BERINGER®

BRAKE SYSTEM

ISO 9001 registered

AEROTEC®

High tech
Racing braking systems

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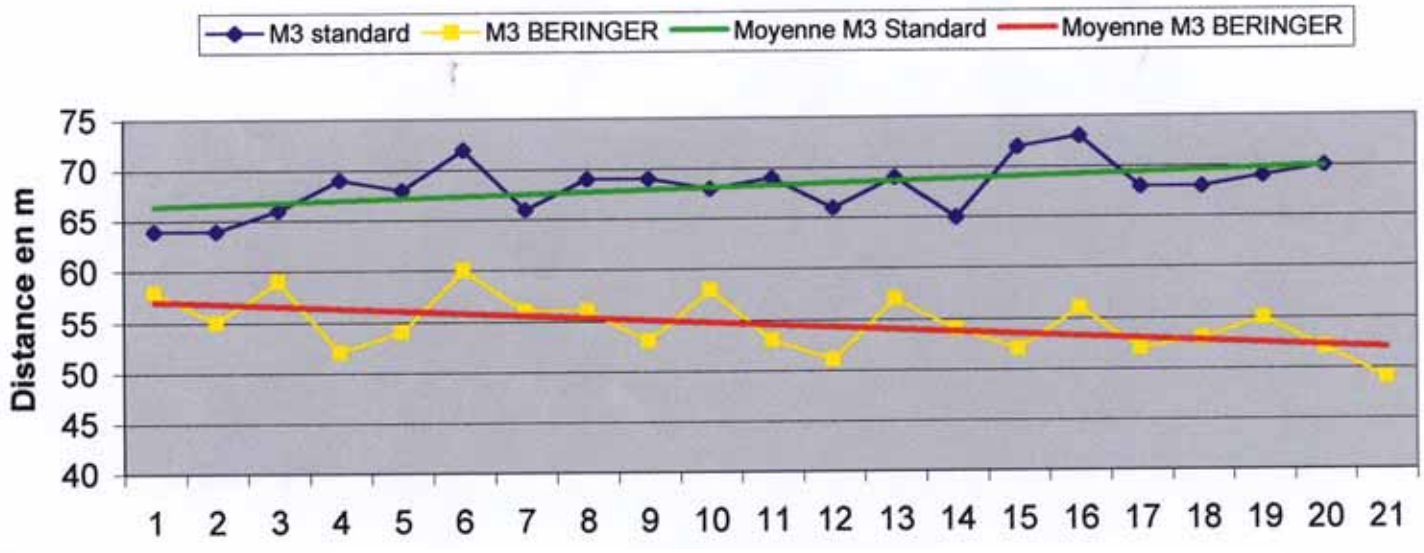
BMW M3

COMPARATIVE TEST of BRAKING DISTANCES

Average distance reduction at 130 km/h on dry surface with BMW M3 : 13.7 meters

Braking distance



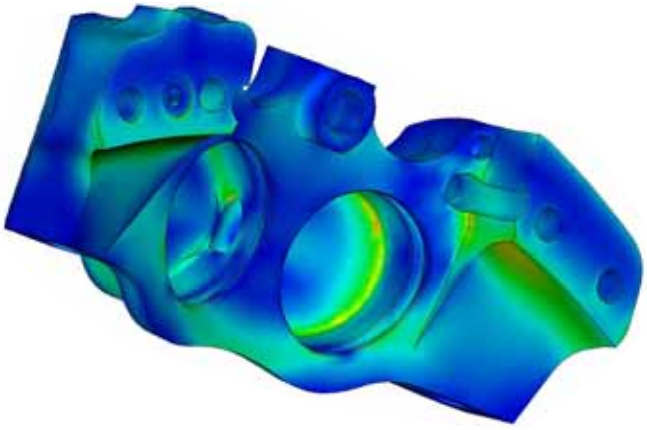
From 130km/h to 0km/h

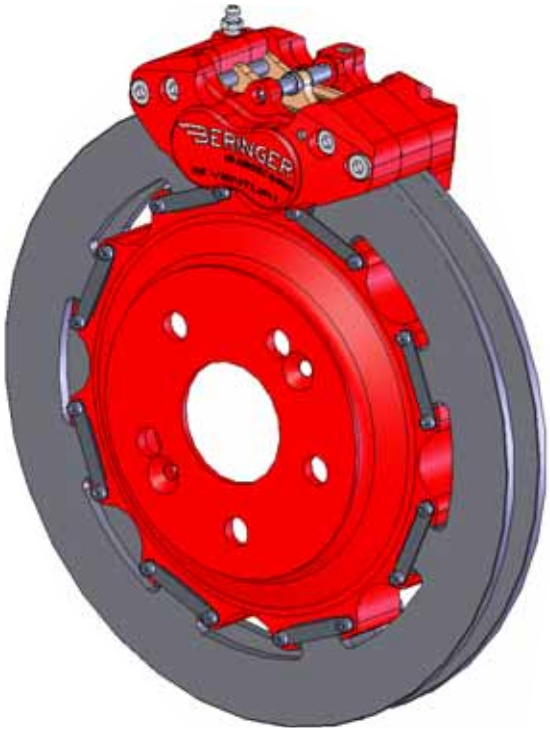
M3 AC SCHNITZER kit

AEROTEC ®

DOUBLE DISC SYSTEM

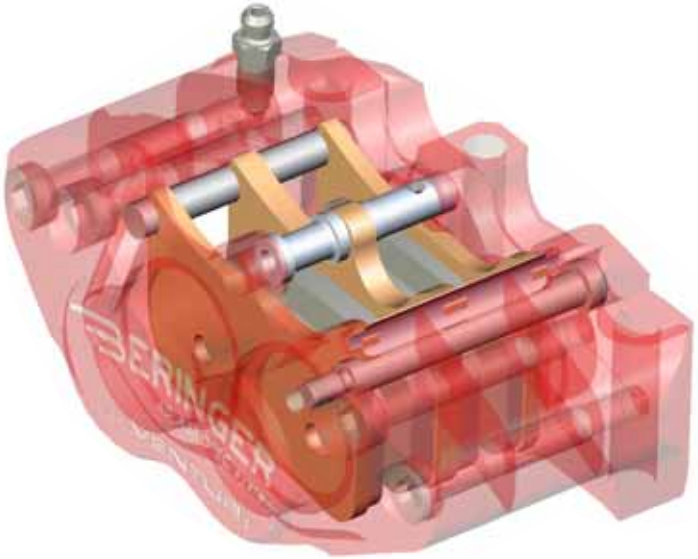
BERINGER BRAKE SYSTEM



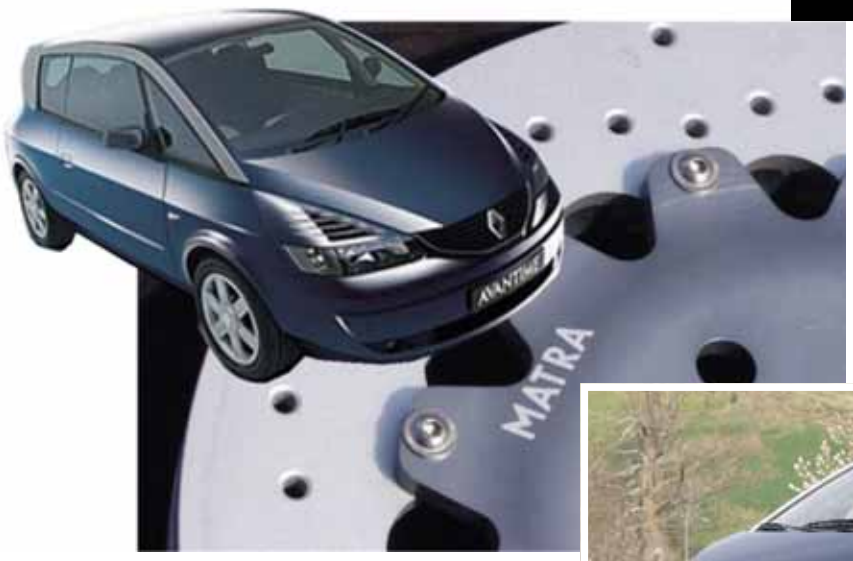


F.E.M.

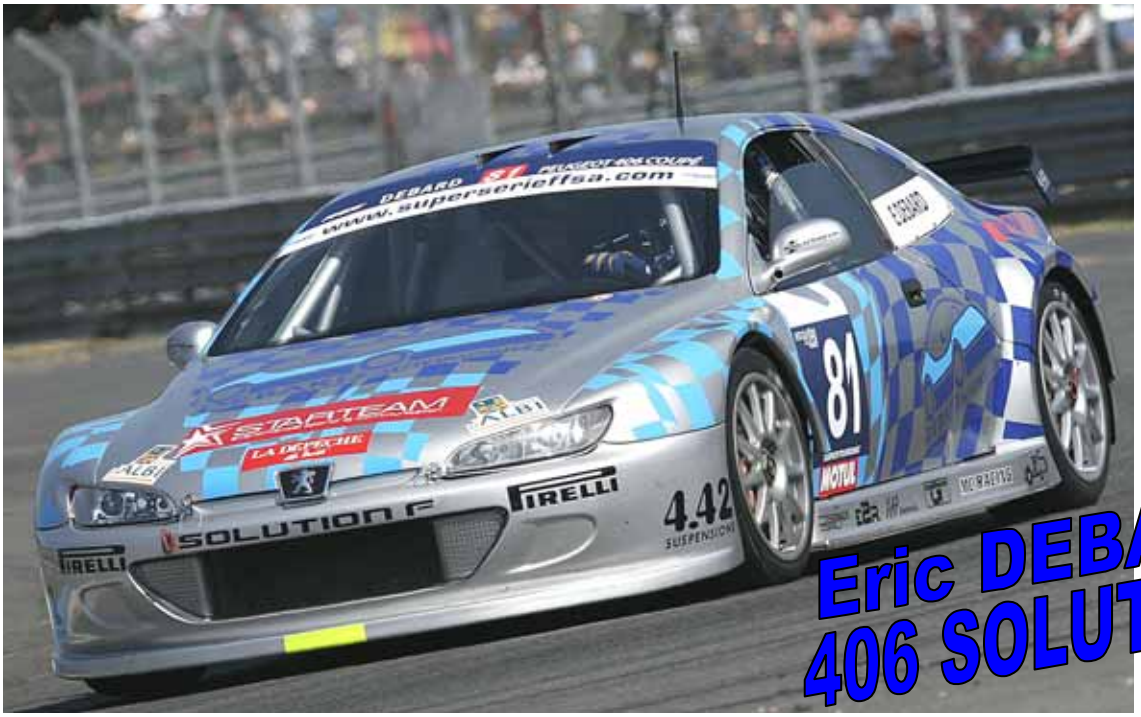
BERINGER brakes are optimized with a powerfull 3D FEM software which allows to reach always the best performance/weight ratio.



