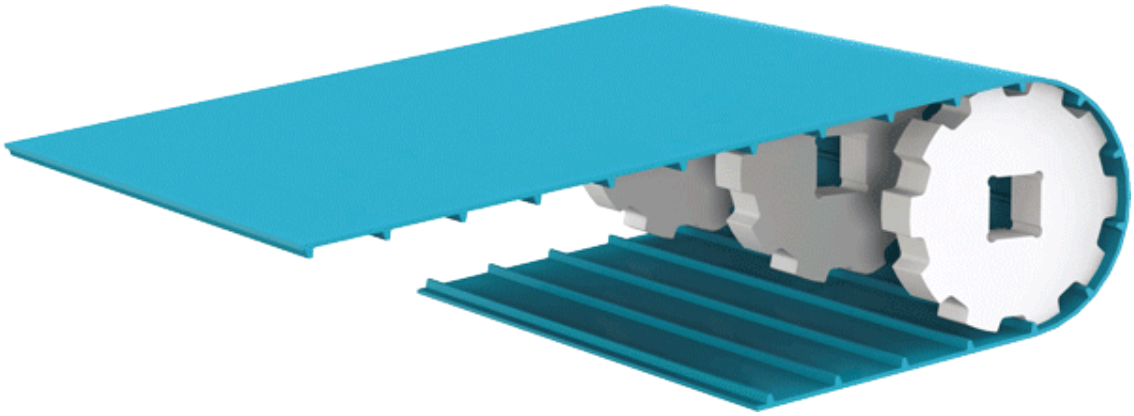
TECHNICAL **MANUAL**

DEL/DRIVE®

POSITIVE DRIVE BELTS

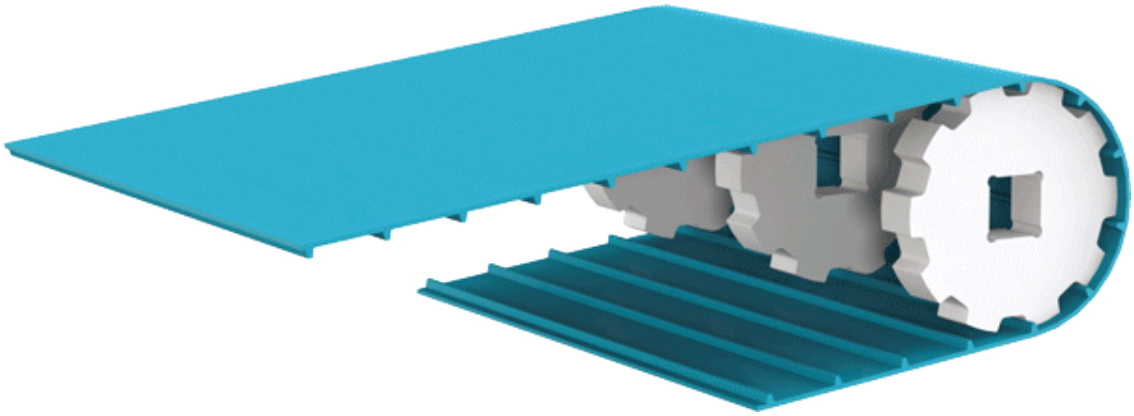


www.mafdel-belts.com

beltservice.com

USER MANUAL

V2



SUMMARY

I | GENERAL

The **DEL/DRIVE®** positively drive belt is the ideal alternative to conventional modular belts:
- Rot-resistant material, smooth top, waterproof and easily cleanable.
- Transverse teeth across the width for even pull and smooth, quiet operation.

The **DEL/DRIVE®** range is a monomaterial without a textile reinforcement and comes in several material types and formats to meet different needs.
To achieve the best performance from this belt, it is important to adhere to the recommendations of this document:

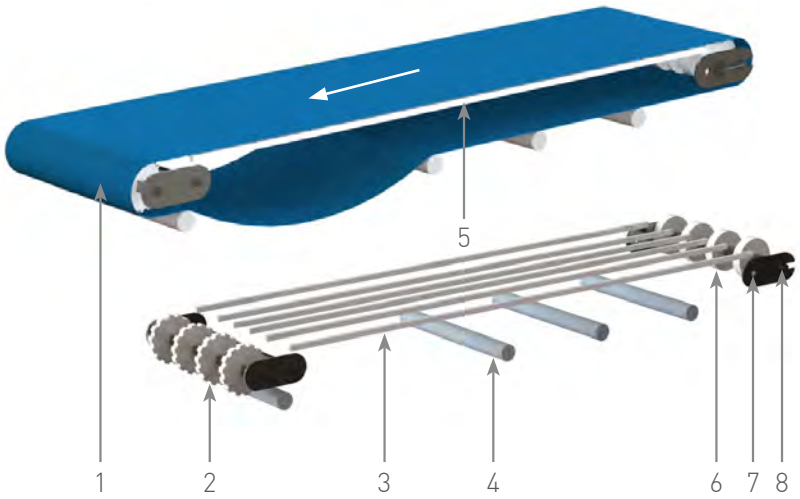
A | OPERATING PRINCIPLES

The **DEL/DRIVE®** belt is installed without tension. However, a tensioner is useful for adjusting the belt and adjusting the sag on the return side of the belt.
In some cases, the **DEL/DRIVE®** belt can be adjusted so the sag is just taken out.
A de-tensioner device also facilitates the assembly/dismantling of belt, especially for cleaning purposes.

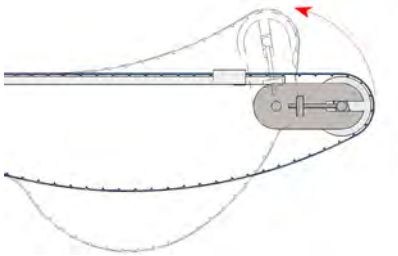
On the belt's underside, the teeth allow good sliding properties on specific surfaces.

Principle scheme:

1) DEL/DRIVE®
2) Motor sprockets
3) Belt support
4) Return support (HDPE rollers or profiles)
5) Side guides
6) Tail wheels or roller
7) Rapid Detention System (optional)
8) Tensioner



Rapid detention system (optional):

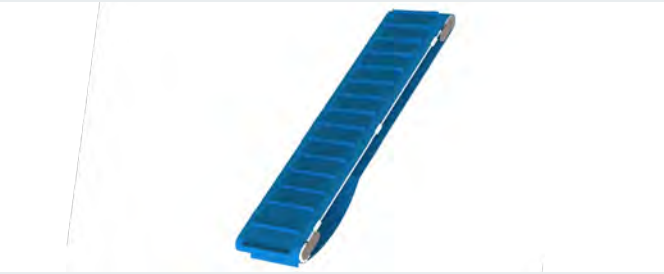


B | CONFIGURATION

HORIZONTAL CONVEYORS
Head driven

CENTRALLY DRIVEN CONVEYORS
Centre drive (Bi-directional)

INCLINED CONVEYORS
Cleated



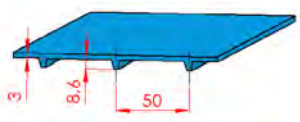
SWAN NECK (Z) CONVEYORS
Swan neck

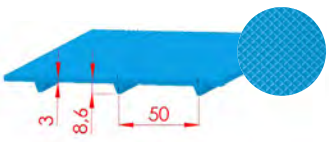
TROUGHED CONVEYORS

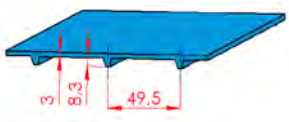
II | PRODUCT RANGE

A | DEL/DRIVE® 50

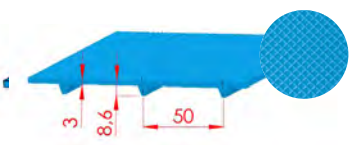
	DEL/DRIVE® 50	DEL/DRIVE® 50EM	DEL/DRIVE® 50H
Reference	DDB50B3	DDB50B3EM	DDB50B3H
Material	Polyurethane	Polyurethane	Polyester Elastomer
Color	Blue	Blue	Blue
Food approval	CE / FDA	CE / FDA	CE / FDA
Top face	Smooth	Structured	Smooth
Hardness	95 ShA	95 ShA	55 ShD
Pitch (mm)	50	50	50
Actual pitch ± 0.1 (mm)	50.2	50.2	49.5
Thickness (mm)	3	3	3
Total thickness (mm)	8.6	8.6	8.3
Max width (mm)	1 850	1850	1 800
Weight	4.8 kg/m²	4.8 kg/m²	4.4 kg/m²
Mini Diameter pulley (mm)	95	95	128
Mini diameter back flex-pulley (mm)	100	100	150
Temperature range	-20°C to +60°C	-20°C to +60°C	-20°C to +80°C
Traction force 2.5% elongation 100mm wide	65 daN	65 daN	160 daN
Coefficient friction			
On HDPE	0.2	0.2	0.15
On bed Inox	0.52	0.52	0.45

