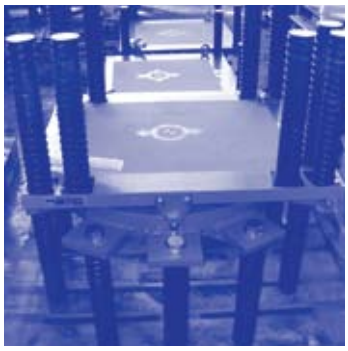
MK4

Innovative Solutions

POT bearings

POT bearings



INTRODUCTION

POT bearings are structural bearings which support vertical and horizontal loads and permit limited rotation around any horizontal axis and have therefore, an extremely wide range of applications.

They can be designed and manufactured for practically any load in a temperature range between -20ºC and 50ºC and have actually been tested for vertical loads up to 100.000 kN.

MK4 bearings are widely used in structural, marine and civil engineering applications, and particularly in bridges. Bearings are available in carbon steel as standard and in stainless steel for applications where corrosion is a potential problem.

MK4 bearings are designed to meet the requirements of the European Standard EN 1337-5 and have the qualification of the **CE mark**. Nevertheless, MK4 can also supply pot bearings complying with other standards, upon request.

MK4 POT bearings are available in three main types: type **PF** (Fixed), type **PG** or **PT** (longitudinally Guided sliding or Transversally guided sliding), and type **PM** (Multidirectional or free sliding). All three types allow rotation. Fixed bearings provide restraint in all horizontal directions. Guided bearings allow movement in one horizontal direction and provide restraint in the other direction. Free sliding bearings allow movement in all horizontal directions. All three types utilize a confined elastomeric principle which enables the product to support high pressures. The inherent properties of the confined elastomeric material allow it to shift much like a viscous liquid upon rotation, offering minimal resistance.

Special Bearings

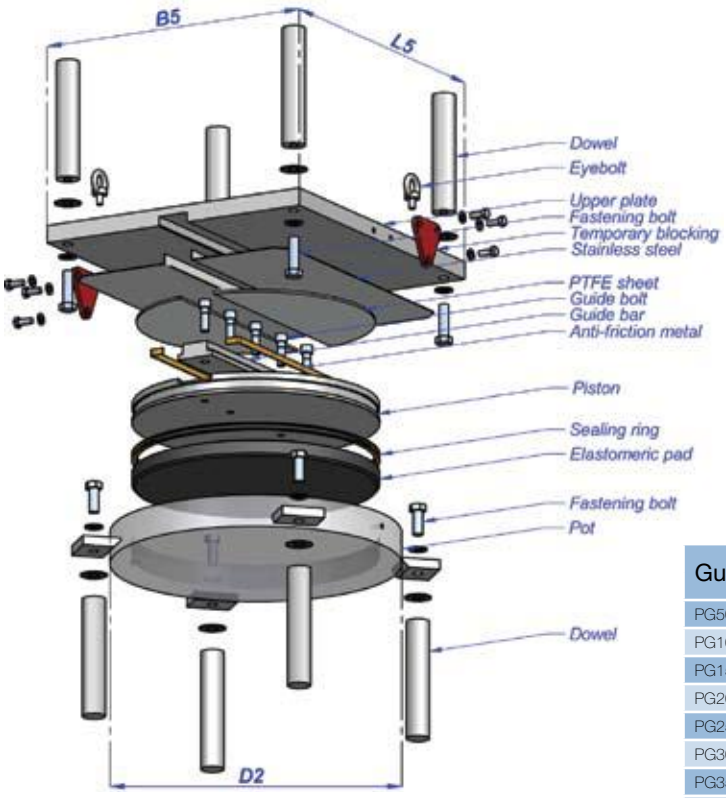
As well as traditional bearings capable of accommodating loads, movements and rotations for standard structures, MK4 is also well placed to provide customized solutions to suit specific requirements such as:

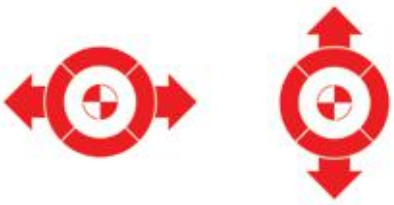
- Special bearings for Incremental Launching
- High rotation capacity
- Temporary restrictions of movement
- Temporary direction of movement
- High horizontal forces
- Anti seismic bearings
- Uplift bearings
- Shear Pins
- Special anchoring systems