MATRA AVANTIME SPORT



An advanced technology: the COMPETITION



Eric DEBARD
406 SOLUTION F

2005 Supertourisme French Champion

Mitsubishi Rallye Raid

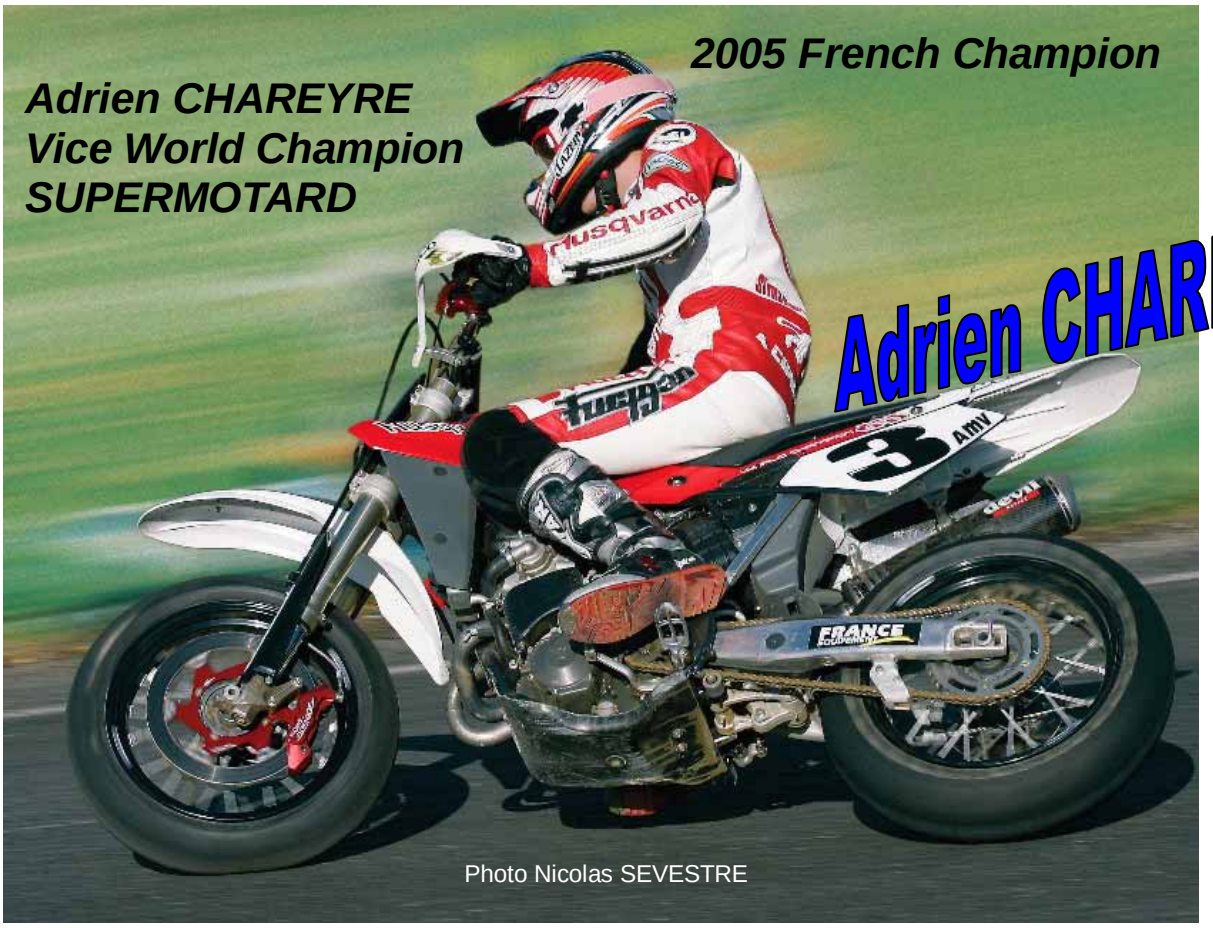
SEAT Supertourisme

Renault FR V6

Rallye

An advanced technology: the COMPETITION

BERINGER is 2000,2002 and 2003 Endurance World Champion
And 2005 vice World Champion with the Team BOLLIGER



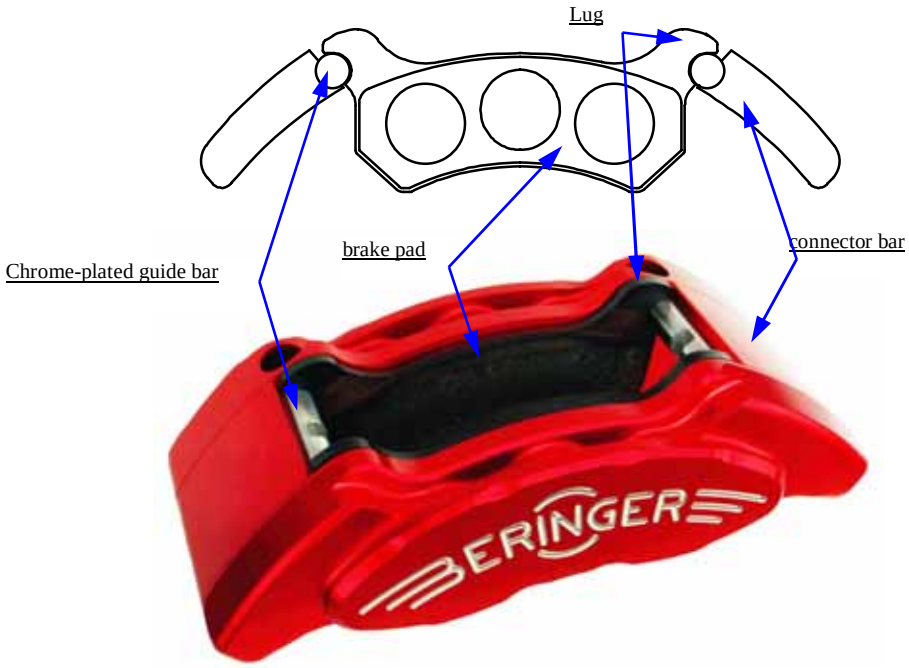
Supermotard :
BERINGER is 2003 and 2004 EUROPEAN Champion and World vice-champion in 2002 2004 2005

technology&performance

This caliper was developed from the knowledge acquired from different competitions in which Béringer has been involved. Thanks to innovative patents and technical solutions, this caliper has the advantage of reacting more quickly (reduction of hysteresis) and not causing slantwise wear of brake pads. Performances are better, but this is not the only advantage.

Brake pad guides : the AEROTEC patent

The patented system of chrome-plated guides for the brake pads greatly reduces hysteresis of the caliper. The brake pads are mounted on supports equipped with two lugs. These lugs slide easily on the chrome-plated guide bars, even during intensive use under difficult conditions.



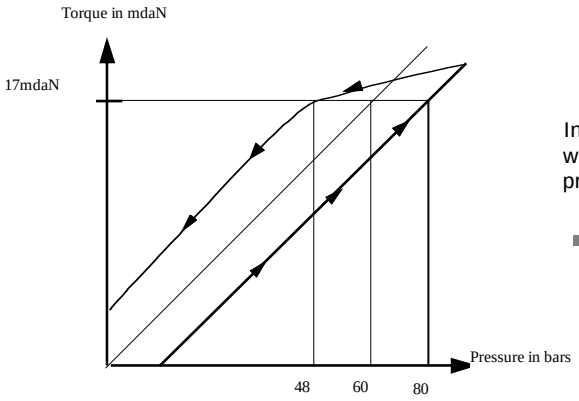
The brake pads are guided by a system of chrome-plated guide bars placed where deformation is the lowest, a patented BERINGER system.

patent: why and how ?

An axial effort (the pressure of the piston on the disk) produces a tangent effort (the pressure of the pad on its stop) caused by the rotation of the disk. This axial effort also causes deformation of the caliper (opening).

On a conventional caliper, we can see friction between the brake pad and the abutment inside the body. This friction, caused by deformation of the caliper, hinders the return of the pad when the brake pressure is released, causing errors of control.

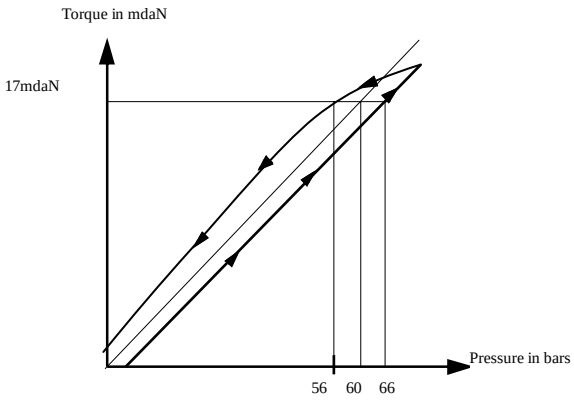
On Béringer caliper, the tangent effort is produced in a neutral zone where there is no caliper deformation and the chrome-plated guide bars ease the to-and-fro movement of the brake pads.



In this way (see graph), when pressure is put on the brake pedal, with a Béringer caliper a torque of 17 mdaN can be obtained with a pressure of 66 bars, instead of 80 on a standard system.

Conventional caliper

When the pedal is released, to obtain these same 17 mdaN, 56 bars are needed with Béringer against 48 with a traditional system: the control error is reduced to 17% against 53 % before and performance is improved by 23 %.



BERINGER caliper

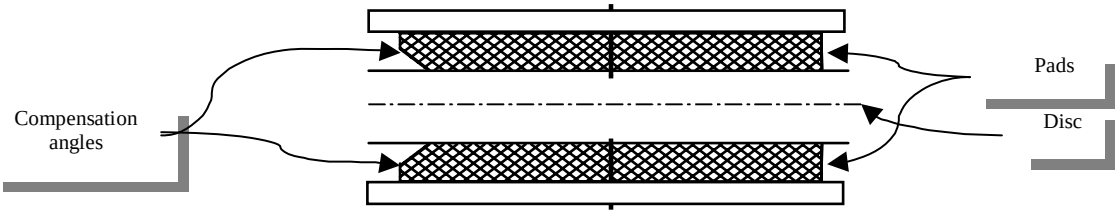
This is a great advantage as the impression of safety given by a better control of braking improves the timing on the circuit.