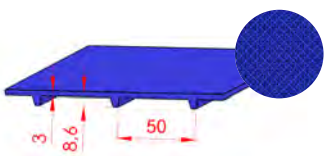


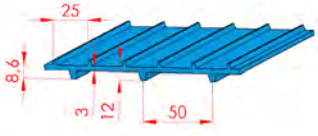




DEL/DRIVE® 50EMLT	DEL/DRIVE® 50AM	DEL/DRIVE® 50AMEM	DEL/DRIVE® 50/25
DDB50B3EMLT	DDB50B3AM	DDB50B3AMEM	DDB50-25B3
Polyurethane	Antimicrobial polyurethane	Antimicrobial polyurethane	Polyurethane
Blue	Blue	Blue	Blue
CE / FDA	CE / FDA	CE / FDA	CE / FDA
Structured	Smooth	Structured	Toothed
92 ShA	95 ShA	95 ShA	95 ShA
50	50	50	50
50.2	50.2	50.2	50
3	3	3	3
8.6	8.6	8.6	12
1 850	1 850	1 850	1 200
4.8 kg/m²	4.8 kg/m²	4.8 kg/m²	4.8 kg/m²
95	95	95	95
95	100	100	97.5
-30°C to +50°C	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C
35 daN	65 daN	65 daN	65 daN
0.25	0.2	0.2	0.2
0.6	0.52	0.52	0.52







SPROCKETS AND WHEELS FOR DEL/DRIVE® 50

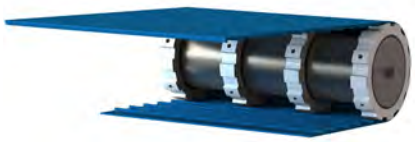
REFERENCE	PRODUCT	MATERIAL	COLOR*	DIAMETER OUTSIDE (mm)	NUMBER TEETH	SQUARE BORE (mm)	WIDTH (mm)
P50WUN06	Sprocket	HDPE	White	95	6	40	32
R50WUN06	Wheel	HDPE	White	83	-	40	32
P50WUN08	Sprocket	HDPE	White	128	8	40	32
R50WUN08	Wheel	HDPE	White	116	-	40	32
P50WUN10	Sprocket	HDPE	White	161	10	40	32
R50WUN10	Wheel	HDPE	White	149	-	40	32
P50WUN12	Sprocket	HDPE	White	193	12	40	32
R50WUN12	Wheel	HDPE	White	181	-	40	32

*Blue on request.

DRUM MOTORS FOR DEL/DRIVE® 50

DEL/DRIVE® can be driven with a drum motor:

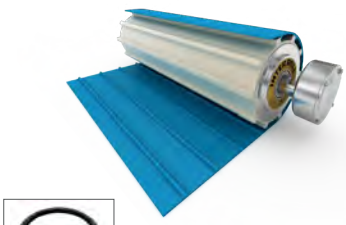
<u>Solution 1</u>: Parallel faced drum motor equipped with HDPE sprockets on stainless steel rings, locked with grub screws (tightening torque: 15 Nm / screw).



REFERENCE	MATERIAL	COLOR*	OUTSIDE (mm)	NUMBER TEETH	TYPE MOTOR DRUM		WIDTH (mm)
P50WUN09R122	PEHD	Blanc	144	9	113i	DM0113	34
P50WUN12R147	PEHD	Blanc	193	12	138i	DM0138	34
P50WUN14R174	PEHD	Blanc	225	14	165i	DM0165	34

* Blue colour on request.

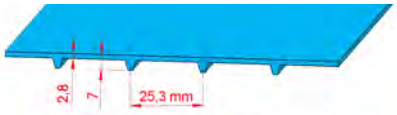
<u>Solution 2</u> : Drum motor with profiled lagging.



DRUM MOTOR TYPE	80i	113i	138i	165i
NUMBER OF TEETH	-	9	10	12
OUTER DIAMETER LAGGING (mm) (+0,5 ; -1)	-	142.5	158	190.2

B | DEL/DRIVE® 25

	DEL/DRIVE® 25	
Reference	DDB25B2	DDB25B2.8
Material	Polyurethane	Polyurethane
Color	Blue	Blue
Food approval	CE / FDA	CE / FDA
Top face	**Smooth**	**Smooth**
Hardness	93 ShA	93 ShA
Pitch (mm)	25.3	25.3
Thickness (mm)	2	2.8
Total thickness (mm)	6	7
Max width (mm)	**1 850**	**1 850**
Weight	3 kg/m²	4 kg/m²
Mini sprocket/pulley/wheel diameter (mm)	48	56.7
Mini diameter back flex-pulley (mm)	50	60
Temperature range	-20°C to +60°C	
Traction force at 2% elongation	25 daN per 100mm wide	30 daN per 100mm wide
Friction coefficient		
On bed HDPE	0.22	
On bed Inox	0.55	



DRIVE SPROCKETS FOR DEL/DRIVE® 25

REFERENCE SPROCKET	MATERIAL	COLOR*	DIAMETER OUTSIDE (mm)	NUMBER TEETH	BORE (mm)		WIDTH (mm)
					square	Ø round	
P25WUN06	HDPE	White	48	6	-	25	25
P25WUN07	HDPE	White	56.7	7	-	25	25
P25WUN08	HDPE	White	65	8	-	25	25
P25WUN10	HDPE	White	81	10	40	-	25
P25WUN12	HDPE	White	97.5	12	40	-	25

* Blue on request.

DRUM MOTORS FOR DEL/DRIVE® 25
with contoured lagging

DRUM MOTORTYPE	80i	113i	138i	165i
NUMBER OF TEETH	13	18	20	-
OUTER DIAMETER LAGGING (mm) (+0,5 ; -1)	104.2	144.3	161.5	-

III | EQUIPMENT

Some accessories (large cleats, sidewalls) are not recommended on the DEL/DRIVE® 25 belt : Please refer to technical support for further guidance.

A | CLEATS

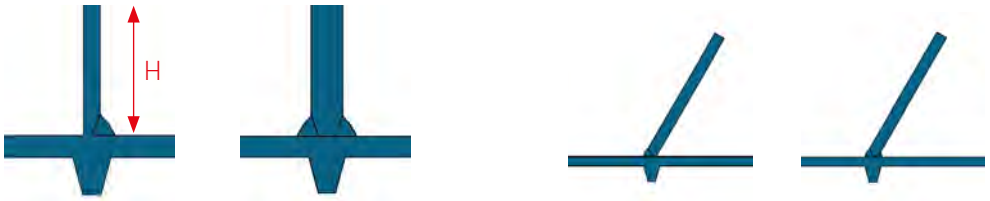
| a High Frequency Welded cleats (HF)

The HF welding process only applies to polyurethane belts (TPU). The cleats should be welded over the teeth, or possibly between the teeth but then, only on the largest sprockets.
The pitch of the cleats must be a multiple of the actual pitch of the belt (see pages 6-7 and 9).
Standard cleat thicknesses: 2 - 3 - 4 - 5 mm.

HF welded cleats

| b Cord-welded cleats

This technique is used for welding polyester cleats onto polyester elastomer (PE) BELTS such as the DDB50B3H belt.
The 2 and 3mm thick cleats are welded with 1 cord, the thicker cleats require 2 cords (one each side).
It's possible to weld inclined cleats using the cord method (60° minimum).



