

Specificații tehnice (F4.1)

[Acest tabel va fi completat de către ofertant în coloanele 3, 4, 5, 7, iar de către autoritatea contractantă – în coloanele 1, 2, 6, 8]

Numărul procedurii de achiziție [ocds-b3wdp1-MD-1597641030947](#) din 17.08.2020

Denumirea procedurii de achiziție: Echipament și utilaj de laborator pentru testarea materialelor de construcție în domeniul drumurilor

Coloană CPV	Denumirea bunurilor	Modelul articolului	Tara de origine	Produsul-cătorul	6	7	8			
1										
	<b>Lotul 1 Agregate</b>	A059-02 KIT	Italia	Matest	<p><b>Aparat de sitat</b></p> <ul style="list-style-type: none"> <li>- Pentru site cu d=200, 300 mm</li> <li>- Capacitate de cernere concomitentă 10 site și mai mare</li> <li>- Posibilitate de sitare umedă sau uscată</li> <li>- Panou de control digital cu microprocesor</li> <li>- Ajustare intensitate vibrații, tip de vibrare: continue sau intermetentă, pauză între vibrații</li> <li>- Cronometru</li> <li>- Miscare verticală, laterală, rotațională</li> </ul>	<p><b>Aparat de sitat</b></p> <ul style="list-style-type: none"> <li>- Pentru site cu d=200, 250, 300, 315 mm</li> <li>- Capacitate de cernere concomitentă 10 site</li> <li>- Posibilitate de sitare umedă sau uscată</li> <li>- Panou de control digital cu microprocesor</li> <li>- Ajustare intensitate vibrații, tip de vibrare: continue sau intermetentă, pauză între vibrații</li> <li>- Cronometru 0-999 minute</li> <li>- Miscare verticală, laterală, rotațională</li> <li>- Electromagnetic</li> <li>- Conform standard EN 932-5, ISO 3310-1</li> </ul>	<p><b>Vas cilindric</b></p> <ul style="list-style-type: none"> <li>- Din metal rezistent la coroziune. Raportul între diametrul interior și adâncime</li> </ul>	<p><b>Vas cilindric</b></p> <ul style="list-style-type: none"> <li>- Din Otel rezistent la coroziune. Raportul între diametrul interior și adâncime</li> </ul>	<p>Echipamente auxiliare, EN 932-5, ISO 3310-1</p>	<p>En 1097-3</p>
38000000-5										

			<p>trebuie să fie 0,5 și 0,8.</p> <p>Cu capacitate de :</p> <ol style="list-style-type: none"> <li>1. 1,0 litri;</li> <li>2. 5,0 litri;</li> <li>3. 10 litri</li> <li>4. 20 litri</li> </ol>	<p>este de 0,5 și 0,8.</p> <p>- Conform cu EN 1097-3, EN932-5</p> <p>Cu capacitate de :</p> <ol style="list-style-type: none"> <li>1. 1,0 litri;</li> <li>2. 5,0 litri;</li> <li>3. 10 litri</li> <li>4. 20 litri</li> </ol>	EN 932-5
A069 A069-01 A069-02 A069-03	Italia	Matest	<p><b>Difuzor cu jgheburii de capacitate mare</b></p> <ul style="list-style-type: none"> <li>- Posibilitatea divizării agregatelor de dimensiuni mici (nisp) până la agregate mari</li> <li>- Dotat cu bare reglabile de o anumită lățime care ar permite divizarea agregatelor de diferite sorturi</li> <li>- Dotat cu 2 tavi de colectare a agregatului Divizat</li> </ul>	<p><b>Difuzor cu jgheburii de capacitate mare</b></p> <ul style="list-style-type: none"> <li>- Divizarea agregatelor de dimensiuni mici (nisp) până la agregate mari</li> <li>- Dotat cu bare reglabile de o anumită lățime care ar permite divizarea agregatelor de diferite sorturi</li> <li>- Dotat cu 2 tavi de colectare a agregatului divizat</li> <li>- Capacitate de 30 de litri</li> <li>-Conform cu EN 932-1, 932-5, 933-3</li> </ul>	EN 932-1 En 932-5
A068	Italia	Matest	<p><b>Site pentru cernerea agregatelor</b></p> <ul style="list-style-type: none"> <li>- Diametrul sitelor 300 mm</li> <li>- Alcătuite din țesătură/metal cu diametrul ochilor de, mm: <ul style="list-style-type: none"> <li>• 11,2</li> <li>• 0,8;</li> <li>• 0,63;</li> <li>• 0,50;</li> <li>• 0,40;</li> <li>• 0,315;</li> <li>• 0,250;</li> <li>• 0,2;</li> </ul> </li> </ul>	<p><b>Site pentru cernerea agregatelor</b></p> <ul style="list-style-type: none"> <li>- Diametrul sitelor 300 mm</li> <li>- Alcătuite din țesătură/metal cu diametrul ochilor de, mm: <ul style="list-style-type: none"> <li>• 11,2</li> <li>• 0,8;</li> <li>• 0,63;</li> <li>• 0,50;</li> <li>• 0,40;</li> <li>• 0,315;</li> <li>• 0,250;</li> <li>• 0,2;</li> </ul> </li> </ul>	EN 933-1 EN 932-5 ISO 3310-1
A053-...	Italia	Matest			