No slantwise wear of brake pads:

On a conventional caliper compensation for slantwise wear due to tilting of the pad is traditionally obtained by pistons of different diameters. But this compensation is:

- insufficient when the pads are new and too great when they are worn ;
- adapted to an average rate of friction and cannot adapt to pads with a higher or lower rate

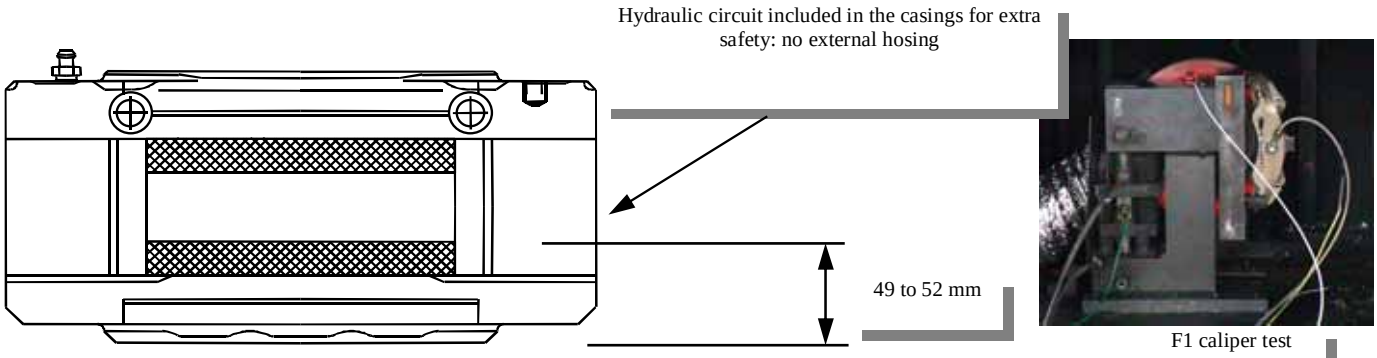
Béringer's unique system of compensation angles optimises slantwise wear, both on new or worn pads, whether using pads with a high or low rate, as the angle is machined into the pad.



Reduced dimensions and reinforced safety:

Thanks to the 3D optimisation by finite elements, Béringer was able to reduce the width of the caliper thus avoiding offsetting the wheel (49 mm for models A, B, D, and E and 52 mm for models C and F).

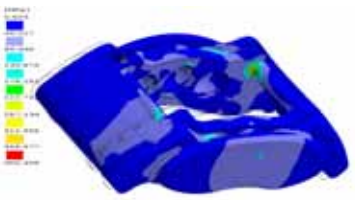
As the brake fluid passes through a circuit integrated in the body, no hose is needed outside the caliper, ensuring an exceptional resistance to external damage caused by gravel, stones, etc.



F1 caliper test

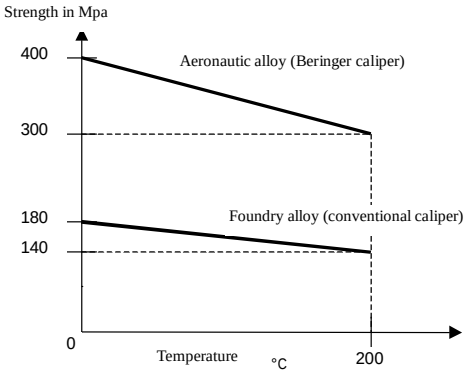
Strict tolerances and NC machining of all components cut from a block ensure accurate dimensions which limit backlash during movements connected with braking.

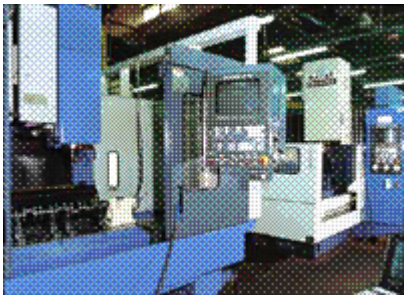
Computer aided design, 3D calculations, machining on high-speed NC machines used for aeronautics: complete mastery from design to production using state-of-the-art equipment



Made from blocks

Béringer uses a high-performance aeronautic alloy, which is used on the wings of supersonic fighter planes. The resistance of this alloy is more than twice that of the original callipers and can be used in high temperatures.





Machining from a block on NC machines ensures perfect control of thickness and a saving of weight from 30 % to 40 %, compared with the original callipers. This precision machining is the guarantee of fine control in the power of braking.

Results of the different tests

Tests of brake pad wear:
After 60,000 km, the slantwise wear on both pads is less than 0.1 mm on a daily used car and less than 0.4 mm on a racing car !

Tests of use in adverse conditions:
Despite the mud and sand, the guide bars continue to operate perfectly and safeguard the properties of the calliper whatever the conditions.

Improvement of vehicle control with ABS

Official tests on braking carried out by UTAC:
These tests were carried out in the real conditions of automobile certification. They proved the effectiveness of the guide bars and the impact on the ABS operation.

The wheels are locked by a very strong pressure on the brake pads. The ABS system releases the pressure when this locking occurs so that the tyres regain their adherence and then exerts pressure again so that the vehicle brakes. During emergency braking, there is a succession of to- and fro movements of the brake pads.
Thanks to the patented brake pad guides, the caliper optimises operation of the ABS by unlocking the wheel more rapidly and limiting the time during which the wheel is locked. On dry ground better control of the vehicle is seen.

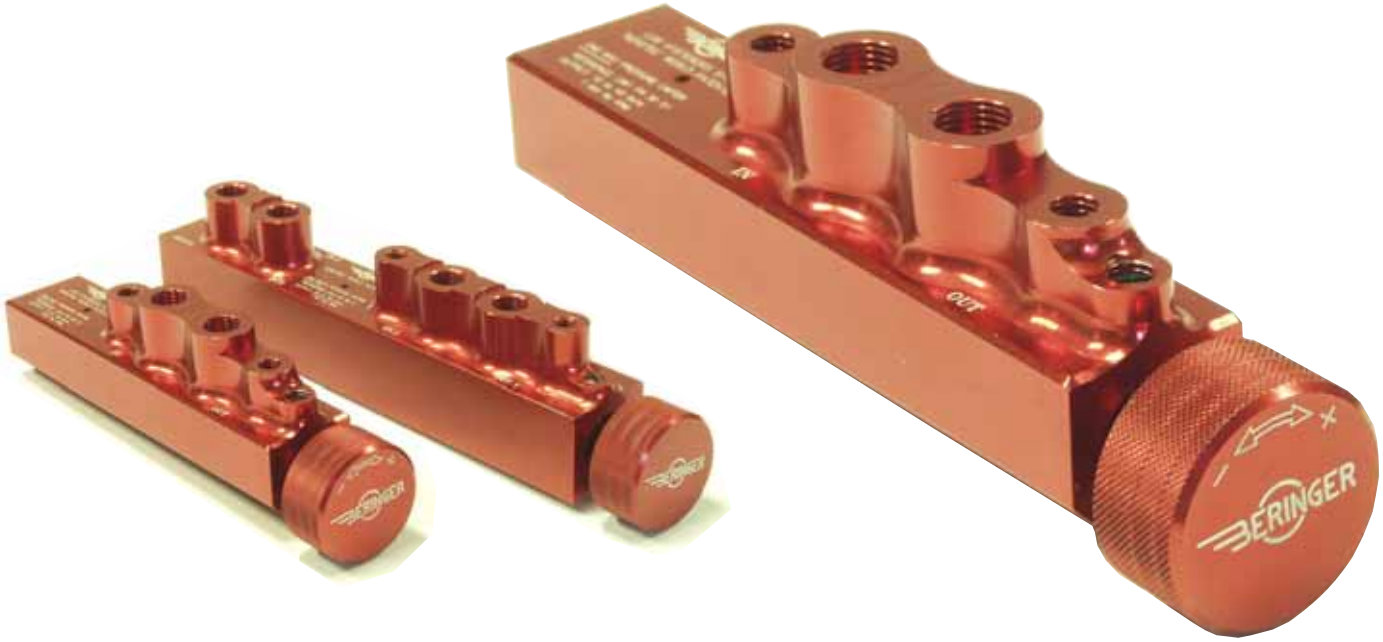
Reduction of braking distance on wet roads !

On surfaces where adherence is poor, ABS is particularly necessary. The adherence factor on wet ground of a moving vehicle is 0.3 (1.1 on dry ground), and only 0.1 when the wheels are locked – three times less!

The UTAC test showed that for an upmarket sports vehicle equipped with a V6 3.0 l engine and reputable brakes, the braking distance from 80 to 0 kph on wet ground is reduced by **8.8 metres!** Remember that a pedestrian crossing is 5 meters wide.

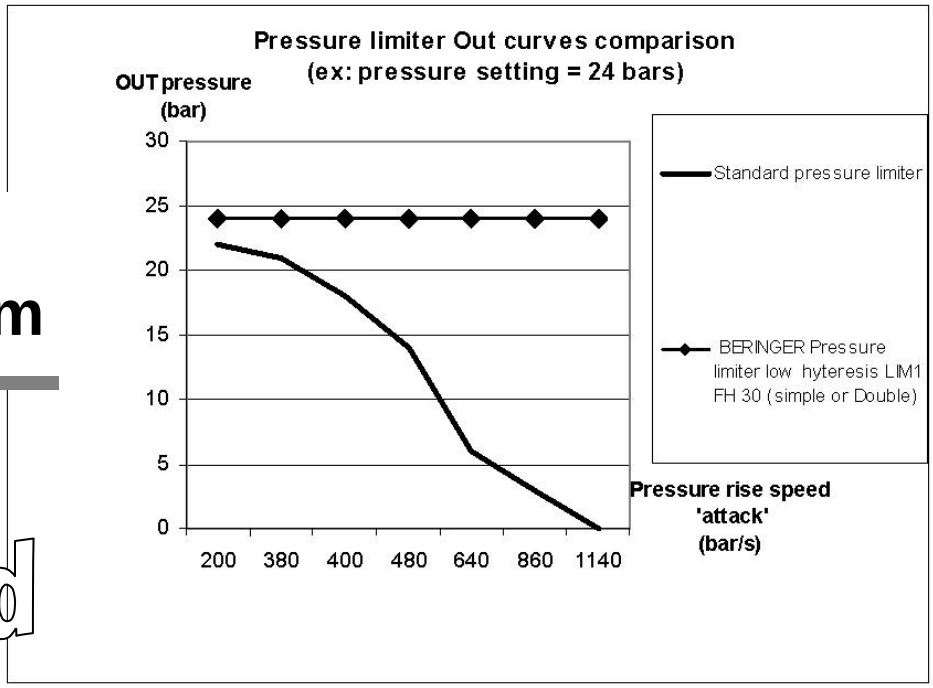
LOW HYSTERESIS PRESSURE LIMITERS

- **Plane curve, single circuit**
- **Plane curve, double circuit**
- **Proportional curve, single circuit**
- **Proportional reverser curve, single circuit**