Thickness 2-3mm | Thickness >3mm | Thickness 2-3mm | Thickness >3mm

Cord welded cleats

In this case, there is no constraint in the positioning of the cleats, but the step should be greater than or equal to the height.

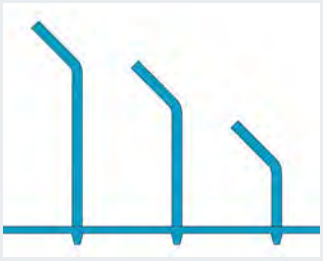
MATERIAL	JOIN MODE	MINIMUM HEIGHT (mm)	MAXIMUM HEIGHT (mm)	MAXIMUM WIDTH (mm)	MINIMUM PITCH (mm)
Polyurethane	High frequency	5	130	1000	50
Polyester	Cord welded	10	-	1000	≥H

For the DEL/DRIVE® 25, the minimum pitch is 25mm for a 2mm-thick cleat.

| c Cranked cleats welded in HF

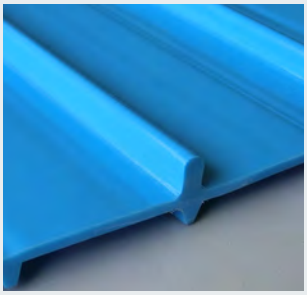
- Cleats with cranked end.
- Only on polyurethane belts.

Consult us.

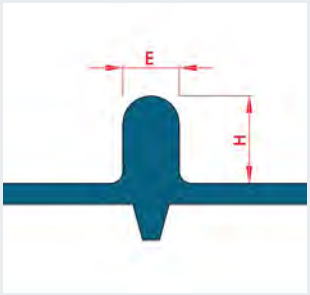


Gussets can be used to reinforce the cleats in cases of heavy loads.

| d Round top cleats welded by HF



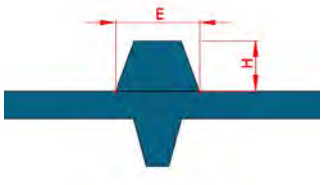
E : THICKNESS (mm)	H : HEIGHT (mm)	MAX WIDTH (mm)	MINIMUM PITCH (mm)
6	10	1 000	50
8	13	1 000	50
9	14	1 000	50
12	18	1 000	50



| e Trapezoidal cleats

It is possible to weld trapezoidal blue 80ShA cleats.

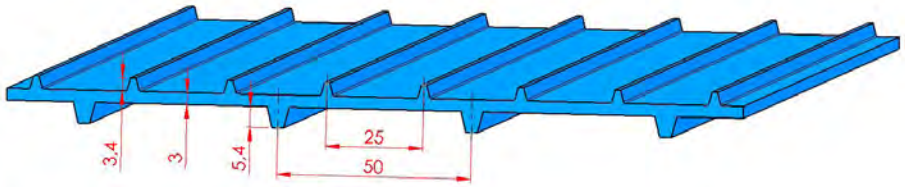
Possible sections (WxHmm):6x4mm, 8x5mm, 10x6mm, 13x8mm or 17x11mm.



In the case of cleatswhich are larger than the thickness of the tooth base (DEL/DRIVE® 50: 6mm; DEL/DRIVE® 25: 4mm), A sprocket/pulley/wheel diameter must be provided which has a diameter greater than the recommended mini diameter. Consult us for further information.

| g Moulded cleats

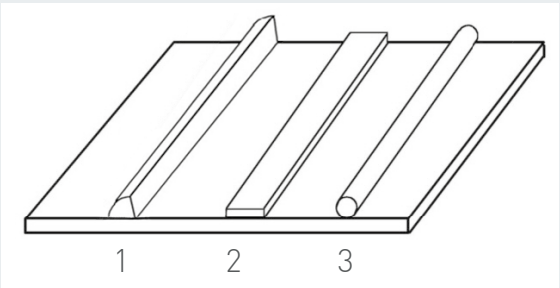
The DEL/DRIVE® 50/25 belt can be used for transporting small objects and bulk product on inclines.
DEL/DRIVE® at 50mm pitch, moulded cleats height: 3mm at 25mm pitch, maximum width: 1200mm.
The DEL/DRIVE® 25 for driving, and using the DEL/DRIVE® 50 for cleats.
Consult us for further information.



| h Other cleats

1. 1/4 round
2. Flat
3. Round

Dimensions: consult us.



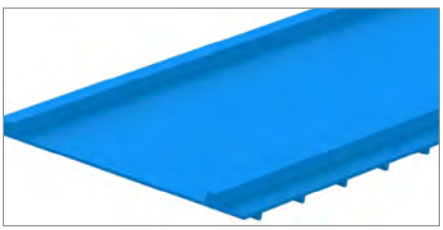
B | LONGITUDINAL PROFILES

| a Trapezoidal profiles

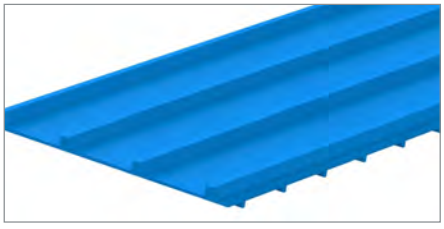
6x4mm, 8x5mm, 10x6mm, 13x8mm or 17x11mm section trapezoidal profiles.

Ensure that sprocket/pulley/wheel diameters are increased.

▸ Welded to the edges to contain small products, also allow the guidance and captivation of a cleated belt in an inflection on a «swan neck» conveyor.



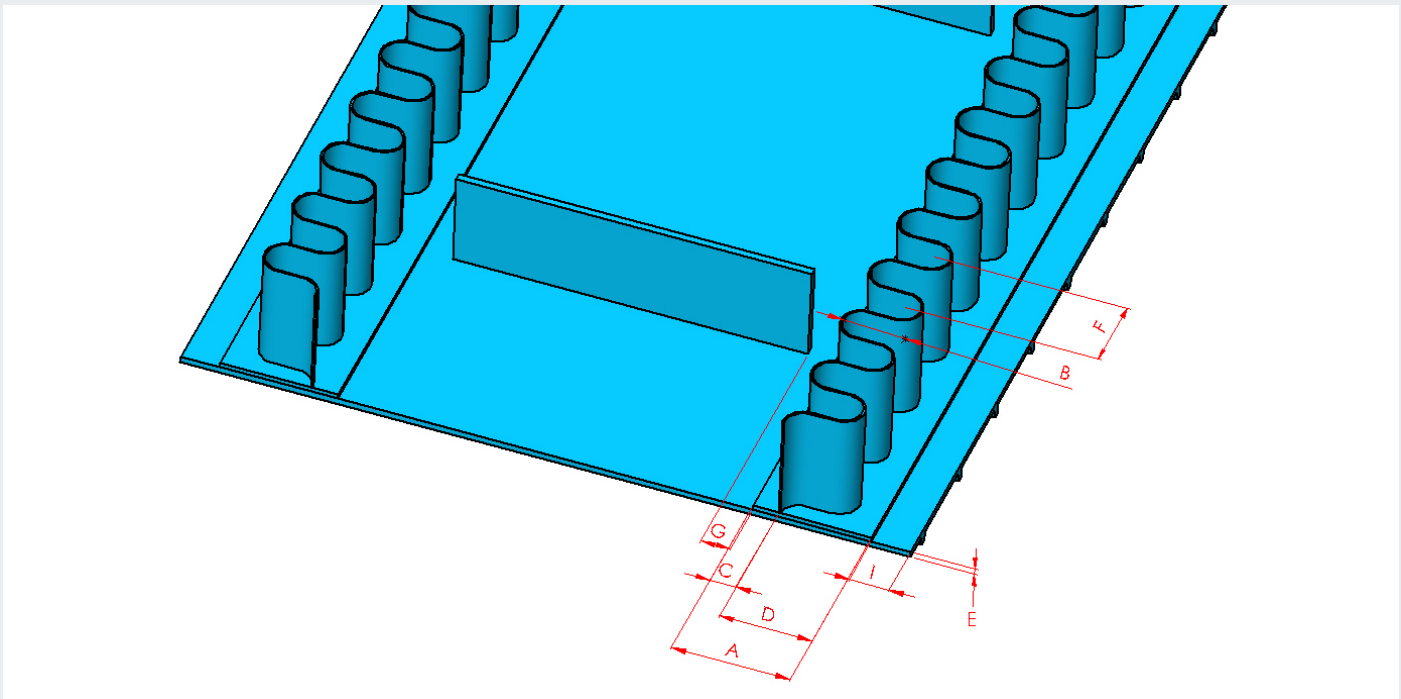
▸ Spread over the width to compartmentalize products on a belt.



| b Side walls

DEL/DRIVE® (except DEL/DRIVE® 50H) can be equipped with 20mm to 80mm high side walls to better contain transported items or product.
In the case of a belt with side walls and cleats, provide a minimum of 5mm of space between the foot of the wall and the cleat.

