

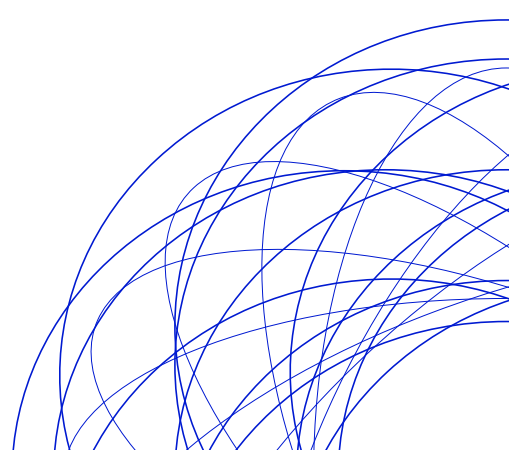
Guida Tecnica:
Sistemi di protezione degli avvolgimenti
Technical Guide:
Insulation Protection Systems



With Great Knowledge Comes Great Power

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1. INTRODUCTION

Mecc Alte is using only premium class H insulation material. Impregnation processes are achieved with the latest impregnation technologies, like Vacuum Pressure Impregnation (VPI) or with the use of dedicated roll and dip or trickle machines. The impregnation process is undertaken twice in the main stator, which assures the best quality for the final customer.

This premium impregnation quality process is perfect for the vast majority of applications, however in order to achieve the same results in insulation reliability when environmental or operating conditions are demanding, it is possible to consider one of the additional protection systems offered by Mecc Alte.

Demanding environmental condition should be considered where: 加裝保護裝置的環境需求如下:

- There is a high humidity [$>95\%$] 環境濕度大於95%
- There is salty atmosphere [marine applications] 含鹽度之環境(如船用港邊等)
- Atmosphere is polluted with some abrasive elements [dust, solid particles] 空氣中含有汙染粒子(灰塵、固態粒子)
- Atmosphere is polluted with some chemical aggressive elements [incombustible diesel particles, acids] 空氣中含有汙染侵略性化學物質(不可燃柴油分子、氨基酸)

Demanding usage applications are those such as:

- Rental
- Automotive/Truck
- Rail
- 24/7 ground or marine
- Power converters reflecting high voltage spikes to the generators

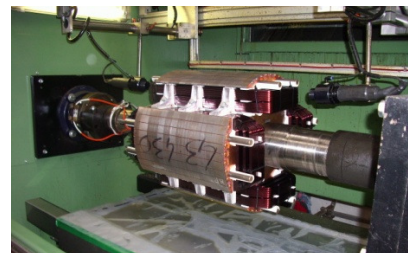
The bigger the size in kVA of the alternator, the bigger the importance of the environmental and the usage conditions with the related protection system on the generator. Please contact a Mecc Alte representative to be guided in the right protection system selection to suit your application.

2. INSULATION RESINS AND PROTECTION VARNISHES

Mecc Alte is using the same high quality polyester resin for the impregnation of all the relevant active electrical components. Main stators are impregnated twice. After the impregnation process is completed, a further protective varnish layer can be applied by dip or by spraying: the two varnishes that can be used are the grey EG43 or the black flexible compound.

2.1 Insulation Resin

The high quality bi-component insulation resin used from Mecc Alte, is a polyester specially developed to be used in vacuum impregnation or dip/ and trickle machines. It does have superior bond strength characteristics, high chemical and moisture resistance and is suitable for uses up to 212° C.



2.2 Grey Varnish EG43 EG43灰色絕緣漆

The EG43 grey varnish, is an high temperature insulating enamel that forms a tough and flexible film, with excellent moisture and chemical protection. It is water and oil proof, and also protects windings from abrasion. It is applied spraying an over coating layer over the impregnated winding, or dipping the stator in a varnish barrel for superior treatments.

EG43灰色絕緣漆，是一種可以絕緣高溫的搪瓷亮漆，形成強固及彈性的表面，具有優秀的防潮及防止化學成分破壞功能。它可防水及防油，並可防止線圈磨損。上漆方式有用噴灑過的塗料層層浸漬纏繞，或浸泡將定子整個浸泡在漆桶中作強化處理。

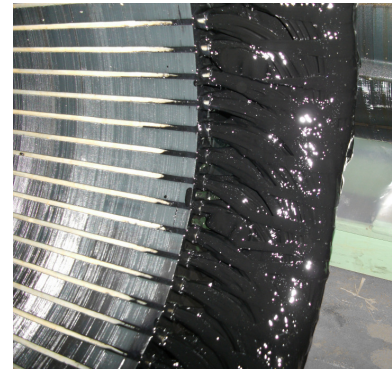


2.3 黑色彈性複合漆: 此種黑色保護漆使美奧迪發電機與眾不同。此最後處理階段能提供發電機在非常惡劣的環境應用下保有卓悅的性能表現, 它是一種橡膠狀的保護處理, 用於取代環氧樹脂和矽脂的繞組包覆。

2.3 Black Flexible Compound.

The black flexible compound is a protection system that makes Mecc Alte special. It is the ultimate winding treatment that offers truly superior performances when the environment is really harsh, or the application very demanding. It is a rubbery protection treatment, used to replace epoxies and silicones winding encapsulation.