				<ul style="list-style-type: none"> <li>• 0,16;</li> <li>• 0,125;</li> <li>• 0,1;</li> <li>• 0,08;</li> <li>• 0,063</li> </ul>	<ul style="list-style-type: none"> <li>• 0,16;</li> <li>• 0,125;</li> <li>• 0,1;</li> <li>• 0,08;</li> <li>• 0,063</li> </ul>		
				<p><b>Site pentru cernerea agregatelor</b></p> <ul style="list-style-type: none"> <li>- Diametrul sitelor 200 mm</li> <li>- Diametrul exterior împreună cu grosimea pereților &lt; 210 mm</li> <li>- Posibilitatea utilizării la sitarea umedă și asamblarea cu garnituri</li> <li>- Garnitură de cauciuc pentru fiecare sită</li> <li>- Diametrul ochiurilor de, mm: <ul style="list-style-type: none"> <li>• 22,4;</li> <li>• 16;</li> <li>• 11,2;</li> <li>• 8; 4; 2;</li> <li>• 0,125;</li> <li>• 0,063</li> </ul> </li> </ul>	<p><b>Site pentru cernerea agregatelor</b></p> <ul style="list-style-type: none"> <li>- Diametrul sitelor 200 mm</li> <li>- Diametrul exterior împreună cu grosimea pereților &lt; 210 mm</li> <li>- Utilizare la sitarea umedă și asamblarea cu garnituri</li> <li>- Garnitură de cauciuc pentru fiecare sită</li> <li>- Diametrul ochiurilor de, mm: <ul style="list-style-type: none"> <li>• 22,4;</li> <li>• 16;</li> <li>• 11,2;</li> <li>• 8; 4; 2;</li> <li>• 0,125;</li> <li>• 0,063</li> </ul> </li> </ul> <p>Conform cu standardele de referință</p>	EN 933-1 EN 932-5	ISO 3310-1 EN 933-1 EN 932-5
A031-...	Italia	Matest		<p><b>Site pentru sitarea umedă</b></p> <ul style="list-style-type: none"> <li>- Dimetrul sitei 200mm și înălțimea 200 mm</li> <li>- Diametrul ochiului: 0,063 mm</li> </ul>	<p><b>Site pentru sitarea umedă</b></p> <ul style="list-style-type: none"> <li>- Dimetrul sitei 200mm și înălțimea 200 mm</li> <li>- Diametrul ochiului: 0,063 mm</li> </ul> <p>Conform cu standardele de referință</p>		
A045-02	Italia	Matest		<p><b>Set de capac și colector pentru sitarea umedă</b></p> <ul style="list-style-type: none"> <li>- Diametrul capacului și colectorului de 200 mm și 10 garnituri de cauciuc</li> <li>- Diametrul capacului și colectorului de</li> </ul>	<p><b>Set de capac și colector pentru sitarea umedă</b></p> <ul style="list-style-type: none"> <li>- Diametrul capacului și colectorului de 200 mm și 10 garnituri de cauciuc</li> <li>- Diametrul capacului și colectorului de</li> </ul>	EN 933-1 EN 932-5	
A046 A047	Italia	Matest					