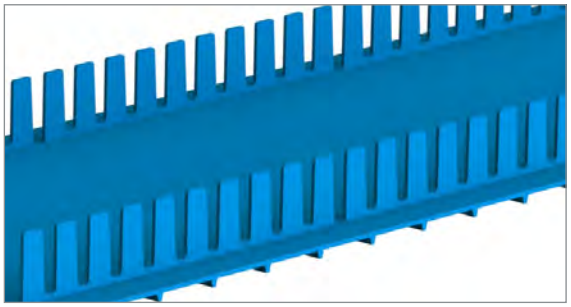
REFERENCE	FOOT WIDTH (mm)	WAVE WIDTH (mm)	DIMENSIONS (mm)				FOOT GAP (mm)	HEIGHT (mm)	MINIMUM SPROCKET/ PULLEY/WHEEL DIAMETER (mm)
	A	B	C	D	E	F	G - I	H	
BC20	30	20	5	25	2.5	23	5	20	100
BC30	30	20	5	25	2.5	23	5	30	100
BC40	30	20	5	25	2.5	23	5	40	100
BC50	60	34	13	47	2.5	40	5	50	125
BC60	60	34	13	47	2.5	40	5	60	150
BC80	60	34	13	47	2.5	40	5	80	190

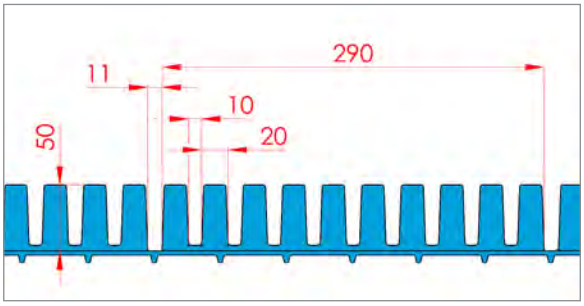


Max centre distance between side walls: 800mm

| c Finger walls

For the lateral holding of items on the belt.



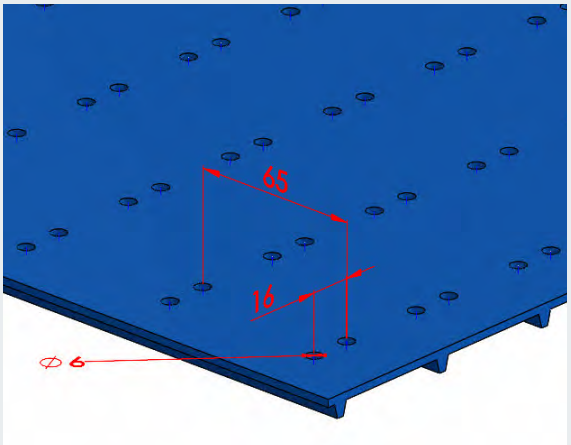


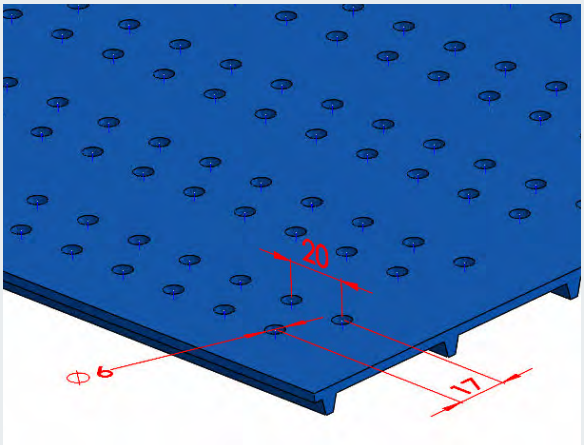
Example of application

C | PERFORATIONS

For draining.
For vacuum applications.

We offer two perforation patterns as seen in the sketches below:
For other dimensions, consult us.





Max width: 800mm

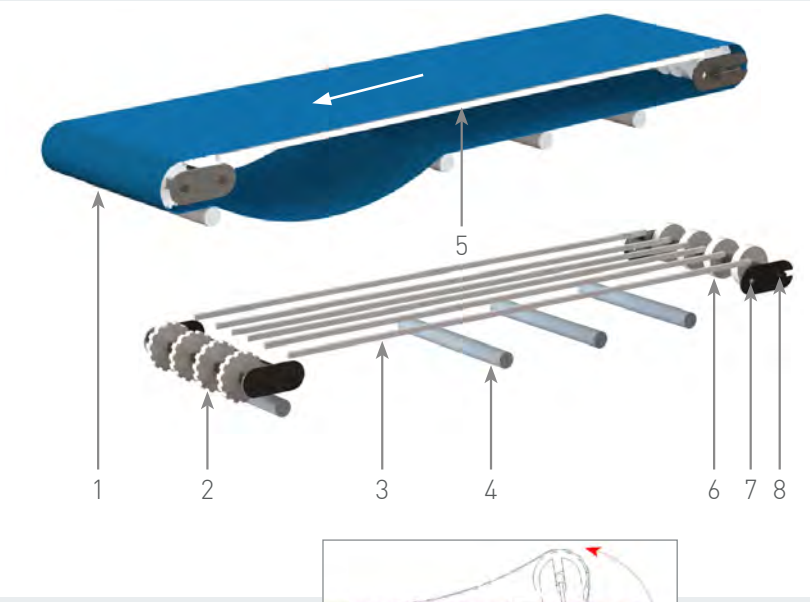
IV | TECHNICAL ADVICE

Below are recommendations and advice for carrying conveyors equipped with positive DEL/DRIVE® belt.
In all configurations, DEL/DRIVE® belts are installed without tension. Catenary sag on the return side of the belt should be provided.

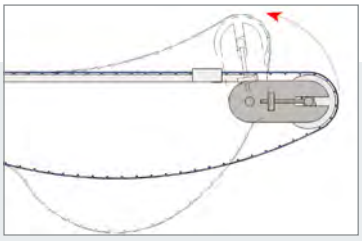
A | CLASSIC CONVEYOR

Principle scheme:

1) DEL/DRIVE®
2) Motor sprockets
3) Belt support
4) Return support (HDPE rollers or profiles)
5) Side guides
6) Tail wheels or roller
7) Rapid Detention System (optional)
8) Tensioner



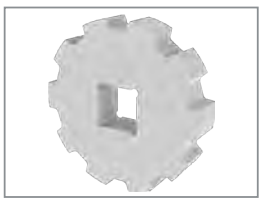
Rapid detention system (optional):



| a DEL/DRIVE®

It is advisable that the motor is positioned so that the belt is pulled and not pushed.
DEL/DRIVE® belts are usually driven by evenly distributed sprockets:

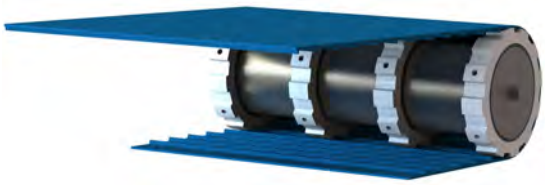
- On a 40mm or round 25 or 30mm square transmission shaft.