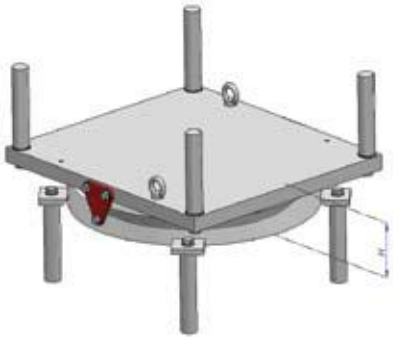
BEARING COMPONENTS AND TYPES

MK4 designs each bearing according to the Client specifications, such as Standard, Loads, top and bottom contact surfaces, etc. Nevertheless, the following tables define the general dimensions of bearings according to the EN 1337-5 considering a maximum concrete pressure of 25 N/mm^2 (SLS).

Guided bearing type PG or PT







PG8000 - Guided POT Bearing - 8000 kN
Maximum Vertical Load: 8000 kN (ULS)
Maximum Horizontal Load: 10% Vmax
Rotation: 0,01 rad (ULS)
Longitudinal Displacement: ±50 mm

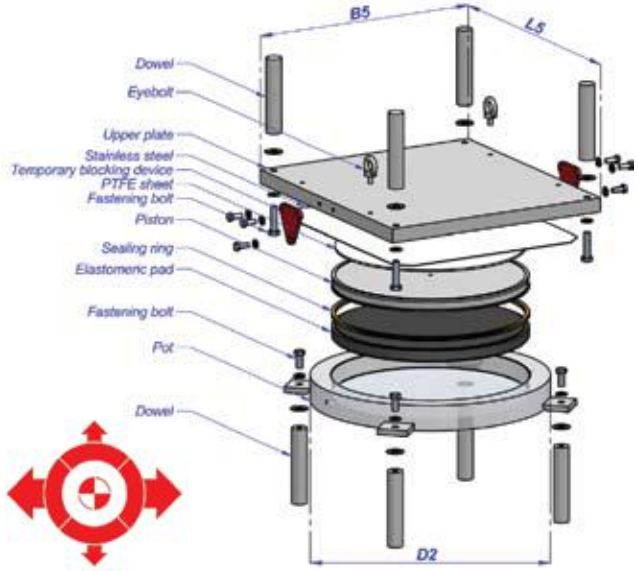
Guided	General dimensions (mm)				Weight
	D2	L5	B5	H	Kg
PG500	251	381	251	89	49
PG1000	271	401	271	89	55
PG1500	291	421	291	90	61
PG2000	324	451	324	94	74
PG2500	369	491	369	95	90
PG300	413	531	413	100	122
PG3500	421	531	421	100	125
PG4000	456	561	456	110	153
PG4500	488	591	488	110	169
PG5000	496	591	496	110	173
PG6000	534	621	534	115	207
PG7000	572	651	572	116	232
PG8000	606	681	606	128	297
PG9000	633	701	633	133	335
PG10000	661	721	661	133	358
PG12000	723	771	723	148	465
PG14000	775	811	775	151	560
PG16000	826	851	826	172	719
PG18000	875	891	875	173	790
PG20000	917	921	917	177	866
PG24000	1004	1004	1004	188	1088
PG28000	1075	1075	1075	209	1388
PG32000	1167	1167	1167	221	1703
PG36000	1232	1232	1232	234	2014
PG40000	1332	1332	1332	247	2432
PG45000	1443	1443	1443	260	3018
PG50000	1465	1465	1465	264	3155
PG55000	1554	1554	1554	292	3939
PG60000	1573	1573	1573	292	4045
PG65000	1681	1681	1681	303	4717
PG70000	1698	1698	1698	307	4878

Dimensions given in the tables are indicative.

The number following the type designation indicates the maximum vertical load (Ultimate Limit State), in kN.

