation. The cartridge design makes filter replacement simple and clean.

Nordicarb is made from polyamide, which makes for a lightweight, corrosion-resistant cartridge which can also be incinerated. It comes with the carbon quality of the customer's choice. The cartridge has bayonet fittings and is very easy to install.

16 IMPORTANT FILTRATION TOOLS

Technical development is a very rapid, not least when it comes to textile fibres. Chemical giants like DuPont, Teijin, Toyobo, Evonik and Toray are carrying on extensive research to find fibre materials which provide users with even better solutions to their problems than the materials currently in use.



As a leading dust and fluid filtration manufacturer, we work closely with all fibre manufacturers around the world. Without continuous feedback on how their materials are performing in practical applications, fibre research would simply come to a standstill.

But the flow of information also passes in the opposite direction, and we are constantly receiving details of new materials, or new, successful application areas for existing fibre materials.

It is this exchange which drives development forward, and only Nordifa's customers can be absolutely certain that they are the first to receive information on new alternatives.

PRODUCT ANALYSIS AND BASIC RESEARCH

Most of the analysis required to find the right filter material for a specific application can be handled by our in-house laboratory. On the rare occasions when more specific factors have to be checked, we collaborate with a number of independent laboratories, both in Sweden and abroad, as well as with our partners.

Naturally, we are also actively involved in on-going Swedish textile research.

TEXTILE RAW MATERIALS AND THEIR PROPERTIES

	SI-units	Factory units	CF Carbon fibre	CO Cotton	GF (glassfibre) Silicon- dioxide	MAR Meta- aramid	MTF Stainless steel	PA Polyamide	PAI Polyamide imide	PAN Polyacrylonitrile homopolymer	PBO Polybenz- oxazole	PET Polyester	PF Phenol- formalde- hyde	PI Polyimide	PP Polypro- pylene	PPS Polyphe- nylene sulphide	PTFE Polytetra- fluoro- ethylene	PVDF Polyvinylidene- fluoride
Trade name			Tenax Torayca			Conex, Nomex	Bekinox Naslon	Perlon	Kermel	Dolanit, Aksa	Zylon	Trevira, Dacron	Kynol	P84	Meraklon Asota	Procon, Torcon	Profilen, Teflon	Kynar
Staple fibres' tenacity	MPa/(kg/m ³)	N/Tex	1,67	0,50	0,45	0,48	0,23	0,50	0,35	0,55	3,70	0,50	0,18	0,33	0,43	0,27	0,14	N/A
Staple fibres' strength	Mpa	N/mm ²	3000,00	370,00	1170,00	660,00	1780,00	570,00	470,00	660,00	5900,00	690,00	230,00	465,00	390,00	370,00	300,00	N/A
Filament fibres' tenacity	MPa/(kg/m ³)	N/Tex	1,67	N/A	1,39	0,50	0,23	0,62	0,41	N/A	3,70	0,60	N/A	0,33	0,54	0,27	0,14	0,31
Filam. fibres' strength	MPa	N/mm ²	3000,00	N/A	3530,00	680,00	1780,00	710,00	540,00	N/A	5900,00	830,00	N/A	465,00	490,00	370,00	300,00	560,00
Break elongation	%		0,4 - 1,8	3-7	2 - 3	18 - 20	1	10 - 19	20-30	13 - 18	2,5 - 3,5	8 - 15	20	30	15 - 25	25 - 30	13	20 - 50
Wet strength, relative	%		100,00	100-200	100,00	75 - 80	100,00	90 - 95	75-80	90 - 96	100,00	95 - 100	100,00	75 - 80	100,00	100,00	100,00	100,00
E-modulus**	Gpa	N/mm ² x1000	x	x	72,00	x	x	x	x	17,77	300,00	137,00	x	4000,00	42,00	x	x	x
Density	g/cm ³		1,80	1,52	2,60	1,38	7,90	1,14	1,34	1,18	1,56	1,38	1,25	1,41	0,91	1,37	2,10	1,78
Moisture absorption	%		0,10	7,50	0,01	2,50	2,00	4,50	3-5	1,50	0,6 - 2	0,40	6,00	3,00	0,10	0,60	0,10	0,04
Working temperature	K= C + 273	Degrees C	530,00	80,00	240,00	200,00	550,00	100,00	250,00	130,00	400,00	135,00	150,00	245,00	90,00	190,00	240,00	130,00
Max temp. bef. collapse	K= C + 273	Degrees C	1800,00	150,00	845,00	400,00	1400,00	250,00	400,00	240,00	650,00	257,00	250,00	400,00	160,00	285,00	327,00	156,00
Fire resistance LOI		% syre för att brand ska uppstå	x	16-18	x	30	x	22	32	19	68	21	30-34	47	18-19	43	95	44
Acid resistance dilute/concentrated		U/K *	4/4	2/1	3/3	3/2	4/3	2/1	4/3	4/3	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4
Alkali resistance dilute/concentrated		U/K *	4/4	4/3	3/2	4/3	4/4	4/3	3/3	3/3	4/3	2/1	4/3	3/2	4/4	4/4	4/4	4/3
Resistance to organic solvents		U/K *	4	3	4	3	4	4	4	3	4	3	4	3	3	4	4	3
Resistance to oxidising agents		U/K *	4	2	4	3	4	2	4	3	4	4	1	3	3	2	4	4
Resist. to hydrolysis		U/K *	4	x	4	1	3	3	4	4	1	1	4	2	3	4	4	4
Relative price		Low, medium, high, (L:M:H)	H	L	L	M	M	M	M	L	H	L	M	M	L	H	H	M

** at 2 % elongation

* U = dilute, K= Concentrated

1- poor N/A Not applicable

2- medium x Information not available

3- good LOI values above 25% are regarded low ignitability

4- excellent Tex Specifies the weight in grams of 1,000 m of the fibre