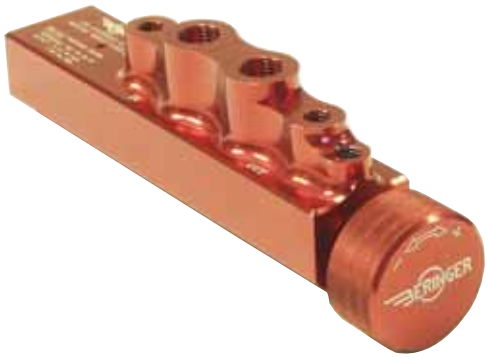


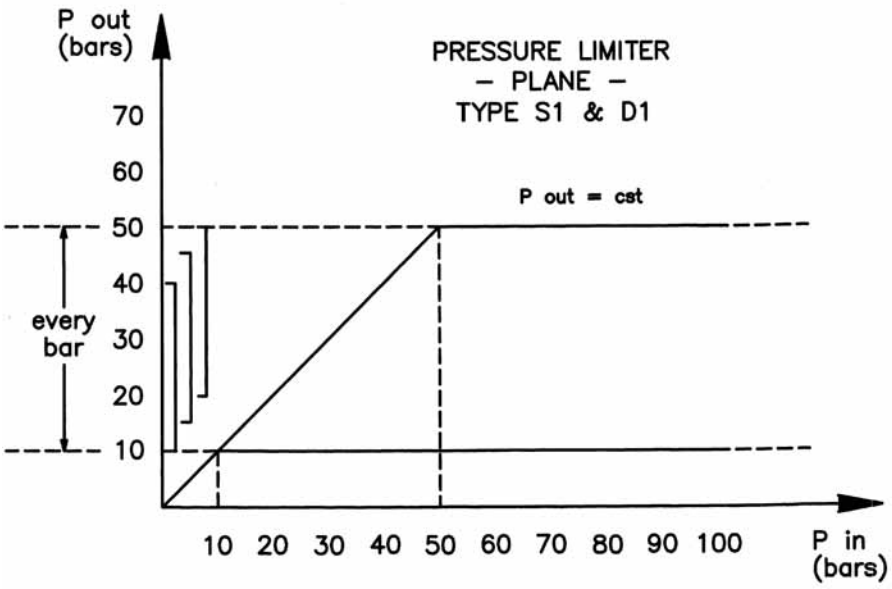
May be used with ABS system

patented

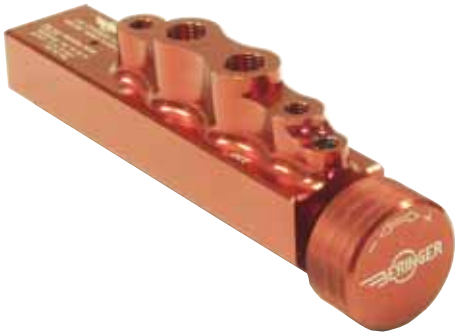


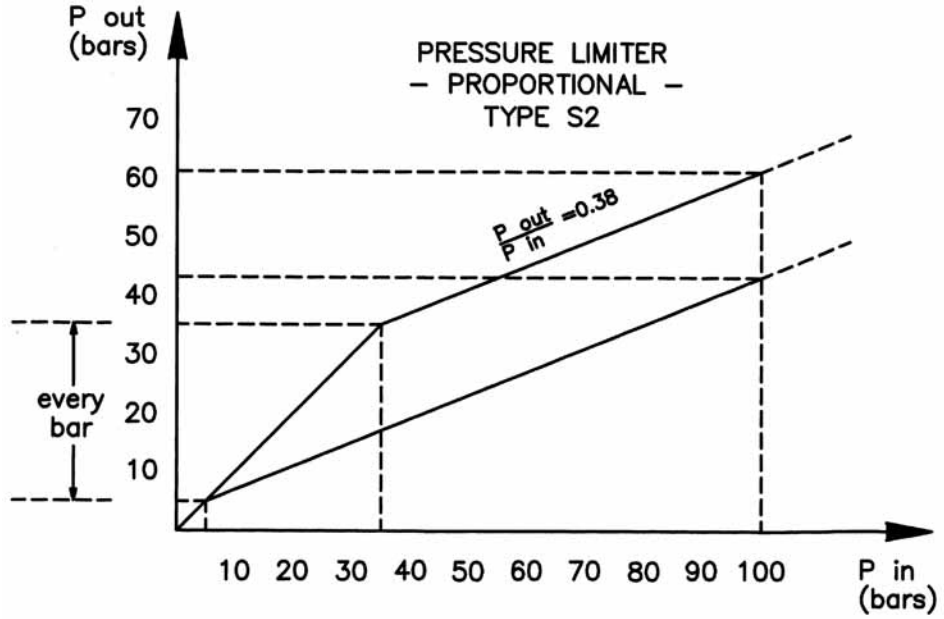
- **Plane curve, single circuit**
- **Plane curve, double circuit**



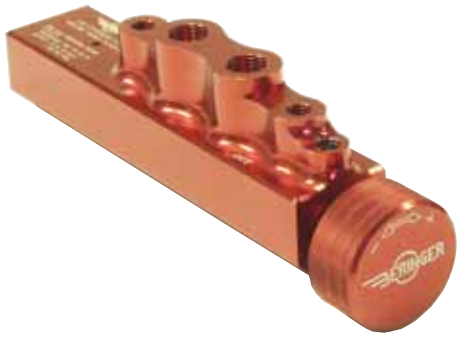


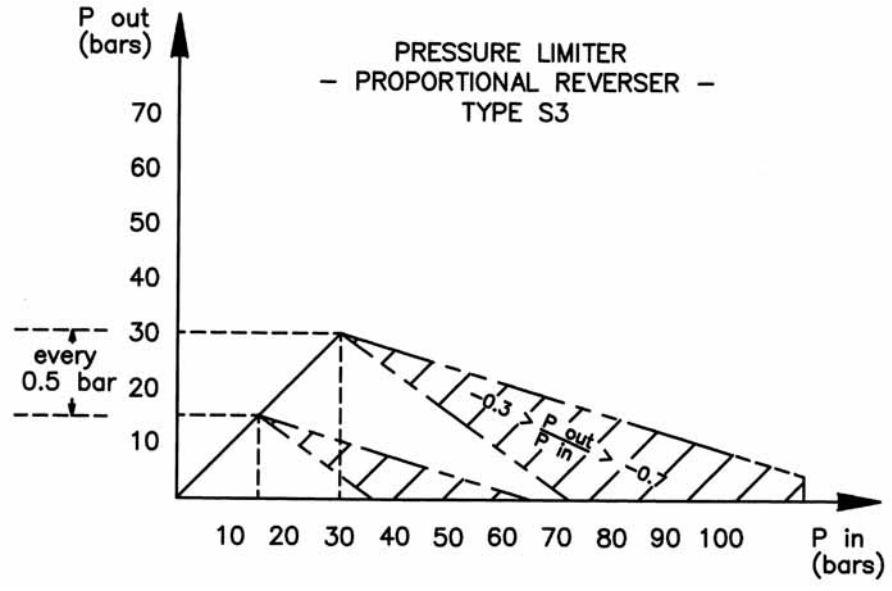
- **Proportional curve, single circuit**





- **Proportional reverser curve, single circuit**



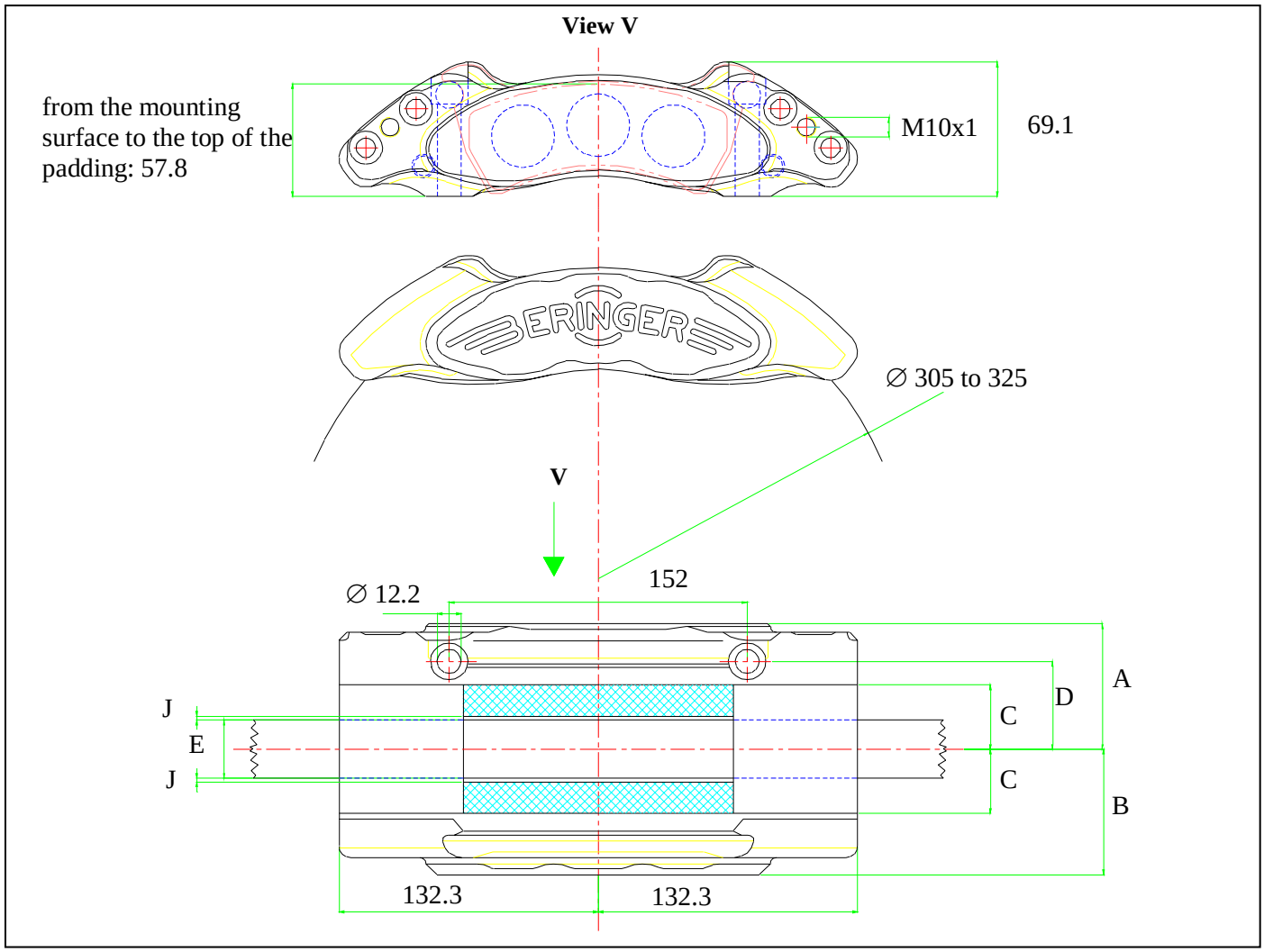


Caliper E-E…

6 pistons ∅ 32 mm, disc ∅ 305 to 325 mm.