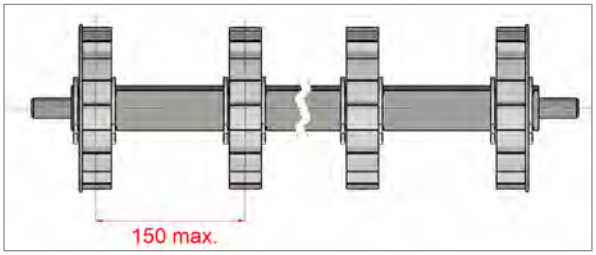
The standard sprockets we offer are designed for 40mm square shafts, they can fit on round shafts using our adapters d. 25mm or d. 30mm round.
For any other shaft size, consult us.

- On an 113i, 138i, 165i, or DM0113, DM0138 and DM0165 motor drum.

The sprockets are attached to the drum with a stainless steel ring using pressure screws (tightening torque: 15 Nm / screw).
DEL/DRIVE® belts may be also be driven on a drum motor with a polyurethane bonded lagging.

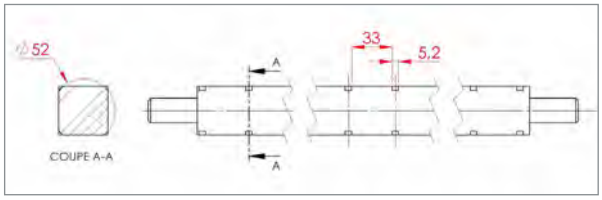


The distribution of the sprockets on the shaft (or motor drum) depends on the load carried.
The belt's maximum load capacity is attained at 75mm sprocket centres. It is reduced to 50% of its traction capacity for centres of 150mm centres (maximum centres).

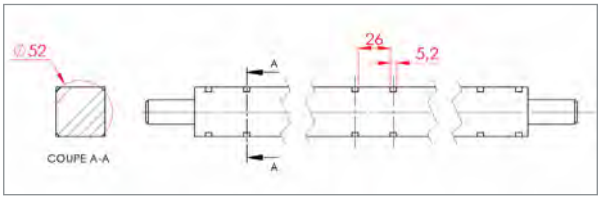


- The diameter of the sprockets and wheels must be equal to or greater than the minimum sprocket/pulley/wheel and back flex-pulley diameters indicated depending on the type of belt used.

- The sprockets must be secured laterally on the shaft. In this case, we offer 40mm square shaft retention clips.

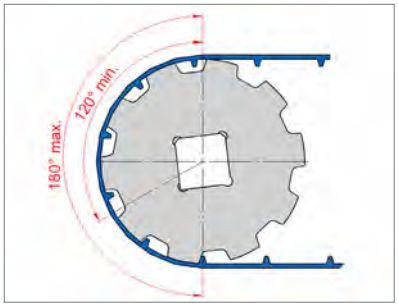


DEL/DRIVE® 50



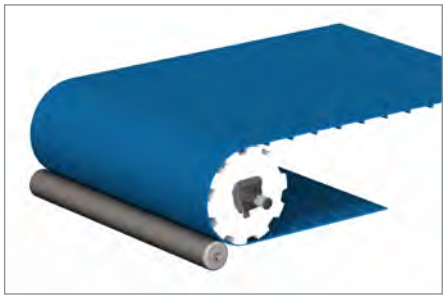
DEL/DRIVE® 25

- The arc of the belt on the sprockets must be between 120 and 180 degrees and should never exceed 180 degrees.

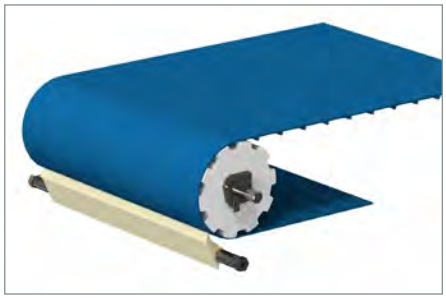


- In some cases, in order to avoid belt disengagement, it is sometimes necessary to hold it against the sprockets without pinching it, by rollers, by fixed shoes placed in front of the sprockets, or by a full width roller positioned between 120 and 180 degrees. In these cases, a gap of about 2mm should be allowed between the belt and the sprockets.

We also recommend our DEL/CLEAN scraper with a torsion system built into the blade support tube, allowing optimal adjustment of scraper pressure on the belt.



Maintaining engagement with a roller

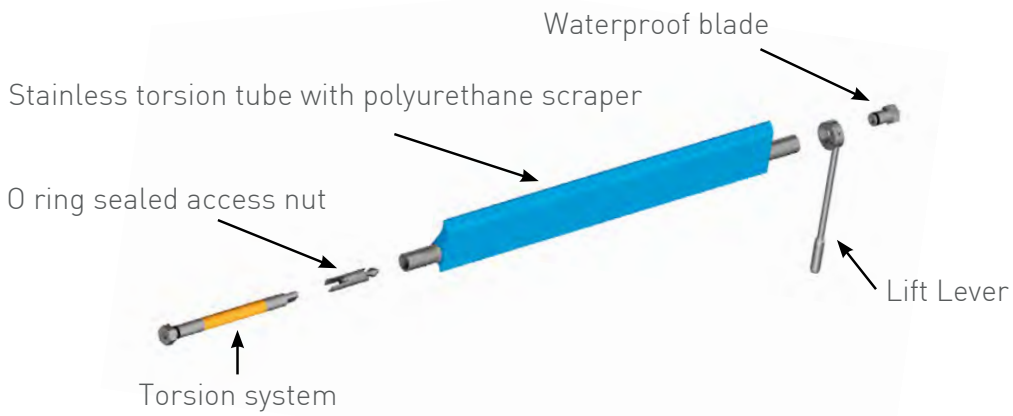


Maintaining engagement using the DEL/CLEAN scraper

DEL/CLEAN scraper

The DEL/CLEAN scraper has many advantages:

- Small footprint
- No lateral offset
- Simple and quick assembly
- Suitable for any existing or new installation
- Suitable for all types of conveyor belts
- Easily cleaned
- Simple maintenance



| b Tail shaft

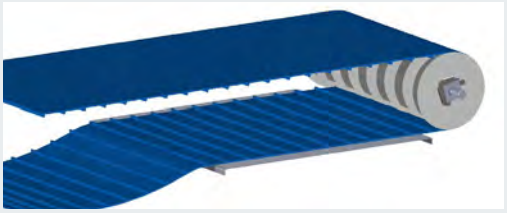
- The non-driven end of a DEL/DRIVE® 50 conveyor are fitted either by idling wheels on a free running shaft with the same number of wheels as there are sprockets on the drive shaft or by a machined, smooth fixed half drum.
For the return of the DEL/DRIVE® belt 25 it is advisable to use a freely rotating roller no smaller than the minimum recommended diameter.

- In the case of small sprocket and wheel diameters, light loads on a short centre distance, the DEL/DRIVE® belt, without take up, may not engage properly in the drive sprockets because the natural inflexible nature of the belt.
We recommend creating a high resistance before the drive sprockets to flatten the belt prior to sprocket engagement.

There are several solutions:

- In place of idler wheels or a roller at the non-driven end, a fixed half-shoe made of HDPE to create drag.

- Use HDPE guides to support the return side of the belt to replace any rollers.



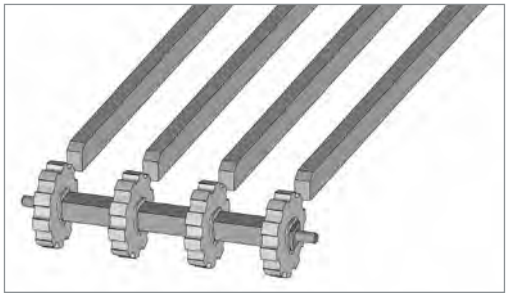
| c Belt support

- The conveying side of the belt should be supported preferably by parallel HDPE runners. The spacing of the runners is a function of the load carried and the distribution of load on the belt. This dimension must not exceed 150mm.

- Generally the runners are the same in number as the sprockets and positioned in alignment with them.

- The width of the runners should be at least 25mm.