BEARING COMPONENTS AND TYPES

Multidirectional bearing type PM

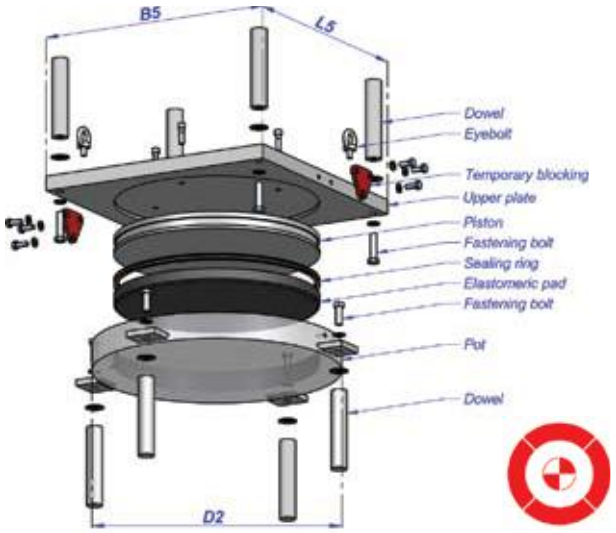


PM8000 - Multidirectional POT Bearing - 8000 kN
Maximum Vertical Load: 8000 kN (ULS)
Rotation: 0,01 rad (ULS)
Longitudinal Displacement: ±50 mm
Transversal Displacement: ±20 mm

Multidirectional	General dimensions (mm)				Weight
	D2	L5	B5	H	Kg
PM500	241	331	241	86	43
PM1000	291	381	291	86	57
PM1500	291	381	191	86	57
PM2000	361	451	361	91	84
PM2500	361	451	361	91	84
PM300	371	461	371	91	87
PM3500	401	491	401	92	99
PM4000	441	531	441	95	119
PM4500	441	531	441	95	119
PM5000	471	561	471	105	146
PM6000	501	591	501	105	161
PM7000	531	621	531	110	199
PM8000	561	651	561	110	216
PM9000	591	681	591	123	260
PM10000	611	701	611	128	292
PM12000	665	751	665	133	354
PM14000	732	811	732	143	445
PM16000	780	851	780	143	510
PM18000	827	891	827	153	617
PM20000	865	921	865	163	709
PM24000	949	991	949	163	824
PM28000	1017	1051	1017	186	1084
PM32000	1105	1131	1105	196	1313
PM36000	1167	1181	1167	196	1469
PM40000	1261	1271	1261	216	1887
PM45000	1307	1307	1307	216	2007
PM50000	1387	1387	1387	236	2491
PM55000	1475	1475	1475	267	3118
PM60000	1489	1489	1489	267	3186
PM65000	1594	1594	1594	287	3928
PM70000	1608	1608	1608	287	4047

Dimensions given in the tables are indicative.

Fixed bearing type PF



PF8000 - Fixed POT Bearing - 8000 kN
Maximum Vertical Load: 8000 kN (ULS)
Maximum Horizontal Load: 10% Vmax
Rotation: 0,01 rad (ULS)

Fixed	General dimensions (mm)				Weight
	D2	L5	B5	H	Kg
PF500	201	201	201	80	29
PF1000	251	251	251	80	40
PF1500	251	251	251	80	40
PF2000	323	323	323	85	61
PF2500	333	333	333	85	65
PF300	352	352	352	85	71
PF3500	385	385	385	89	86
PF4000	426	426	426	90	102
PF4500	434	434	434	90	106
PF5000	468	468	468	99	133
PF6000	507	507	507	99	153
PF7000	544	544	544	99	182
PF8000	582	582	582	105	219
PF9000	613	613	613	117	264
PF10000	641	641	641	117	285
PF12000	704	704	704	132	387
PF14000	772	772	772	137	476
PF16000	824	824	824	147	593
PF18000	873	873	873	157	708
PF20000	913	913	913	158	779
PF24000	1002	1002	1002	167	975
PF28000	1073	1073	1073	189	1274
PF32000	1164	1164	1164	199	1547
PF36000	1229	1229	1229	209	1860
PF40000	1329	1329	1329	219	2232
PF45000	1378	1378	1378	230	2554
PF50000	1461	1461	1461	240	2954
PF55000	1550	1550	1550	279	3849
PF60000	1568	1568	1568	279	3949
PF65000	1676	1676	1676	289	4597
PF70000	1693	1693	1693	289	4703

Dimensions given in the tables are indicative.

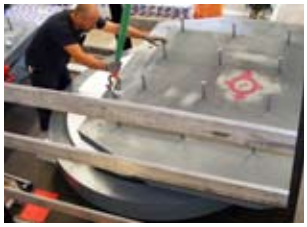
The number following the type designation indicates the maximum vertical load (Ultimate Limit State), in kN.