The flexible black compound cures to a tough, resilient, glossy black thick coating that seals the copper against moisture and chemical attacks. Due to its encapsulation capability and flexibility, is also extremely resistant to the particle abrasion as it adsorbs the impacts. Moreover, the high flexibility leads to a long-trouble less life protection, as the compound follows elastically the thermal expansion cycles of the windings from the cold to the hot condition and vice versa without forming any cracks.



黑色複合漆固化後形成堅韌, 有彈性, 有光澤的黑色厚塗層, 密封銅琺瑯對抗濕氣和化學成份腐蝕。因為此漆的包覆能力及彈性, 可發揮阻擋汙染粒子及吸收撞擊的功用。更佳的是, 高度彈性的漆質可延長保護壽命, 隨著繞組由冷到熱的情況複合物質成份在熱脹冷縮循環下不會造成任何裂縫產生。

3. PROTECTION SYSTEMS

3.1 Protection level: STANDARD

The Standard protection level is referred to a generator which has the sole impregnation resin applied to all the active parts. It should be noted that this level is standard on the Mecc Alte ECP3 generator series: voltages from turn to turn in this series are never dangerous for the insulation life, resulting in no need to apply any additional protection varnish.

3.2 Protection level: STANDARD +

With the Standard + protection system in addition to the usual impregnation resin, the stator exciter is protected with a further layer of grey varnish EG43. Stator exciter is protected because it is the first active part that is cooled from the air cooling flux. Consequently it can be easily damaged by either particles or moisture. ECO 28, ECO 31 and ECO 32 families are built with this protection level as a standard.

3.3 Protection level: GREY 3.3 保護等級: GREY(灰漆EG43) 此保護等級在勵磁機定子及主定子上皆塗裝灰漆EG43。

With the grey protection level, not only the exciter stator is coated with the EG43 but also the main power stator. This protection level, which is available as an option on some families and as a standard on some others, is the standard for the marine and nearly all the most demanding application. Main and exciter stator grey EG43 coating is usually sufficient to protect the windings, as all the rotating machine parts are subjected to much lower voltages and are cleaned centrifugally from the moisture and contaminating particles that could corrode the copper enamel. This level is the Mecc Alte standard for ECP 34, ECO 38, ECO 40, ECO 43 and ECO 46 families 此級在一些系列中是標配, 也供其他系列選配使用。是標準的海洋機及通用最廣泛的應用

3.4 Protection level: TOTAL 低的電流且經由離心力清除掉會腐蝕銅琺瑯的濕氣及汙染粒子。ECP34, ECO38, ECO43 及ECO46 列為標配。

The Total protection level is available as an option on the whole industrial range. It is the ultimate solution to be used when the application or the environment is abusing the insulation of the generator. With this protection level, the grey EG43 varnish on main and exciter stator is replaced by a 0.5 to 2mm thick layer of flexible compound. The black compound acts as a physical barrier to moisture particles and chemical substances. Being the rubbery layer of the flexible compound so protective, it limits also the main stator capability to dissipate heat: this means that on some specific models a 3% derating is applied on the nominal power. Please refer to the ratings guide in paragraph 5 of this handbook.

3.5 Protection level: TOTAL +

The protection level Total + is adding on the top of the Total also the overcoating of all the rotating active components with the grey varnish EG43. Before selecting this protection level, please be in contact with a Mecc Alte representative as most likely the Grey or the Total protection levels are going to be adequate for the vast majority of applications. 保護等級TOTAL+屬於最高階的保護層級, 所有旋轉活性(線圈)

零件皆會包覆EG43灰色絕緣漆。

Impregnation TOTAL+: 主定子&勵磁定子包覆黑漆, 轉子包覆灰漆EG43。

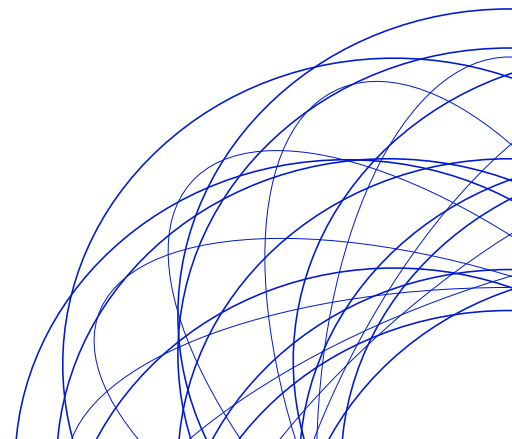
4. PROTECTION LEVEL SCHEMATICS

The following schematics describes the protection level offered as a standard versus the Mecc Alte generator family.

MODEL	Protection Level: STANDARD	Protection Level: STANDARD +	Protection Level: GREY	Protection Level: TOTAL	Protection Level: TOTAL +
BTP/CTP/ECP 3	Standard	On Request	On Request	On Request	On Request
LT3		Standard			
ECO/EC SO 28					
ECO/EC SO 32			Standard	On Request	On Request
ECP 34					
ECO 38					
ECO 40					
ECO 43					
ECO 46					
HCO 3					
HCO 32					
HCP 34					

Please contact a Mecc Alte representative to be guided in the right protection system selection that suits your application.