- total surface of the pistons: 4825 mm^2.
- height of the pad: 42.4 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 305: 357 mm
- for a disc ∅ 315: 367 mm
- for a disc ∅ 325: 377 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1

Dimensioned drawing of the caliper :



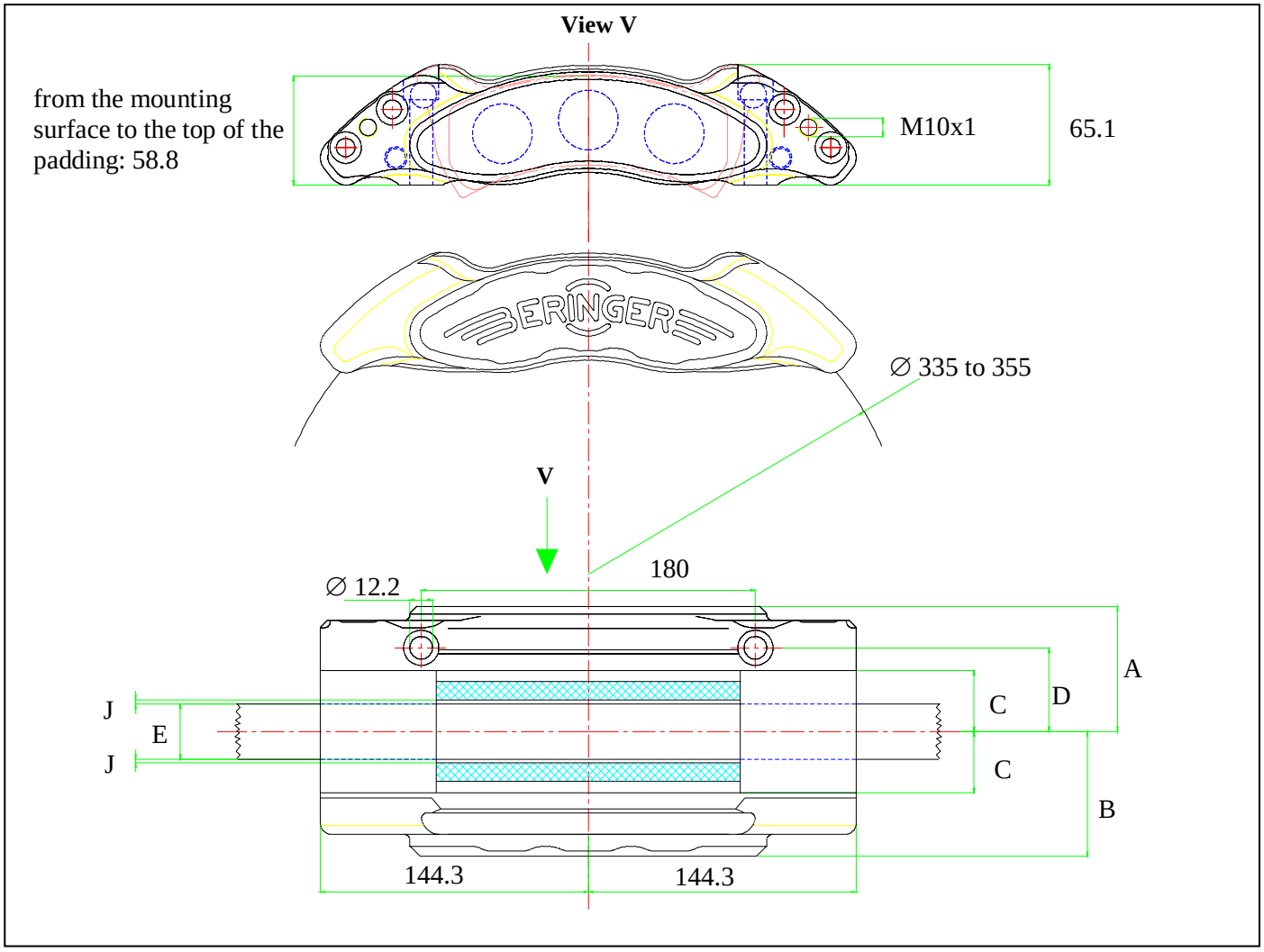
caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/ max) pads
E-E-A--	20 à 23	2.70	40.6	60	60	28.5	1/2.5
E-E-B--	24 à 27	2.75	42.6	62	62	30.5	1/2.5
E-E-C--	27 à 30	2.75	44.1	63.5	63.5	32	1/2.5
E-E-F--	29 à 32	2.75	45.1	64.5	64.5	33	1/2.5
E-E-D--	32 à 35.5	2.80	46.85	66.25	66.25	34.75	1/2.75

Caliper F-F…

6 pistons ∅ 32 mm, disc ∅ 335 to 355 mm.

- total surface of the pistons: 4825 mm^2.
- height of the pad: 45.7 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 335: 387 mm
- for a disc ∅ 345: 397 mm
- for a disc ∅ 355: 407 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1.

Dimensioned drawing of the caliper :

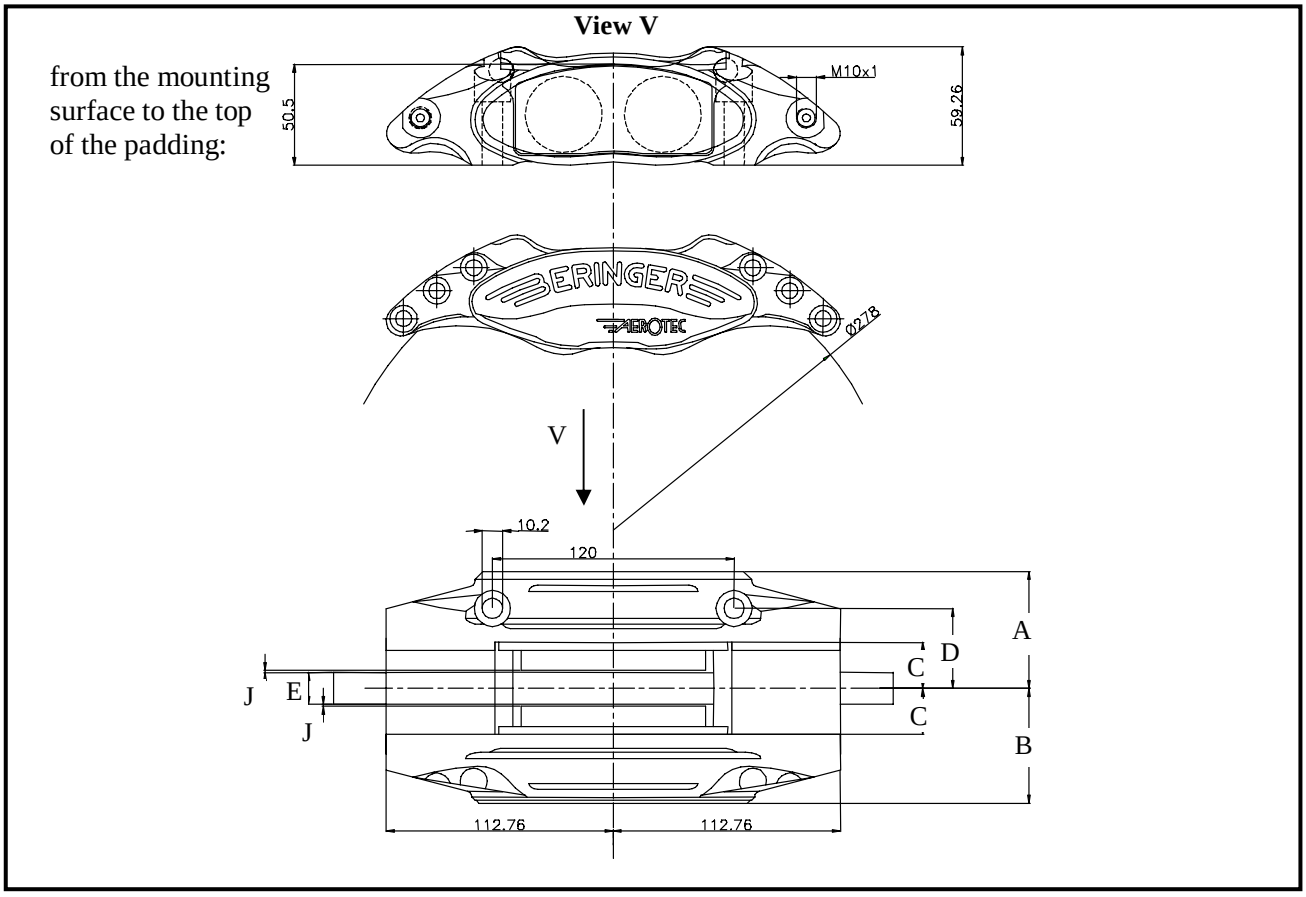


caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/ max) pads
F-F-A--	20 à 23	3.05	40.6	63	63	28.5	1/2.5
F-F-B--	24 à 27	3.10	42.6	65	65	30.5	1/2.5
F-F-C--	27 à 30	3.10	44.1	66.5	66.5	32	1/2.5
F-F-F--	29 à 32	3.10	45.1	67.5	67.5	33	1/2.5
F-F-D--	32 à 35.5	3.15	46.85	69.25	69.25	34.75	1/2.75

Caliper F3…
4 pistons ∅ 38 mm, disc ∅ 278 mm.

