



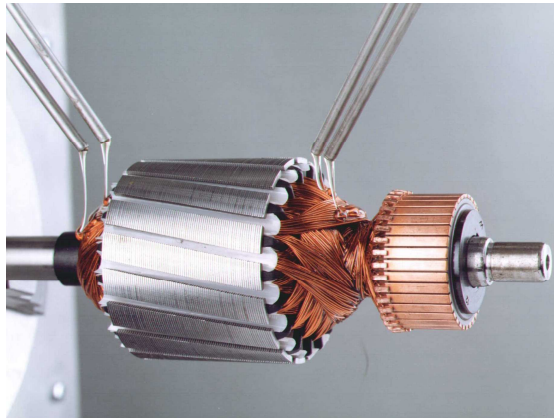
Damisol 3630 _ UPI* Class H new green range

*UPI Unsaturated Polyester Imide

DAMISOL 3630 Range



Polyester imide resin Class H+
Low viscosity
Low emission (no VOC)
High performances



Universal use (Versatile)

Why changing?



- **Environmental and Health & Safety reasons**

- VOC legislation (1999/13 CE) ⇒ Customers have to strongly reduce the emission
- REACH directive ⇒ Reduction of dangerous (CMR) chemicals use
- ROHS : Regulation on hazardous substances
- Smell is no more acceptable
- Epoxy is sensitizing
- Epoxy diluents are “grey listed” by many customers
- High flash point (no fire risk) becomes compulsory- ATEX

Strong green and safe approach



- **Global cost reasons**

- Solvents becomes more and more expensive
- After burner (or gaz treatment) equipment are highly expensive to buy and amortize



What choosing? Damisol 3630 one component UPI* resins

* Unsaturated Polyester imide

- **No label** (even not Xi irritating) ⇒ No health, safety or transport issue
- **No VOC content** ⇒ In line with the European legislations (1999/13/EC-2002/95/EC)
- **Low Emission** ⇒ Environmental friendly
- **Low Smell** ⇒ Workers friendly (slight banana smell)
- **Low Viscosity** ⇒ Easy impregnation- Easy to use
- **High stability** ⇒ Low Jellification risk
- **Outstanding Reactivity** ⇒ Easy to process – on all process
- **Excellent mechanical & ageing Properties** ⇒ High vibration resistant
- **Good electrical properties** ⇒ HV peaks resistance (inverter driven motors)
- **High water & chemical resistance properties** ⇒ Good protection

Versatile range

Available now

Damisol 3630 HTP 600mPa.s & 300mPa.s: Ok on all type of process- Target more dipping (including hot dipping) and VPI process

Damisol 3630 HIR 600mPa.s & 300mPa.s: Focus on trickle and Roll dip process

Damisol 3630 XLE 7000mPa.s: Focus on hot dipping process- Possible on VPI process- Extremely low emission <3% - LV Industrial motors & generators + wind turbines

Very soon- under pilote customer trials

Damisol 3630 HTC : Filled version for higher thermal conductivity and better resin build- Focus on trickle process- LV Industrial segment