TECHNICAL SPECIFICATIONS

Materials

Unless specific instruction is given, the main standard materials used in the bearing fabrication are:

Pot, Piston and Upper plate: S355J2, S275J2, S355JR, S275JR (EN 10025).
Elastomeric pad: Natural Rubber according to AASHTO 50Sh±5, ISO6446.
PTFE pad: Pure polytetrafluorethylene with dimples.
Stainless steel: X5CrNiMo17.12.2 (1.4401) EN 10088-2.
DU metal: Composite material with bronze and PTFE
Lubricant: Silicon grease.
Sealing Ring: Brass ring.



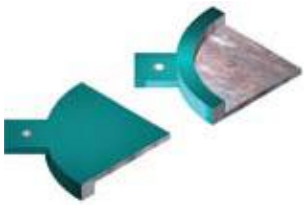
Corrosion protection

All bearing components are suitably protected against corrosion according to the requirements of Standard Specifications.

MK4 POT Bearings standard corrosion protection is provided by:

- Sandblasting SA 2.5. grade.
- Prime coating Epoxy zinc paint: 50 µm.
- Intermediary coating Epoxy paint: 80 µm.
- Final Coating Aliphatic Polyurethane paint: 50 µm.

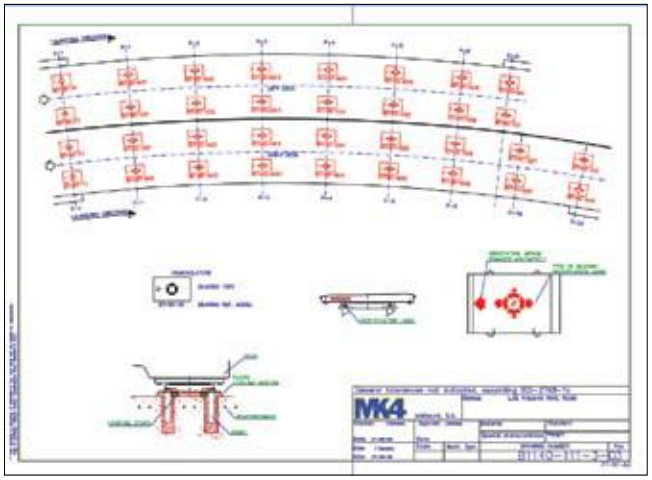
High performance corrosion protection (Metallization) is also provided upon request.



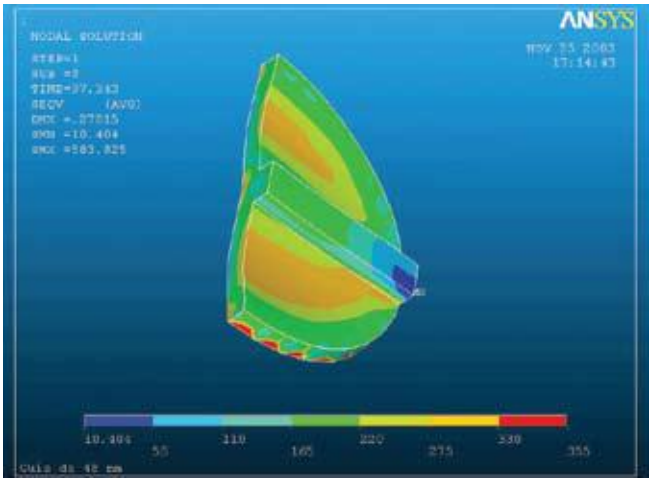
Labelling

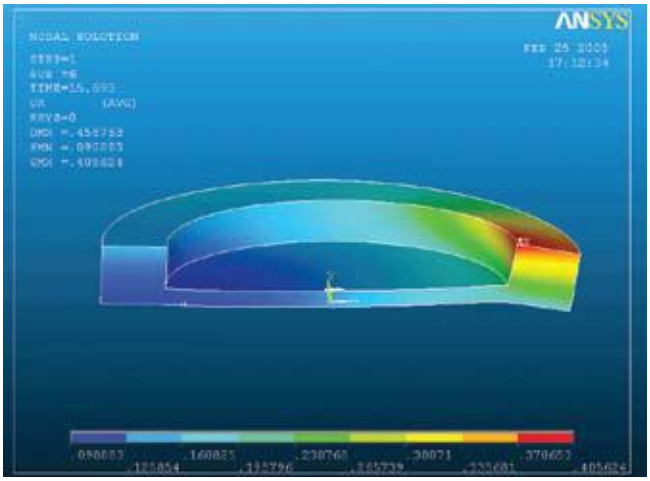
All MK4 bearings are supplied with a metal label, indicating all important bearing information and references for traceability.