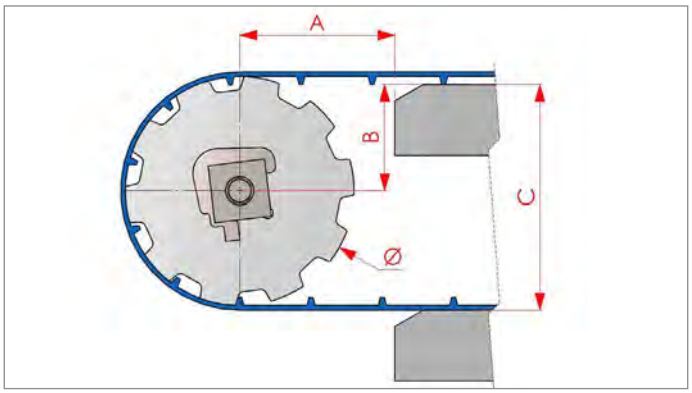
- The ends of the runners must be chamfered to facilitate the smooth arrival and departure of the belt.



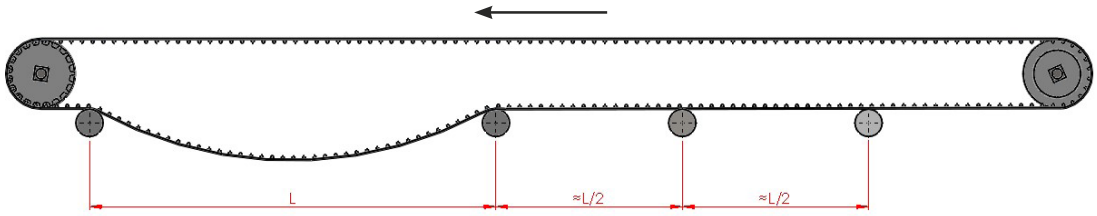
- The height of runners in relation to sprockets must adhere to the basic rules defined in the following table:

	B	C
DDB50B3	(d. ext. sprocket) / 2 - 6mm	(d. ext. sprocket) – 3mm
DDB25B2	(d. ext. sprocket) / 2 - 4mm	(d. ext. sprocket) – 2mm
DDB25B2.8	(d. ext. sprocket) / 2 – 4mm	(d. ext. sprocket) – 2mm

The A dimension should be as low as possible.



The return side of the belt can be supported by rollers whose interval should not exceed 1500mm, or support runners in HDPE. In the case of continuous runners, it is necessary to have a gap of unsupported space to allow for catenary sag.

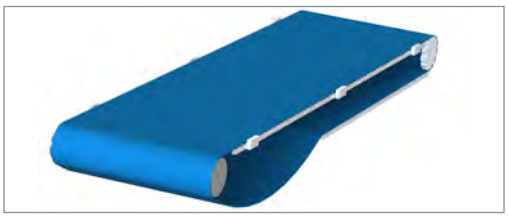


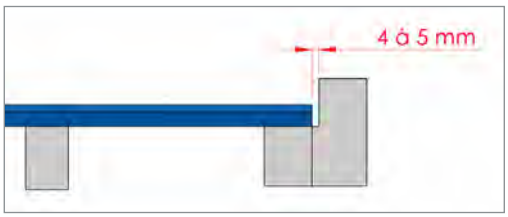
In the case of centrally cleated belts, it is advisable to place longitudinal runners on each side of the cleats to support the weight of the belt with a side clearance of around 4 to 5mm. For larger, heavier belts, longitudinal runners in HDPE can be installed directly under the cleats.

| d Side guidance

The cross-sectional rigidity of the DEL/DRIVE® belts allows the edges of the belt to be guided along its length of travel, either by continuous HDPE longitudinal side guides, or more simply by intermittent blocks of HDPE.

A gap of about 4 to 5mm clearance should be created between the belt and the side guides. The return side can be guided with flanged rollers.



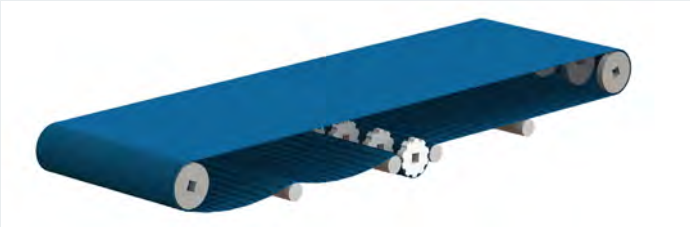


| e Quick de-tension System

The DEL/DRIVE® belt is installed without tension however, a tensioner is useful for adjusting the catenary sag on the return side of the conveyor belt.
In some cases, the DEL/DRIVE® belt can be run with no sag but care must be taken not to introduce positive tension.
A quick de-tensioner device facilitates the assembly/removal of the belt and can also create rom to properly clean the belt (page 4).

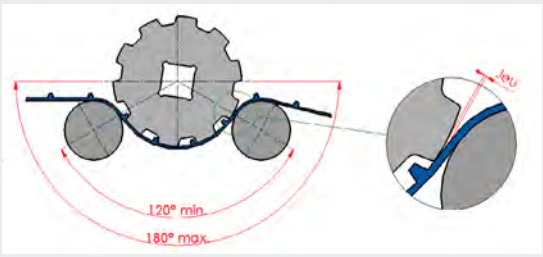
B | CENTRALLY DRIVEN CONVEYORS:

Bi-directional operation



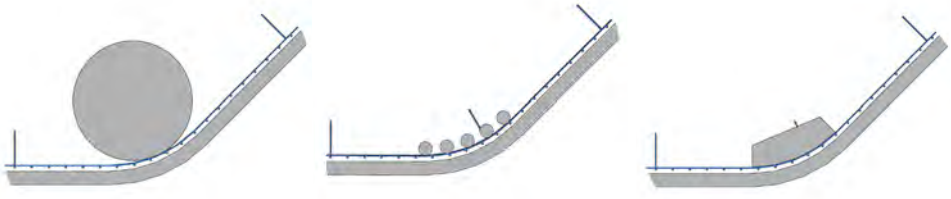
- The general rules of conventional conveyor design apply to this application however, the position of the drive differs. The transmission shaft is located under the conveyor belt. The arc of the belt against the drive sprockets must be between 120 and 180 degrees and involves a minimum sprocket size of 10 teeth for the DEL/DRIVE® 50 belt.

- The belt is held against the drive sprockets by snub rollers. The tops of the snub rollers should never be above the centreline of the drive sprocket.
Take care to adhere to the recommended minimum back flex-pulley diameter, and maintain a clearance between belt and sprocket of about 2mm.



C | CONVEYORS WITH INFLECTION (SWAN NECK)

- The DEL/DRIVE® 50 is particularly suited to this application because its transverse stiffness and lack of tension allow the inflection to be negotiated without significant transverse belt deformation. However, it is necessary to hold it down at the sides in the curve by means of a single wheel, a series of rollers or a HDPE shoe on either side of the belt.



Wheels | Rollers | Shoes

- The inflection radius should not be less than 200mm. In the case of conveyor belts with side walls, the minimum radius is 350mm regardless of the height of the walls. In any event, the incline should not exceed 60 degrees.

- A minimum indent width (e) is required proportional to the belt width (l).
The recommended value is **e = L / 8** with a minimum of width 50mm in any width of belt.

- If possible, use relatively thick and closely spaced cleats to maximise the rigidity of the belt in the inflection (2 to 3 cleats at least, in the curvature).

- The drive should head driven so that the belt is pulled and never pushed.

- The upper convex inflection can be supported on sprockets, wheels or on a cylinder.

- The return side of the belt should be supported by HDPE runners on both sides of the cleats, and even under the cleats if necessary.
The catenary sag should occur at the bottom of the return, leaving a sufficient gap and large enough to maintain a smooth exit and entrance for the running belt.

- In the case of belts of significant length without side walls, it is recommended to consider DEL/DRIVE® 50H.

D | TROUGH CONVEYORS

- DEL/DRIVE® 50 and DEL/DRIVE® 25 belts can be troughed over larger widths.