End 2010

Damisol 3630 VPI: High resin film build for VPI process

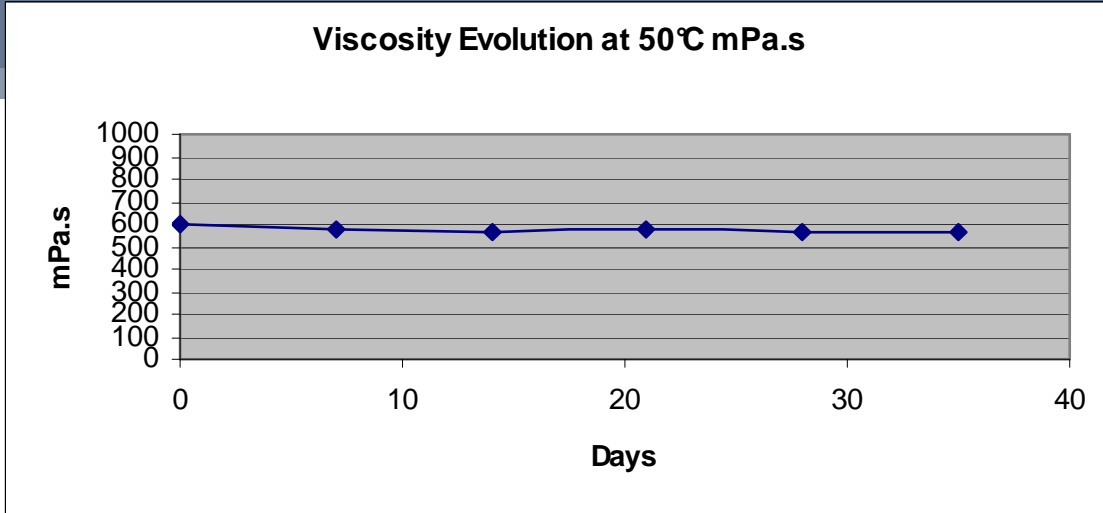
Damisol 3630 UV: UV curable- Hot dipping (current heating + UV special process)

Today situation: Impregnating Liquid general properties

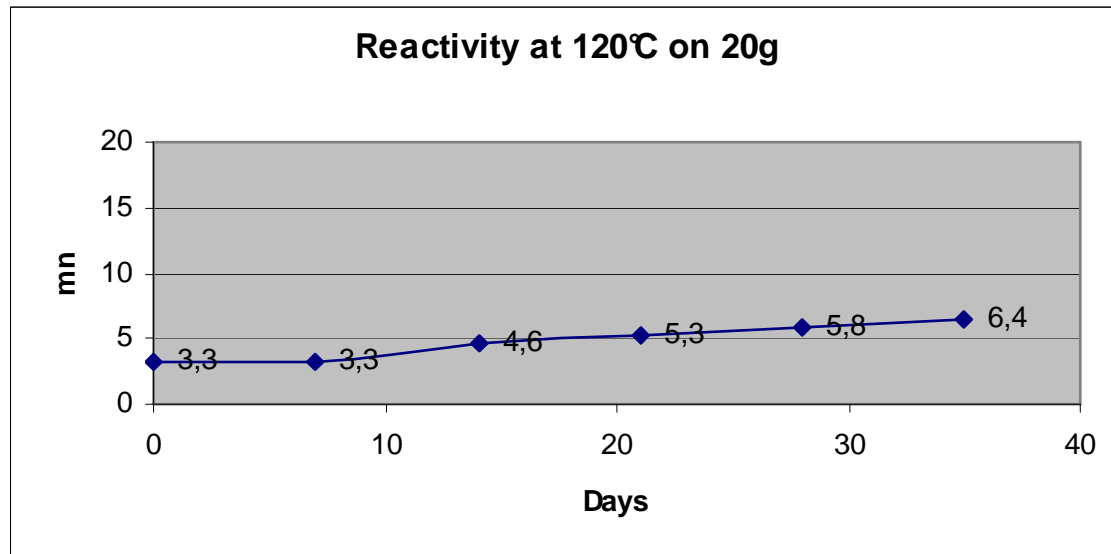
	Varnish (VOC solvent)	Solventless resin (VOC diluent)	Damisol 3630 range
Chemistry	Epoxy/polyester/Silicone...	Polyester +/-imide	Polyesterimide
Viscosity Brookfield 23°C (mPa.s)	100 / 300	100 / 500	300 / 600
Reactivity	NC (Solvents)	2-4 mn à 120°C	2-4 mn à 120°C
Curing (T° on Copper)	2 steps process: 1h 120°C +4h 150-180°C	30- 60mn à 150°C	30mn (HiR) - 60mn à 150°C
Diluent	Different solvents	Styrene/VinylToluene...	Not concerned
Flash point °C	<40°C	32°C / 53°C	>100°C
COV	> 50%	~ 40%	0
Emissions	> 50%	<25% *	< 8% *
Labels FDS	XN harmful R10-R20 flammable R52/53 harmful for aquatic life R36 38 Irritating eyes & skin R43 sensitizing?– R40 C3...???	XN R20 Nocif R10-R20 flammable R52/53 harmful for aquatic life CMR future risk???	NC