- total surface of the pistons: 4536 mm^2.
- height of the pad: 42.5 mm.
- minimum internal diameter of the rim: 325mm
- thickness of the pad : 14 mm (minimum 8mm).
- feeding thread : M10x1
- it is possible with discs of width>10 with other bridges (new guides would be necessary)

Dimensioned drawing of the caliper :



caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/max) pads
M-M-K--	16	1.54	40	58.5	57.5	23	1 / 2.5

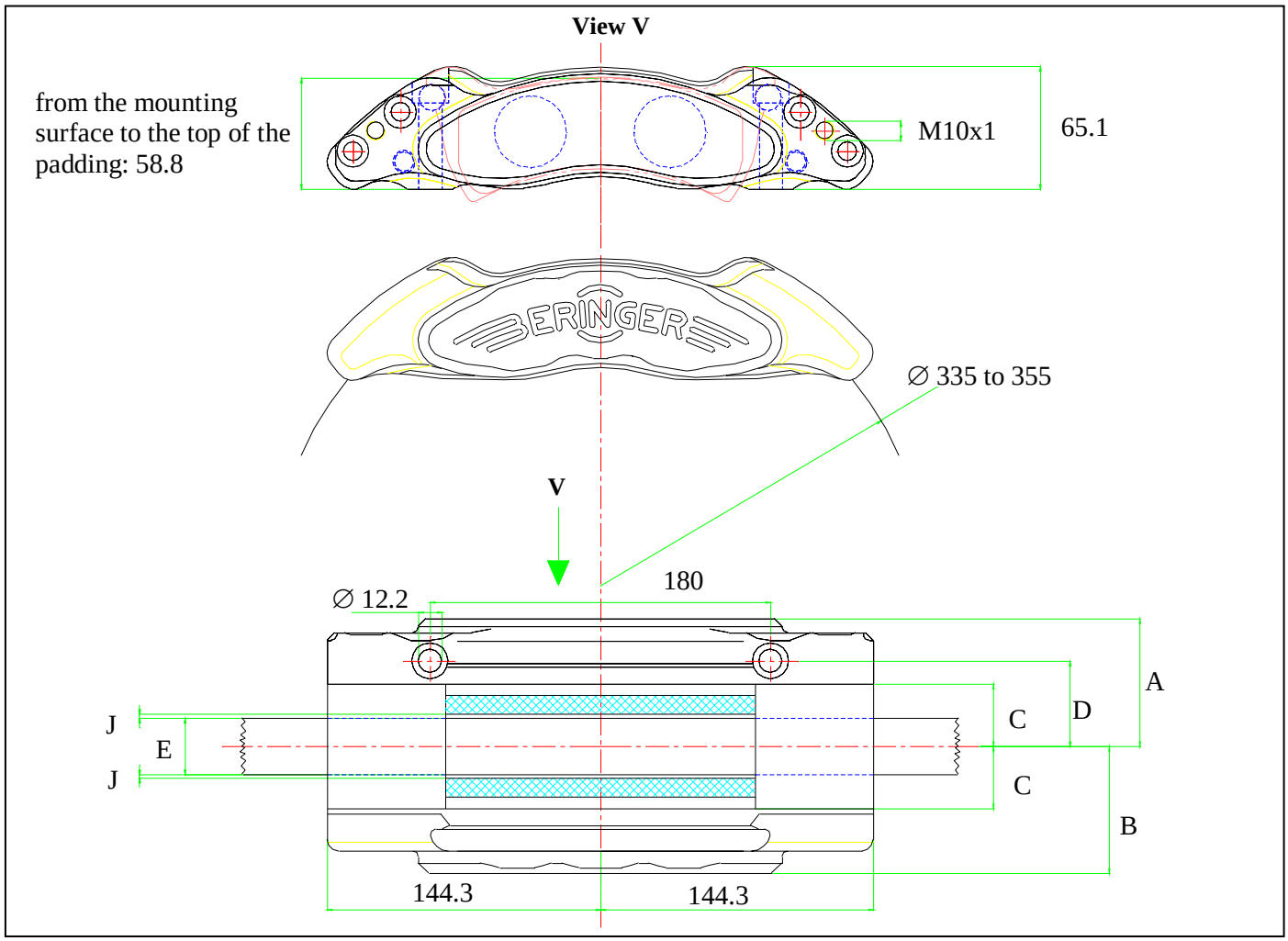
Caliper H-H…

4 pistons ∅ 38 mm, disc ∅ 335 to 355 mm.

(entraxe 180)

- total surface of the pistons: 4536 mm^2.
- height of the pad: 45.7 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 335: 387 mm
- for a disc ∅ 345: 397 mm
- for a disc ∅ 355: 407 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1.

Dimensioned drawing of the caliper :



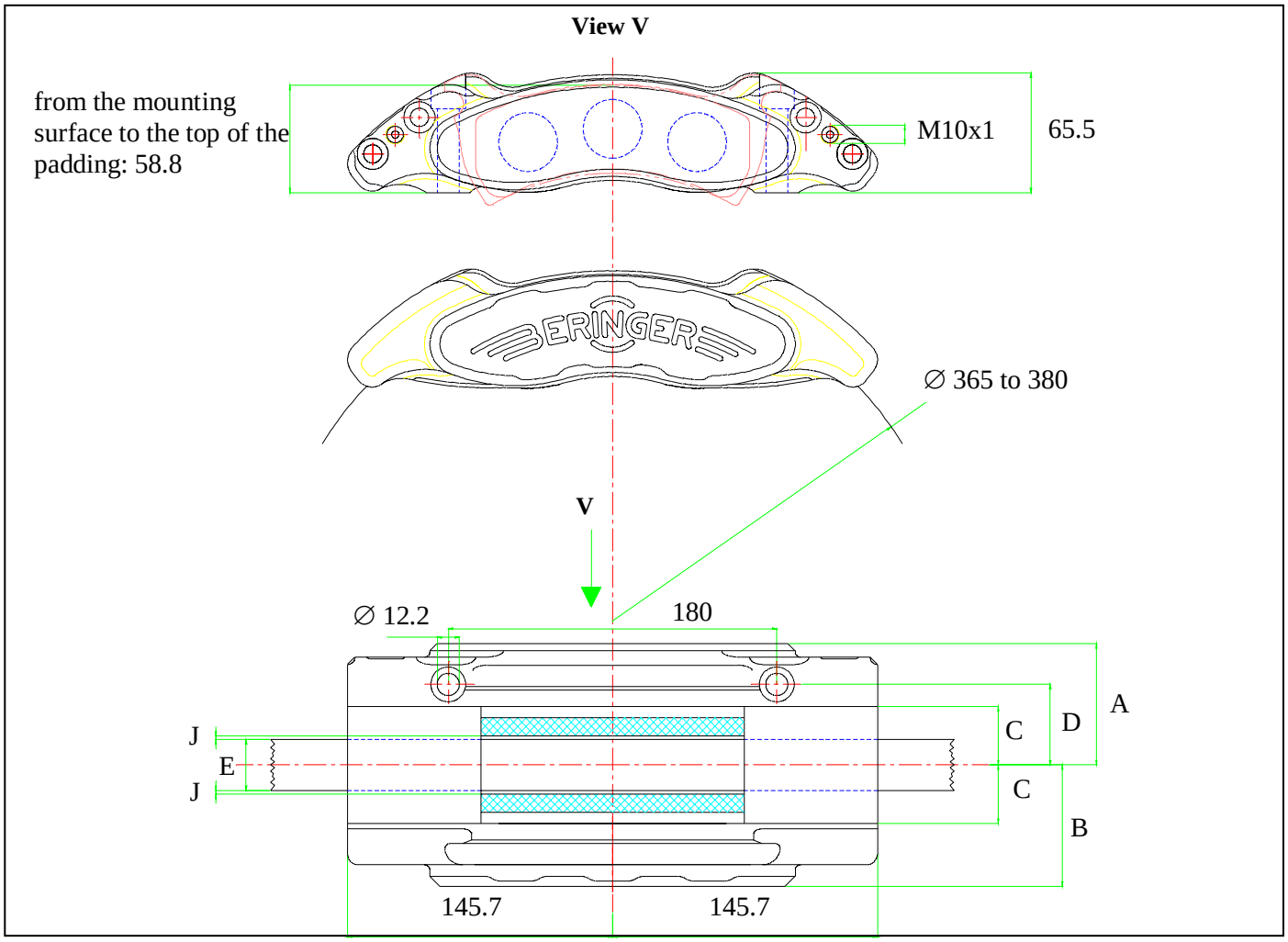
caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/ max) pads
H-H-A--	20 à 23	3.05	40.6	63	63	28.5	1/2.5
H-H-B--	24 à 27	3.10	42.6	65	65	30.5	1/2.5
H-H-C--	27 à 30	3.10	44.1	66.5	66.5	32	1/2.5
H-H-F--	29 à 32	3.10	45.1	67.5	67.5	33	1/2.5
H-H-D--	32 à 35.5	3.15	46.85	69.25	69.25	34.75	1/2.75

Caliper I-I…

6 pistons Æ 32 mm, disc Æ 365 to 380 mm.

- total surface of the pistons: 4825 mm^2.
- height of the pad: 45.7 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 365: 417 mm
- for a disc ∅ 375: 427 mm
- for a disc ∅ 380: 432 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1.

Dimensioned drawing of the caliper



caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/max) pads
I-I-A--	20 à 23	3.35	40.6	63	63	28.5	1/2.5
I-I-B--	24 à 27	3.40	42.6	65	65	30.5	1/2.5
I-I-C--	27 à 30	3.40	44.1	66.5	66.5	32	1/2.5
I-I-F--	29 à 32	3.40	45.1	67.5	67.5	33	1/2.5
I-I-D--	32 à 35.5	3.45	46.85	69.25	69.25	34.75	1/2.75