- The belt can be supported on angled stainless sheets or longitudinal HDPE runners positioned at a maximum of 150mm centres.

- Depending on the belt width and the desired angle, the trough can be completed in 2 or 3 sections by machining the teeth underside in the following pattern.

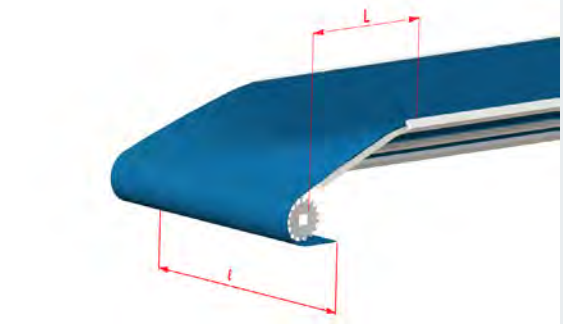
2-section trough

3-section trough

- The minimum length (L) of the lead in depends upon the width (l) of the belt and the angle of the trough.

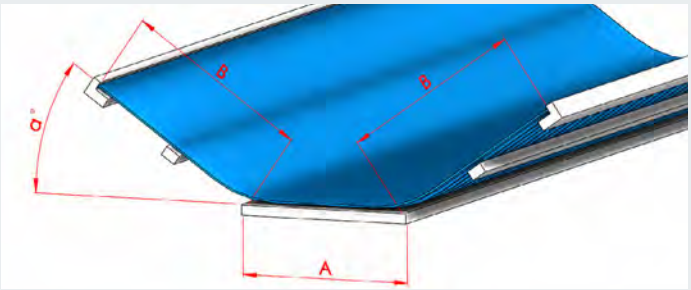
L = coef. x l

TROUGH ANGLE (α°)	15°	20°- 25°	30° - 45°
RATIO OF LEAD IN TO WIDTH	1	1.5	2



- The top tangent of the sprockets should be at least 6mm higher at the bottom of the trough.

- Trough base ratio:



TYPE OF BELT	A	B
DEL/DRIVE® 50	0.5 x l	0.25 x l
DEL/DRIVE® 50H	0.4 x l	0.3 x l

V | JOINING TOOLS

A | MATERIAL

| a End-to-end welding of belts less than 1100mm wide

- Quick, easy-to-end join using a welding table and a heating blade. For workshop and on-site joining.
Demonstration video available on the website: www.mafdel-belts.com

- D400 for belt widths of 400mm
- D650 for belt widths of 650mm
- D1100 for belt widths of 1100mm

- Welding plates available for DEL/DRIVE® 50 or DEL/DRIVE® 25

KIT	HEATING BLADE	WELDING TABLE	ACCESSORIES				WELDING PLATES	
			Gloves	Knife	Trimming fork	Case	DEL/DRIVE® 50	DEL/DRIVE® 25
KITSOUDURED400	MD400	JD400	GANTSPROT	LUNE	F19	CAISSE400 (cardboard)	PLAQMD400-DD50	PLAQMD400-DD25
KITSOUDURED650	MD650	JD650	GANTSPROT	LUNE	F19	CAISSE650 (plastic)	PLAQMD650-DD50	PLAQMD650-DD25
KITSOUDURED1100	MD1100	JD1100	GANTSPROT	LUNE	F19	CAISSE1100 (plastic)	PLAQMD1100-DD50	PLAQMD1100-DD25

| b Cord welding of belts less than 1850mm wide

- End-to-end welding of the belt is possible using a welding cord applied into a prepared 45deg bevel cut using a special tool.

Tools required:

- Table **T1400** or **T1900** for aligning and holding the belt whilst preparing the ends and welding the belt.
- **TR600** hot air gun with a **BR5** or **BR7** nozzle for the application of the welding cord.
- **1/4 moon** knife for cutting the ends of the **F19** or **F21** belt and a fork to trim the excess bead.

T1400 - T1900

TR600

BR5 or BR7

LUNE

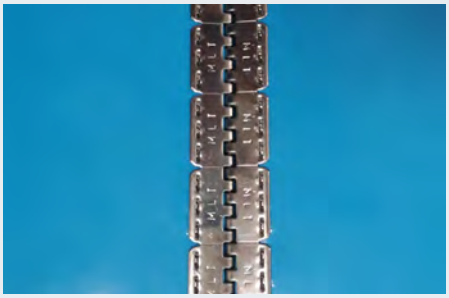
F19

F21

B | JOINING BY FASTENERS

| a Stainless fasteners

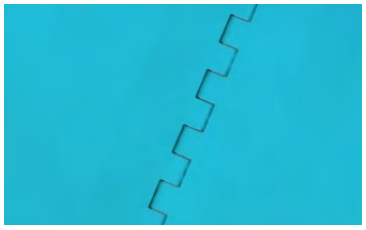
- Joining with a stainless steel pin.
- For 1.5mm to 5mm thick belts.
- All widths.
- Easily fitted with very simple tools.



| b Plastic fasteners

DEL/DRIVE® 50 polyurethane or polyester belts can be joined with plastic Fasteners with acetal pins.

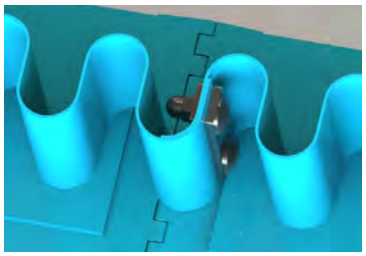
- Allows use on metal detectors.
- Up to 1100mm wide.
- Minimum pulley of 8 (128mm) recommended minimum teeth.



Because the traction resistance of the clip is lower than that of the conveyor belt, it is recommended that a deduction of a 50% safety factor is made when calculating the maximum allowable traction force.
It is possible to use a stainless steel pin that allows greater traction loads. If regular removal of the belt is required, a stainless steel pin is a good choice.

| c Mechanical fasteners with side walls

- Stainless steel.
- For Fastened conveyor belts.



VI | CALCULATIONS

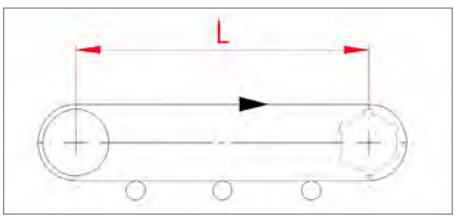
The maximum extension of the DEL/DRIVE® belts is 2.5%. This extension corresponds to the maximum allowable load on the belts.

A | TRACTION FORCE

Calculating the traction force required to drive a load:

SYMBOL	UNIT	DESIGNATION
F1	daN	Minimum traction force for continuous load drive
F2	daN	Minimum traction force for driving a load with accumulation
F	daN	Total minimum traction force
Cf		Friction coefficient of the belt on the conveyor bed
Cr		Rolling coefficient on support rollers (on ball bearings: 0.05, on smooth bearings: 0.1)
Cc		Load friction coefficient on belt (accumulation)
M	kg	Maximum load on belt
M'	kg	Weight of the belt / 2
Ma	kg	Total or partial accumulated load
MAB	kg	Maximum load on the belt from point A to point B
M'AB	kg	Weight of the belt from point A to point B
L	m	Conveyor centre distance
L'	m	Length on the ground
H	m	Elevating height

| a Horizontal conveyor



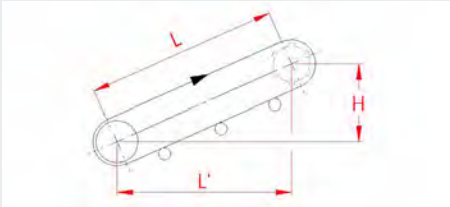
$$F = F1 = (M + M') \times Cf + M' \times Cr$$

With accumulated load carried (Ma):
$F = F2 = F1 + Ma \times Cc$

With start/stop operation: $F = 2 \times F2$

In the event of s light load on a short centre distance, it is sometimes necessary to create a resistant force in order to create a flatter belt on the conveyor (see page 18).