Stability at 50°C

Damisol 3630 HTP 600- Viscosity measured at 23°C



Solventless resins gell
after ~10 days at 50°C



Highly stable
No resin properties evolution
No early Jellification risk
Peace of mind

Behaviour on thick layer

Oliphant Test: 1h at 120°C + 2 h at 160°C

Low crack risk



Solventless resin
(Styren diluent)



HTP 600 version

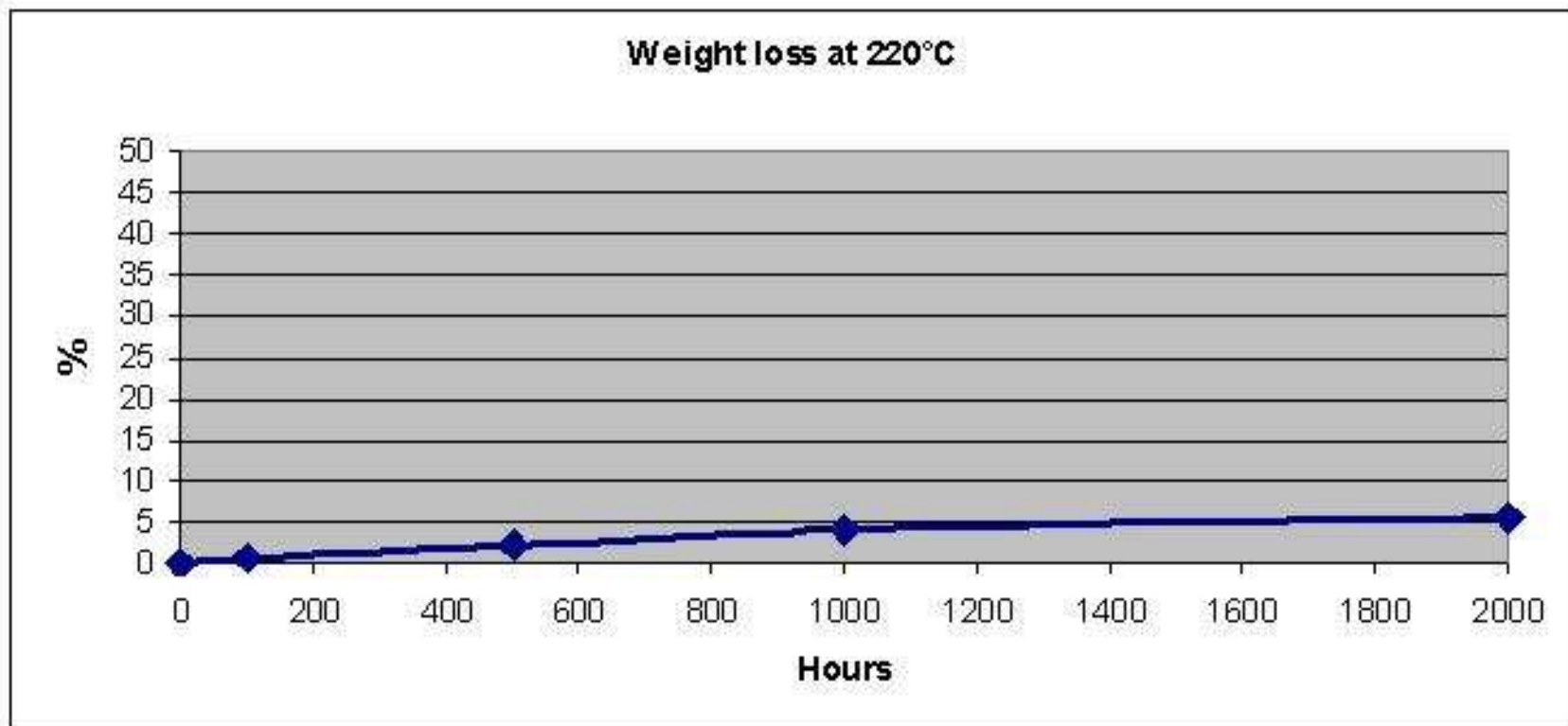
Enamel compatibility



Weightloss

Outstanding thermal stability of the 3630 range

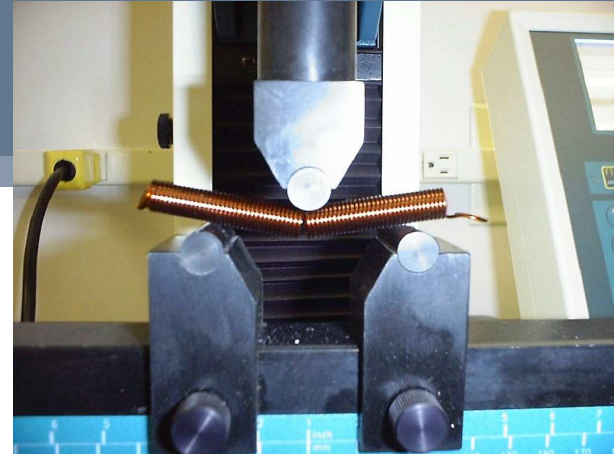
Test on 20 grams cured resin cakes



Mechanical Properties Initial

High bonding properties,
specially at high temperature

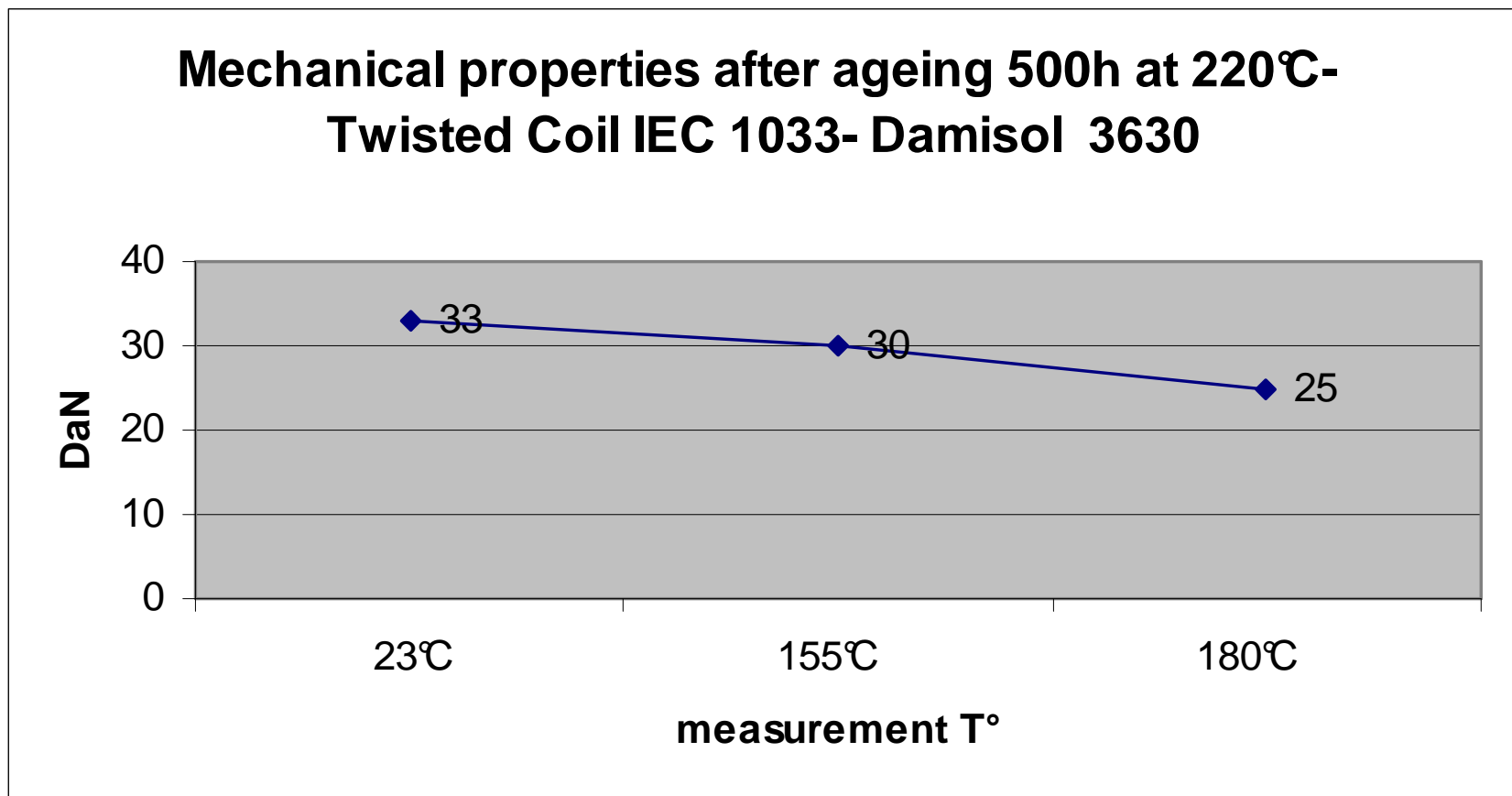