In addition, a general drawing of the structure is supplied with the position and direction of each bearing to assist in the correct installation on site.



DESIGN PARAMETERS





The design of the MK4 Pot bearings is based on the latest technical developments in this area, and fully complies with the EN 1337-5. Our technical department can design each bearing to meet all conditions for a particular case, such as different Standard, construction method of the structure, etc.

In order to optimize the bearing size and calculations, it is advisable to provide us the following data:

Structure name or reference				TORREJÓN - SESEÑA VIADUCT				
Bearing identification mark				AB1	AB1	P1	P1	P2
Type of bearing (PF, PG, PM)				PF	PG	PM	PG	PG
Quantity				1	1	1	1	2
Seating material	Upper surface			concrete	concrete	concrete	concrete	concrete
	Lower surface			concrete	concrete	concrete	concrete	concrete
Average design contact pressure (MPa) (capacity of structure)	Upper surface		SLS	25	25	25	25	25
			ULS	30	30	30	30	30
	Lower surface		SLS	25	25	25	25	25
			ULS	30	30	30	30	30
Design load (kN)	Serviceability limit state (SLS)	Vertical	Maximum	8000	8000	22000	22000	20000
			Permanent	5600	5600	15000	15000	14000
			Minimum	4000	4000	11000	11000	10000
		Transversal		800	800	-	2200	2000
		Longitudinal		800	-	-	-	-
	Ultimate limit state (ULS)	Vertical		10400	10400	28600	28600	26000
		Transversal		1040	1040	-	2860	2600
		Longitudinal		1040	-	-	-	-
Displacement (mm)	Serviceability limit state (SLS)	Irreversible	Transversal					
			Longitudinal					
		Reversible	Transversal	0	0	20	0	0
			Longitudinal	0	50	50	50	50
	Ultimate limit state (ULS)	Irreversible	Transversal					
			Longitudinal					
		Reversible	Transversal	0	0	20	0	0
			Longitudinal	0	50	50	50	50
Rotation (radians)	Serviceability limit state (SLS)	Irreversible	Transversal					
			Longitudinal					
		Reversible	Transversal	0,015	0,015	0,015	0,015	0,015
			Longitudinal	0,015	0,015	0,015	0,015	0,015
	Ultimate limit state (ULS)	Total	Transversal	0,02	0,02	0,02	0,02	0,02
			Longitudinal	0,02	0,02	0,02	0,02	0,02
Maximum bearing dimensions (mm)	Upper surface		Transversal	800	800	1400	1400	1400
			Longitudinal	800	800	1400	1400	1400
	Lower surface		Transversal	750	750	1500	1500	1500
			Longitudinal	750	750	1500	1500	1500
	Overall height			250	250	250	250	250
Preset value for upper plate (PM and PG) (mm)				0	0	20	20	20

CE, QUALITY CONTROL AND TESTING

MK4 is always working on the design and production process in order to ensure that the bearings comply with the client requirements and to guarantee the achievement of optimum quality.

MK4 Quality System is certified according to the ISO 9001:2000.

MK4 POT bearings have the qualification of the **CE Mark**, which confirms that all bearings are manufactured in accordance with the EN 1337-5 Standard.

Testing

Full scale tests on bearings can be performed:

- Vertical load up to 100.000 kN.
- Combined Vertical and Horizontal Load.
- Rotation.
- Friction performance.
- Dynamic Loads.
- Behaviour under high and low temperature.