The presence of IP23, Air Inlet Filters and/or IP45 protection available from the Mecc Alte option list, will also influence the protection level necessary for the application requirement or environmental condition.



5. TOTAL AND TOTAL+ LEVELS INDUSTRIAL RATINGS

MODEL	50Hz		60Hz	
	125/40 (cl.H)	105/40 (cl.F)	125/40 (cl.H)	105/40 (cl.F)
ECP3-1SN/4	6,5	6	7,8	7,2
ECP3-2SN/4	8	7,5	9,6	9
ECP3-1LN/4	11	10	13,2	12
ECP3-2LN/4	13,5	12,5	16,2	15
ECP3-3LN/4	15	14	18	16,5
ECO28-SN/4	17	16	20,4	19
ECO28-1LN/4	20	18,5	24	22
ECO28-2LN/4	25	23	30	27,5
ECO28-VL/4	29	25	35	31
ECO32-2S/4	35	33	42	40
ECO32-3S/4	40	37	48	46
ECO32-1L/4	50	48	60	58
ECO32-2L/4	60	57	72	69
ECO32-3L/4	68	61	81	76
ECP34-1S/4	85	77	102	92
ECP34-2S/4	105	95	126	114
ECP34-1L/4	130	118	156	141
ECP34-2L/4	150	136	180	163
ECO38-1SN/4	180	170	220	205
ECO38-2SN/4	200	185	240	220
ECO38-3SN/4	225	207	270	250
ECO38-1LN/4	250	230	300	280
ECO38-2LN/4	291	267	349	320
ECO38-3LN/4	340	310	407	373
ECO40-1S/4	400	370	480	440
ECO40-2S/4	450	410	540	490
ECO40-3S/4	500	450	600	540
ECO40-1L/4	550	500	660	600
ECO40-1.5L/4	601	543	722	652
ECO40-2L/4	660	611	792	733
ECO40-VL/4	698	640	839	776
ECO43-1SN/4	800	730	960	870
ECO43-2SN/4	930	850	1116	1020
ECO43-1LN/4	1067	970	1280	1164
ECO43-2LN/4	1261	1164	1513	1397
ECO46-1S/4	1455	1310	1746	1571
ECO46-2S/4	1746	1552	2095	1862
ECO46-1L/4	2037	1843	2444	2212
ECO46-2L/4	2425	2183	2910	2619



Mecc Alte SpA

Via Roma
20 – 36051 Creazzo
Vicenza – ITALY
T: +39 0444 396111
F: +39 0444 396166
E: mecc-alte-spa@meccalte.it

After sale service email:
sat2@meccalte.it

France

Mecc Alte International S.A.
Z.E.La Gagnerie
16330 ST.Amant De Boixe
T: 0545/397562
F: 0545/398820
E: mecc.alte@meccalte.fr

After sale service email:
philippe.denis@meccalte.fr

India

Mecc Alte India PVT LTD
Plot NO: 1, Sanaswadi-Talegaon
Dhamdhare Road
Taluka: Shirur, District: Pune – 412208
Maharashtra, India
T: +91 2137 619600
F: +91 2137 619699
E: sales@meccalte.in

United Kingdom

Mecc Alte U.K. LTD
6 Lands' End Way
Oakham
Rutland
T: +44 01572/771160
F: +44 01572/771161
E: gen@meccalte.co.uk

After sale service email:
rod.marshall@meccalte.co.uk

Germany

Mecc Alte Generatoren GmbH
Ensener Weg 21
D-51149 Köln
T: 02203/503810
F: 02203/503796
E: info@meccalte.de

After sale service email:
service@meccalte.de

Far East

Mecc Alte (F.E.) PTE LTD
19 Kian Teck Drive
Singapore 628836
T: +65 62 657122
F: +65 62 653991
E: enquiry@meccalte.com.sg

After sale service email:
enquiry@meccalte.com.sg

Spain

Mecc Alte España S.A.
C/ Rio Taibilla, 2
Polig. Ind. Los Valeros
03178 Benijofar (Alicante)
T: 096/6702152
F: 096/6700103
E: gerencia@meccalte.es

After sale service email:
serviciotecnico@meccalte.es

U.S.A. and Canada

Mecc Alte Inc.
1229 Adam Drive
McHenry IL, 60051 (USA)
T: 815 344 0530
F: 815 344 0535
E: sales@meccalte.us

After sale service email:
sales@meccalte.us

Australia

Mecc Alte Alternators PTY LTD
10 Duncan Road, PO Box 1046
Dry Creek, 5094, South Australia
T: +61 (0)8 8349 8422
F: +61 (0)8 8349 8455
E: sales@meccalte.com.au

China

Mecc Alte Alternator Haimen LTD
755 Nanhai East Rd
Jiangsu HEDZ 226100 PRC
T: +86 0513 82325708
F: +86 0513 82325768
E: sales@meccalte.cn

www.meccalte.com