After curing 2 hours at 150°C



Mechanical properties TC IEC1033 initial	Styren based UPI	Damisol 3630 HTP	Damisol 3630 HIR
At 23°C in DaN	30	25	28
At 130°C in DaN	13	10	16
At 155°C in DaN	7,5	8	14
At 180°C in DaN	6,5	6	12

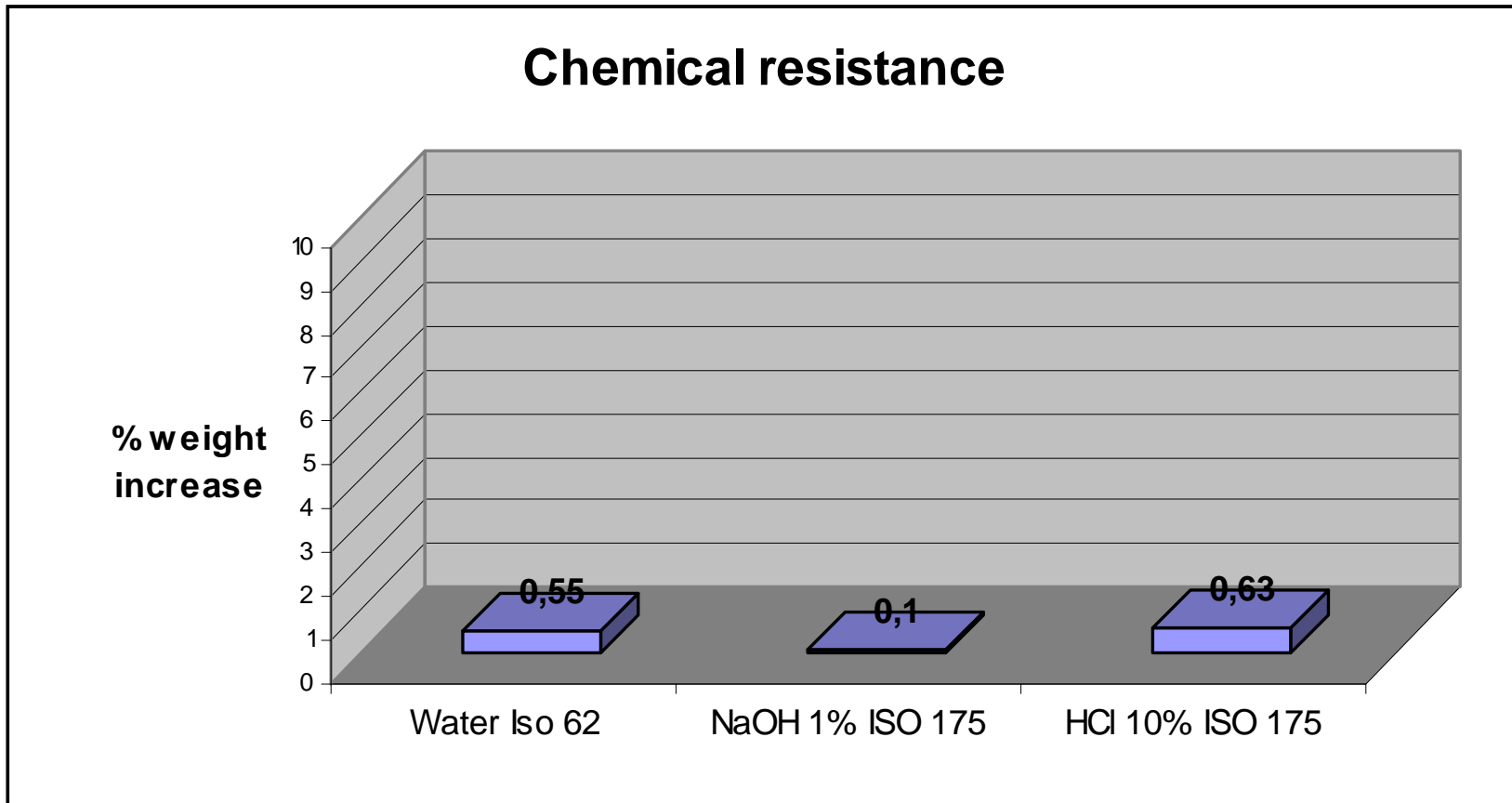
Mechanical properties after ageing at 220°C