CERTIFICADO

CE

Núm. 0370-CPD-0758

CERTIFICADO DE CONFORMIDAD CE

APOYOS ESTRUCTURALES. PARTE 5: APOYOS "POT"

MEKANO4 S.A.
EDIFICIO HORIZON, 1A PLANTA , CTRA. RUBÍ, 72-74
08100 SANT CUGAT DEL VALLÈS (BARCELONA)

C/ FREDERICH W. BERTÖNER, 19
08100 MOLLET DEL VALLÈS (BARCELONA)

EN 1337-5:2005


DNV BUSINESS ASSURANCE

CERTIFICADO DEL SISTEMA DE GESTIÓN

(MANAGEMENT SYSTEM CERTIFICATE)

MEKANO4, S.A.

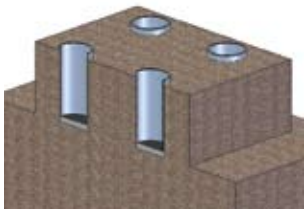
ISO 9001:2008

DISEÑO E INSTALACIÓN DE SISTEMAS DE POSTESADO Y SUS APLICACIONES ESPECIALES (TIRANTES DMK, PT EXTERIOR Y EXTRADOSADO;DISEÑO, FABRICACIÓN Y SUMINISTRO DE APOYOS POT.DISEÑO, FABRICACIÓN E INSTALACIÓN DE SOLUCIONES AVANZADAS TECNOLÓGICAMENTE DE ANCLAJES AL TERRENO CON CORDONES DE POSTESADO.

DESIGN AND INSTALLATION OF POST-TENSIONING AND SPECIFIC SOLUTIONS (DMK CABLE STAYS, EXTRADOSED AND EXTERNAL PT).DESIGN, MANUFACTURING AND SUPPLY OF POT BEARINGS.DESIGN, MANUFACTURING AND INSTALLATION OF TECHNICALLY ADVANCED GROUND ANCHORS WITH PT STRAND.

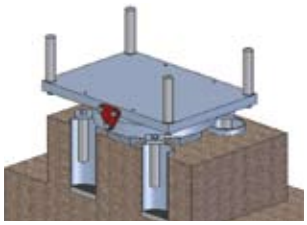
ENAC

SITE INSTALLATION



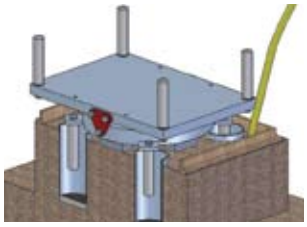
1. Preparation of the piers

Before concrete casting in piers/abutments, prepare recesses for bearing dowels using plastic ducts sealed at their lower point with cellulose caps. Ducts shall protrude to avoid any entrance of concrete during the casting operation.



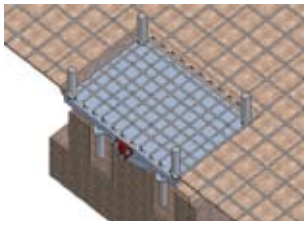
2. Placing in position and levelling the bearing

Place the bearing on its final position according to topography. It is very important to assure that the bearing is perfectly horizontal. For this operation, levelling coves or timber wedges can be used. Furthermore, there must be enough space between the duct which is housing the dowels and the bearing base, in order to allow the mortar to flow properly and make sure that the ducts are being completely filled up.



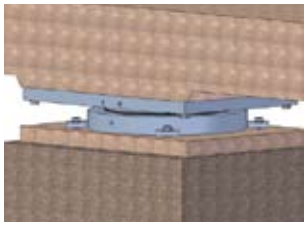
3. Mortar Filling

A small formwork for the plinth has to be built. High resistance self-levelling mortar shall be poured, vibrating if necessary, to assure the correct execution of the plinth.



4. Deck formwork and reinforcement

Deck formwork is placed embedding the upper dowels of the bearing. The corresponding bearing´s reinforcement steel should be positioned on the deck.



5. Removal of fastening accessories

Finally, after the concrete casting of the deck, the bearing has to be unlocked, removing the lateral fastening accessories and blocking device.

MK4
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SPAIN | POLAND | MIDDLE EAST | CHILE | BRASIL | COLOMBIA | PERU

MK4 Headquarter

Pol Ind. Can Nadal
Calle Can Nadal, Nave 1A-2
08185 Lliçà de Vall
Barcelona (Spain)

Tel. +34 93 579 59 00
Fax +34 93 570 60 03

mk4@mekano4.com

twitter @mekano4
www.mekano4.com

QUALITY SYSTEM CERTIFICATION ISO 9001 DNV

CE 0170-CPD-0708