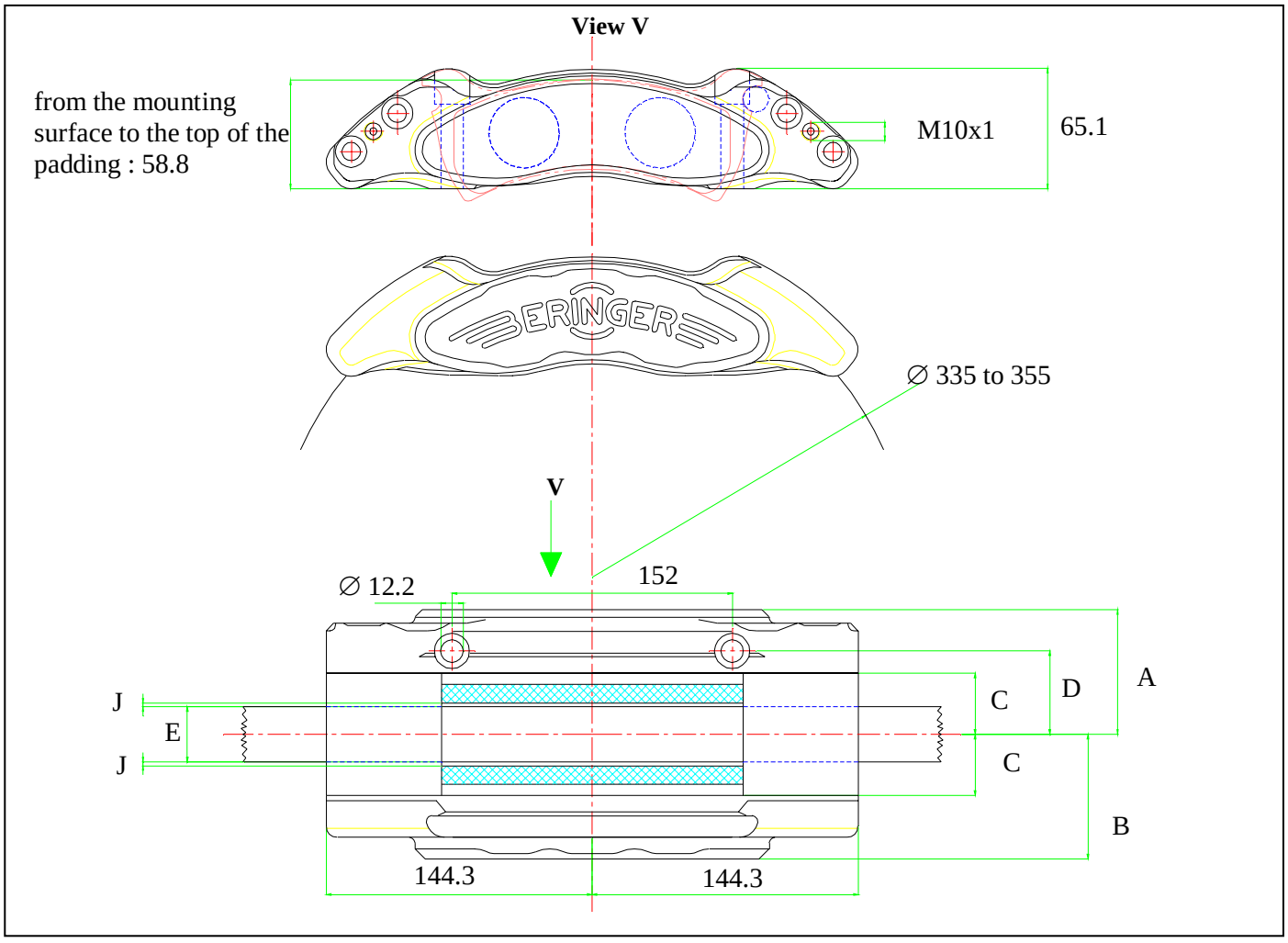
Caliper J-H…

4 pistons ∅ 38 mm, disc ∅ 335 to 355 mm.

(entraxe 152)

- total surface of the pistons: 4536 mm^2.
- height of the pad: 45.7 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 335: 387 mm
- for a disc ∅ 345: 397 mm
- for a disc ∅ 355: 407 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1.

Dimensioned drawing of the caliper :



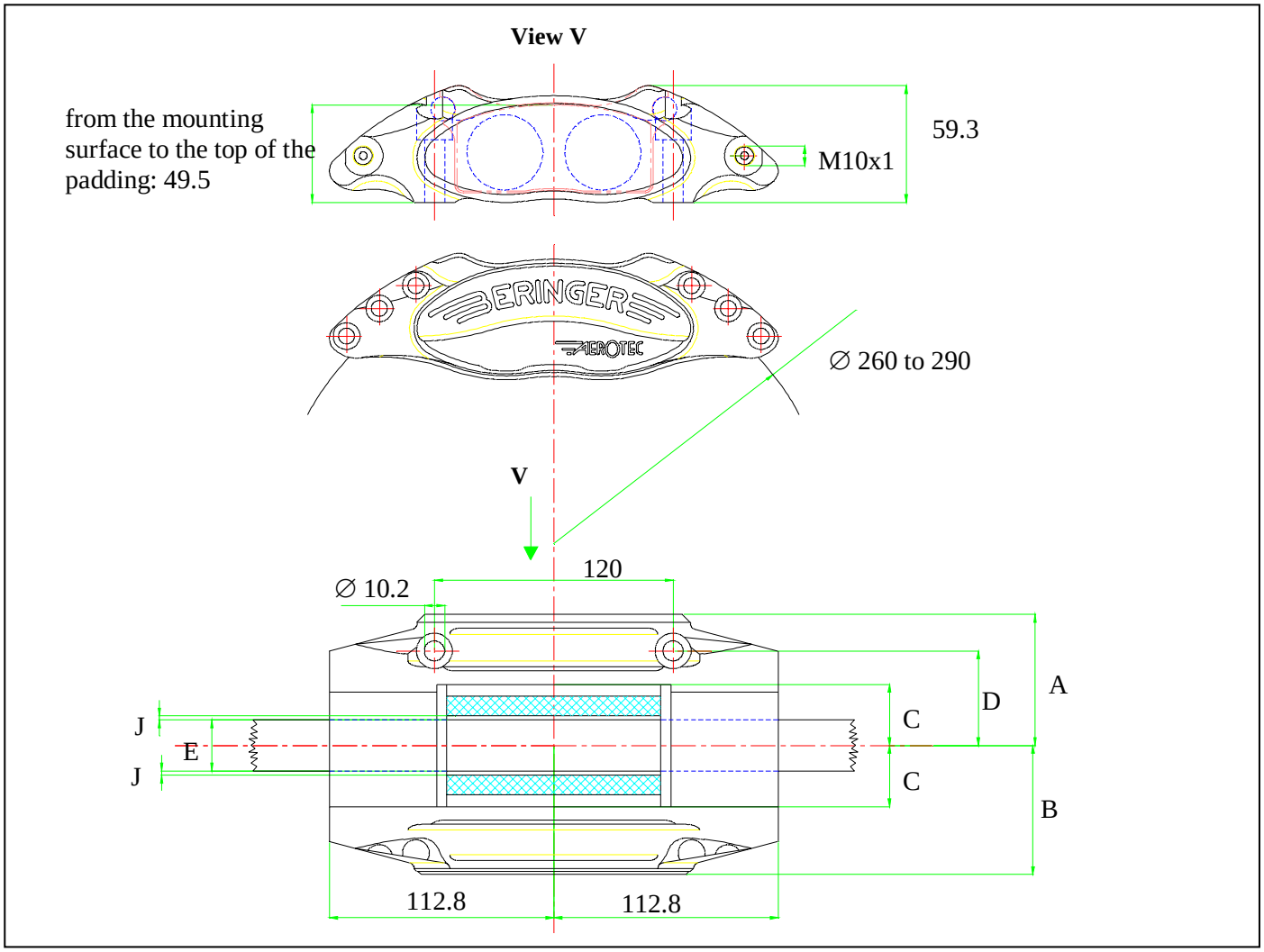
caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/max) pads
J-H-A--	20 à 23	3.05	40.6	63	63	28.5	1/2.5
J-H-B--	24 à 27	3.10	42.6	65	65	30.5	1/2.5
J-H-C--	27 à 30	3.10	44.1	66.5	66.5	32	1/2.5
J-H-F--	29 à 32	3.10	45.1	67.5	67.5	33	1/2.5
J-H-D--	32 à 35.5	3.15	46.85	69.25	69.25	34.75	1/2.75

Caliper M-M…

4 pistons ∅ 38 mm, disc ∅ 260 to 290 mm.

- total surface of the pistons: 4536 mm^2.
- height of the pad: 42.5 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 260: 312 mm
- for a disc ∅ 275: 327 mm
- for a disc ∅ 290: 342 mm
- thickness of the pad : 16 mm (minimum 8mm) except for M-M-K-: 14mm (minimum 7mm).
- feeding thread : M10x1

Dimensioned drawing of the caliper :

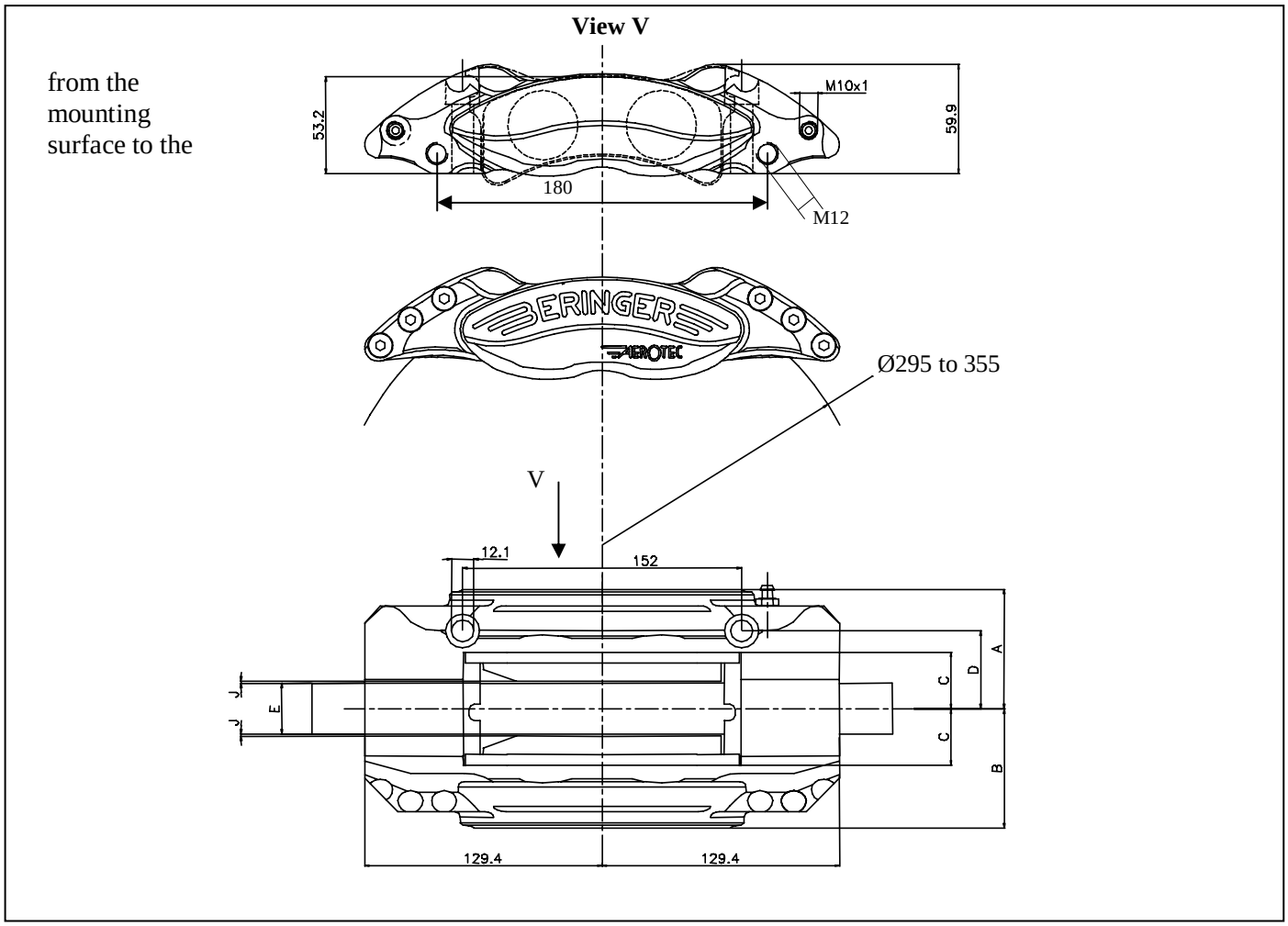


caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	pads play J (min/max)
M-M-K--	16	1.80	40	58.5	57.5	23	1
M-M-L--	17 à 22	1.90	45	63.5	62.5	28	1/3.5
M-M-J--	23 à 28	1.90	48	66.5	65.5	31	1/3.5

Caliper Q-Q (super 1600)…
4 pistons ∅38 mm, disc ∅295 to 355 mm.