| b Incline conveyor



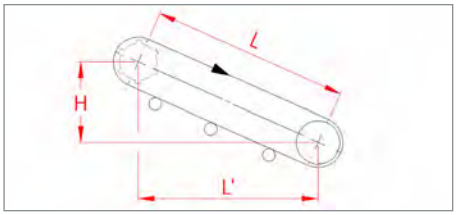
$$F = F1 = (M + M') \times Cf \times \frac{L'}{L} + M' \times Cr \times \frac{L'}{L} + M \times \frac{H}{L}$$

With accumulation of the load (Ma):

$$F = F2 = F1 + Ma \times Cc \times \frac{L'}{L}$$

With start-stop operation: $F = 2 \times F2$

| c Decline conveyor



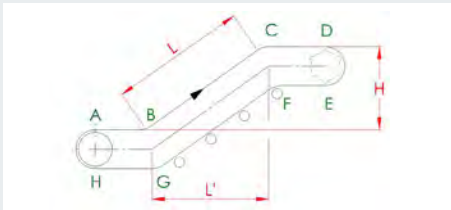
$$F = F1 = (M + M') \times Cf \times \frac{L'}{L} + M' \times Cr \times \frac{L'}{L} - M \times \frac{H}{L}$$

With accumulation of the load (Ma):

$$F = F2 = F1 + Ma \times Cc \times \frac{L'}{L}$$

With start-stop operation (pitch-by-pitch advance): $F = 2 \times F2$

| d Swan-neck conveyor



$$F = F1 = (MAB + M'AB + MCD + M'CD) \times Cf + (M'HG + M'FE) \times Cr + (MBC + M'BC) \times Cf \times \frac{L'}{L} + M'GF \times Cr \times \frac{L'}{L} + MBC \times \frac{H}{L}$$

With start-stop operation (pitch-by-pitch advance): $F = 2 \times F1$

e Example

Horizontal conveyor with a DDB50B3 belt:
Belt width : 400mm
Conveyor centre distance: 5 000mm
Pulley diameters : 128mm
Conveying side support : HDPE
Return side support: rollers
Maximum load over the belt: 400kg

Features DDB50B3 (page 6):
Tooth pitch: 50.2mm
Weight: 4.8 kg/m²
Traction: 65daN / 100mm wide
Friction coefficient on HDPE: 0.2

The theoretical length of the belt must be increased by 0.5% with at least one pitch more to obtain the catenary sag necessary for the belt to function properly. The belt length must be exactly divisible by the belt's tooth pitch.

Calculating the length of the belt:

Theoretical = 128 x π + 2 x 5 000 = 10 402.1mm
With sag allowance = 10402.1 x 1.005 = 10 454.1mm
Number of pitches = $\frac{10\,454.1}{50.2}$ = 208.25
Rounded up = 209 x 50.2 = **10 491.80 mm**

F calculation for continuous operation without accumulation:

F = (M + M') x Cf + M' x Cr

$F = (400 + \frac{4.8 \times 0.4 \times 10.49}{2}) \times 0.2 + \frac{4.8 \times 0.4 \times 10.49}{2} \times 0.1$ = **85daN**

Maximum traction force of the DDB50B3 belt - 400mm width:

F = 65 x 4 = **260daN**

This force is far greater than the traction force required (safety coefficient ~ 3).

If the belt advance is pitch by pitch, the effort at each start is doubled:

F = 2 x 85 = **170daN**

The DEL/DRIVE® 50 is also suitable in this case (safety coefficient ~1.53).

B | MOTOR POWER

SYMBOL	UNIT	DESIGNATION
C	Nm	Motor torque
F	daN	Minimum total traction force
d	mm	Motor sprocket diameter
V	m/mn	Linear belt speed
n	tr/mn	Motor rotation speed
P1	Kw	Minimum power needed
P	Kw	Motor power
η		Transmission yield (builder data)

| a Motor torque

$$C = \frac{F \times d}{200}$$

| b Minimum power needed

$$P1 = \frac{C \times n}{9550} \qquad \text{with } n = \frac{1000 \times V}{\pi \times d}$$

| c Motor power

$$P = \frac{P1}{\eta}$$

η :Transmission efficiency (manufacturer data), generally: 0.6 to 0.8.

VII | CHEMICAL RESISTANCE

This table, showing the degrees of resistance of our belts in the face of various chemical attacks, A only an indicative value. The resistance of our belts can vary considerably depending on the duration of exposure, temperature, quantity and concentration of the chemical.
In the case of cleaning, our belts generally withstand detergents if used in accordance with the manufacturer's recommendations. It is imperative that all washing be followed by a rinse with water. Partial or insufficient rinsing prolongs the action of the detergents on the belt and may contribute to its degradation.

A	Good resistance	C	Non-resistant
B	Boundary	*	Not known

CHEMICAL PRODUCT	POLYURETHANE	POLYESTER
Acetic acid (20%)	C	A
Acetic acid (glacial)	C	B
Acetone	C	B
Acetylene	B	A
Aluminum chloride	B	B
Aluminum sulphate	A	A
Ammonia	C	B
Ammonium hydroxide	C	B
Ammonium nitrate	A	A
Ammonium sulphate	A	B
Amyl acetate	C	B
Amyl alcohol	C	A
Aniline	C	C
Animal oils and fats	A	A
Antifreeze	C	B
Barium nitrate	B	*
Benzene	C	C
Benzyl alcohol	C	*
Bleach (0,5%)	C	A
Bleach (3%)	C	A
Boric acid	A	A
Brine	C	A

CHEMICAL PRODUCT	POLYURETHANE	POLYESTER
Bromine	C	C
Butane	A	A
Butter	A	A
Butyl acetate	C	B
Butyl alcohol	C	*
Butylene	B	*
Calcium carbonate	C	*
Calcium chloride	B	B
Calcium hydroxide	B	A
Calcium nitrate	C	B
Calcium oxide	A	A
Calcium sulphate	A	*
Carbon monoxide	A	A
Carbonic acid	A	C
Caustic soda (3-10%)	A	A
Caustic soda (45%)	C	B
Cheese	A	A
Chlorine gas	C	C
Chlorobenzene	C	C
Chrome salts	A	A
Chromic acid	C	C
Citric acid	A	A
Copper chloride	A	A
Copper cyanide	A	*
Copper nitrate	B	*
Corn oil	A	A
Cotton oil	A	A
Diethyl ether	B	B
Ethanol	C	A
Ethyl acetate	C	B
Ethyl chloride	B	B

CHEMICAL PRODUCT	POLYURETHANE	POLYESTER
Ethyl Ether	C	*
Ethylene	A	A
Ferric sulphate	A	*
Fish oil	A	A
Formic acid	C	B
Fruit acids	A	A
Glucose	A	A
Glue	A	A
Glycerine	C	A
Glycolic acid	C	C
Hexane	A	A
Hydrazine	C	C
Hydrochloric acid (20%)	C	B
Hydrochloric acid (37%)	C	C
Hydrofluoric acid	C	C
Hydrogen sulphide	B	A
Iron chloride	A	B
Kerosene	B	B
Lactic acid	B	A
Lead nitrate	C	*
Linseed oil	B	*
Methanol	C	A
Milk	A	A
Mineral oil	A	A
Nitric acid	C	C
Nitrobenzene	C	C
Nut oil	A	A
Oil	B	B
Oleic acid	B	A
Olive oil	A	A
Ozone	C	C

CHEMICAL PRODUCT	POLYURETHANE	POLYESTER
Peanut oil	A	A
Pentane	A	A
Perchlorethylene	C	C
Phenol	C	C
Phosphoric acid	B	B
Polyurethanere water	A	A
Potassium hydroxide	C	C
Propyl alcohol	C	*
Salt water	A	A
Sodium carbonate	B	B
Sodium citrate	C	B
Sodium hydroxide	B	B
Sodium nitrate (25%)	B	B
Sodium nitrate (3%)	A	A
Stearic acid	A	B
Sulfuric acid	C	C
Super gasoline with lead	A	B
Super unleaded gasoline	A	B
Toluene	C	B
Trichlorethylene	C	B
Turpentine	C	B
Vegetable oils and fats	A	A
White spirits	A	B
Xylene	C	B

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