Stable bonding properties after ageing, even at high temperature



Chemical resistance properties

Good chemical resistance, comparable to today's Styren based UPI*



* UPI: Unsaturated Polyester Imide

? Questions / Answers !



Any Questions?

Questions / Answers

Smell?	Very low smell (banana) on liquid form. Smell only in the oven during curing
VOC?	VOC= 0 referring to the European legislation. No solvent in the resin.
Emission?	Low Emission from 2 to 8%- Dependant on the process. It is important to go quick at high temperature (>150°C) to minimize the organic emission
Toxicity?	No toxicity at all, even not sensitizing!
Transport?	Not dangerous good- No transport legislation concern.
Stability in drums & tanks?	Excellent stability with temperature- Avoid direct light (UV sensitivity). High flash point. No storage problem
Curing possibilities?	30mn at 150°C (T° on pieces) minimum for the HiR version- 60mn at 150°C for the other versions. 130°C minimal temperature in any case
Chemical resistance?	Excellent in general- Even resistant to Freon for hermetic application. The curing phase is very important to achieve the best performances.
UL?	UL class H on MW 35 wires. Twisted coil test, the only necessary to enter UL systems. The mechanical ageing tests show even class 200°C properties.

€ Cost estimation

Real Customer Example (France)

- Production of 100 000 medium size industrial motors / year (Copper weight around 2Kg)
- Investment on one after burning gaz oven (200 k€ amortized in 5 years)

Resin Reference	Solvent based varnish (VOC solvent)	Solvent less resin (VOC diluent)	Damisol 3630 HTP
Dry resin quantity per motor (g)	100	100	100
Resin quantity involved (g)	300 (150 in chimney-50 in oven)	140 (25 in chimney-15 in oven)	120 (5 in chimney-15 in oven)
Resin price (€/kg)	3	5	7
Resin cost /motor (€)	0,9	0,7	0,84
Prod. Manpower/motor(€)	0,8	0,8	0,8
Energy Cost /motor (€)	0,20	0,10	0,12
Investment for VOC amortizing /motor (€)	0,40	0,40	0
VOC Investment Maintenance /motor (€)	0,02	0,02	0
Total (€ per motor)	2,32	2,02	1,76

Real costs

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- + Insurance costs
- + CO2 Emissions (Kyoto, Copenhagen)
- + Fire risk
- + Workers « comfort »
- + Company image (external & internal)



Thank you !