- total surface of the pistons: 4536 mm^2.
- height of the pad: 42.5 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 355: 410 mm
- for a disc ∅ 295: 360 mm
- thickness of the pad : 16 mm (minimum 8mm).
- feeding thread : M10x1.

Dimensioned drawing of the caliper :



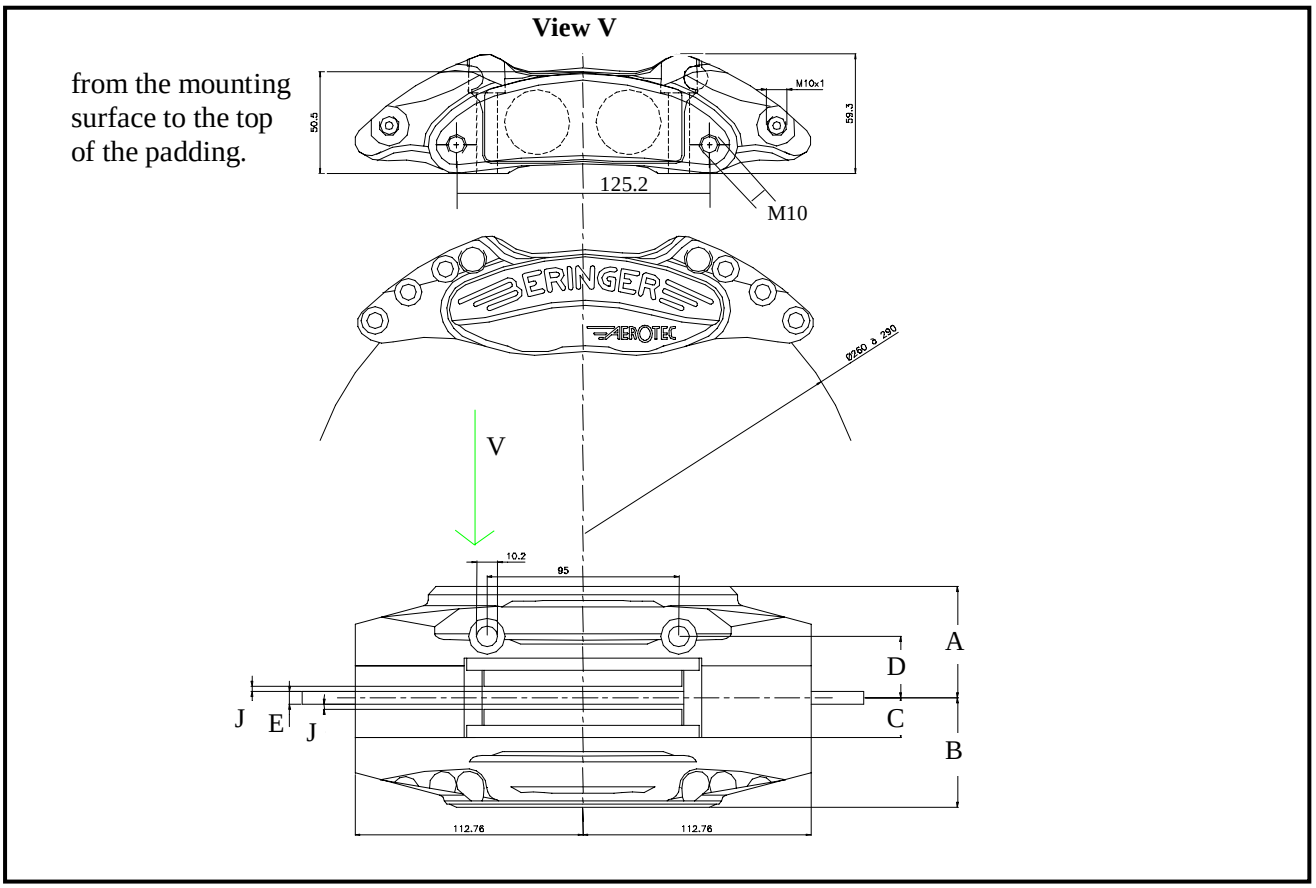
caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/ max) pads
Q-Q-K--	32	2.05	42.7	65.5	65.5	31	1/2.5
Q-Q-M--	36	2.07	44.7	67.5	67.5	33	1/2.5

Caliper R-R…

4 pistons ∅ 32 mm, disc ∅ 260 to 290 mm.

- total surface of the pistons: 3217 mm^2.
- height of the pad: 42.5 mm.
- minimum internal diameter of the rim:
- for a disc ∅ 260: 312 mm
- for a disc ∅ 275: 327 mm
- for a disc ∅ 290: 342 mm
- thickness of the pad : 14 mm (minimum 7mm)
- feeding thread : M10x1
- it is possible with discs of width>10 with other bridges (new guides would be necessary)

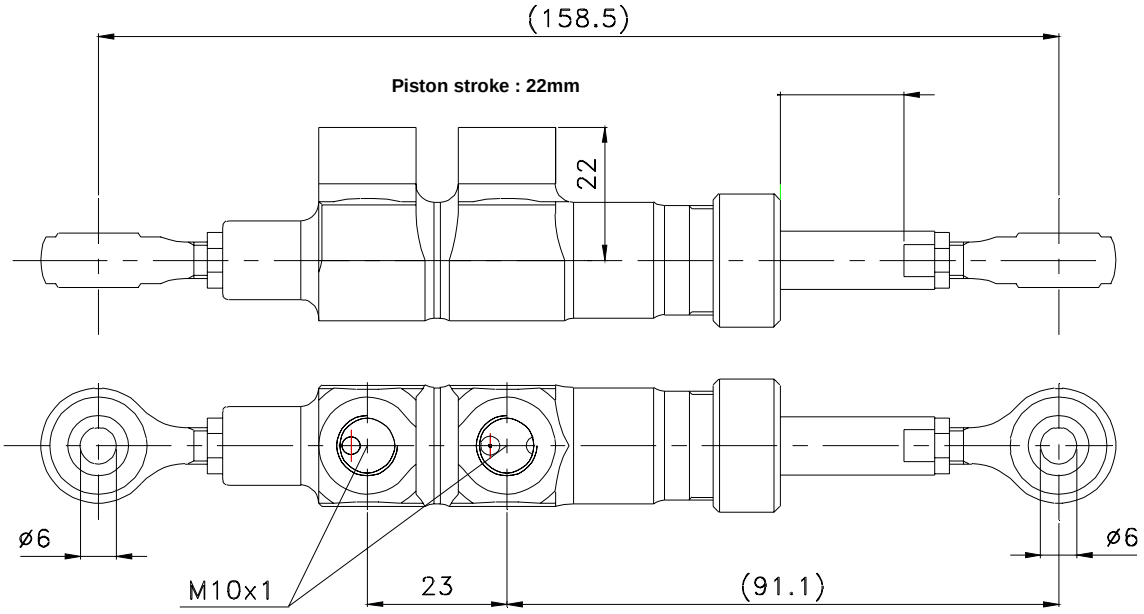
Dimensioned drawing of the caliper :



caliper part n°	thickness of the disc (E)	weight without pads (kg)	offset D	half width A	half width B	internal half width C	play J (min/max) pads
R-R-N--	6.5 à 10	1.58	30.5	55.25	54.25	19.75	0.75/2.5

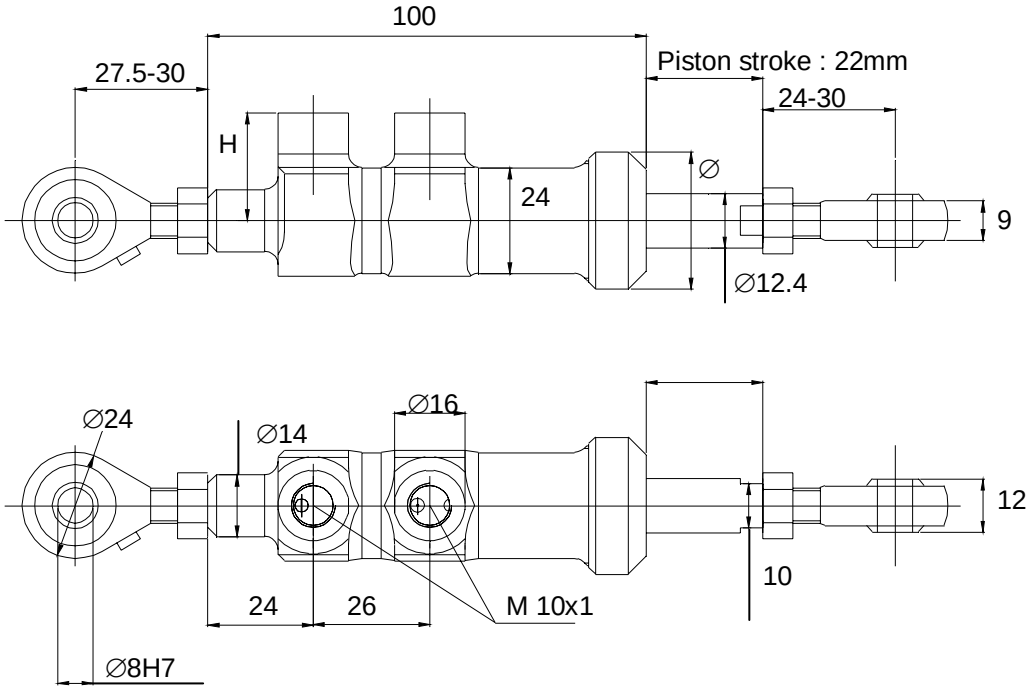
Master cylinder ∅12.7

- Part n°: MC12.7
- diameter of the piston: 12.7 mm.
- Piston stroke : 20 mm.
- thread type of the connectors (same type for feeding and output): M10x1.
- diameter of the ball-end bores: 6 mm ball-end with needle bearing are available).
- ball-end rod: M6x0.8 (male).



Master cylinder ∅15.9 to ∅25.4

- Piston stroke : 23 mm.
- thread type of the connectors (same type for feeding and output): M10x1.
- diameter of the ball-end bores: 8 mm ball-end with needle bearing are available).
- ball-end rod: M8x1.25 (male).



Référence	MC15.9	MC17.5	MC19	MC20.6	MC22.2	MC23.8	MC25.4
Piston diameter	15.9	17.5	19	20.6	22.2	23.8	25.4
∅	31	31	31	31	31	34	34
H	23.6	24.4	25.1	25.9	26.7	27.5	28.4