				<ul style="list-style-type: none"> <li>- 300 mm și 10 garnituri de cauciuc</li> </ul>	<ul style="list-style-type: none"> <li>- 300 mm și 10 garnituri de cauciuc Conform cu standardele de referinta</li> </ul>		
				<ul style="list-style-type: none"> <li>- <b>Aparat indexul de curgere</b></li> <li>- Corp din aluminiu diametru 90 mm cu înălțime 125 mm</li> <li>- Buncăr de alimentare din aluminiu 100 mm dia. cu înălțimea de 170 mm</li> <li>- Obturator de control</li> <li>- Pâlnie din polycarbonat având înălțimea de 85 mm, partea conică de 60 ° , care are un capăt de 12 mm</li> <li>- Suport de bază</li> <li>- Supapă</li> <li>- Decantor.</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Aparat indexul de curgere</b></li> <li>- Corp din aluminiu diametru 90 mm cu înălțime 125 mm</li> <li>- Buncăr de alimentare din aluminiu 100 mm dia. cu înălțimea de 170 mm</li> <li>- Obturator de control</li> <li>- Pâlnie din polycarbonat având înălțimea de 85 mm, partea conică de 60 ° , care are un capăt de 12 mm</li> <li>- Suport de bază</li> <li>- Supapă</li> <li>- Decantor.</li> </ul> <p>Conform cu standardele de referinta</p>	EN 933-6	
A073N	Italia	Matest	<ul style="list-style-type: none"> <li>- <b>Aparat compactare filer</b></li> <li>- cilindru cu diametrul interior 25,4 mm;</li> <li>- plungerul glisant liber în cilindru cu max. joc lateral de 0,20 ± 0,05 mm;</li> <li>- patru coloane și bază metalică care ține întregul.</li> <li>- Set de 100 bucăți hîrtie de filtru cu diametrul de 25 mm</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Aparat compactare filer</b></li> <li>- cilindru cu diametrul interior 25,4 mm;</li> <li>- plungerul glisant liber în cilindru cu max. joc lateral de 0,20 ± 0,05 mm;</li> <li>- patru coloane și bază metalică care ține întregul.</li> <li>- Set de 100 bucăți hîrtie de filtru cu diametrul de 25 mm</li> </ul> <p>Conform cu standardele de referinta</p>	EN 1097-4 EN 932-5		
A124 A124-01	Italia	Matest	<ul style="list-style-type: none"> <li>- <b>Coș de sîrmă/recipient perforat</b></li> <li>- Dimetrul coșului și înălțimea lui max 200mm</li> <li>- Confectionat din material rezistent la Corozione</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Coș de sîrmă/recipient perforat</b></li> <li>- Dimetrul coșului și înălțimea lui max 200mm</li> <li>- Confectionat din otel inoxidabil rezistent la Corozione</li> </ul> <p>Conform cu standardele de referinta</p>	EN 1097-6 EN 932-5		
V041	Italia	Matest					

V085	Italia	Matest	
S148 S147 V108-01	Italia	Matest	
	<p><b>Cadru gravitațional specific</b></p> <ul style="list-style-type: none"> <li>- Folosit pentru determinarea gravitațională specifică a betonului, agregate etc. Pentru a fi utilizat cu o balanță electronică adecvată dotată cu o instalație sub cârlig.</li> <li>- Cadru robust din oțel realizat, încorporează pe partea sa inferioară o platformă reglabilă în înălțime, ținând un recipient cu apă și permițând testul de densitate specifică.</li> </ul>	<p><b>Cadru gravitațional specific</b></p> <ul style="list-style-type: none"> <li>- Folosit pentru determinarea gravitațională specifică a betonului, agregate etc. Pentru a fi utilizat cu o balanță electronică adecvată dotată cu o instalație sub cârlig.</li> <li>- Cadru robust din oțel realizat, încorporează pe partea sa inferioară o platformă reglabilă în înălțime, ținând un recipient cu apă și permițând testul de densitate specifică.</li> </ul> <p>Conform cu standardele de referință</p>	<p>EN 12497-6 EN 12497-7 EN 13108</p>
<p><b>Mai și con pentru determinarea absorbției nisipului</b></p> <p><b>Picnometru conic Sticle gay Lussac 50 ml</b></p> <ol style="list-style-type: none"> <li>1. Tipar metalic, în forma de trunchi de con de <math>(40 \pm 3)</math> mm diametru la partea superioară, de <math>(90 \pm 3)</math> mm, la baza și de <math>(75 \pm 3)</math> mm înaltime. Metalul trebuie sa aiba o grosime minima de 0,8 mm.</li> <li>2. Mai metalic, cu masa de <math>(340 \pm 15)</math> g, cu o fata de îndesare plata de <math>(25 \pm 3)</math> mm diametru, pentru utilizare în tiparul metalic.</li> <li>3. Palmie, de sticla obișnuita (putand înlocui tiparul și maiul metalic).</li> <li>4. Picnometru conic folosit pentru determinarea gravitației specifice și a absorbției apei a nisipurilor și a agregatelor fine. Borcan de sticlă cu con de aluminiu și sigiliu de cauciuc, capacitate: 1 kg</li> <li>5. Sticle gay lussac 50 ml din sticlă Pyrex și completată cu c</li> </ol>	<p><b>Mai și con pentru determinarea absorbției nisipului</b></p> <p><b>Picnometru conic Sticle gay Lussac 50 ml</b></p> <ol style="list-style-type: none"> <li>1. Tipar metalic, în forma de trunchi de con de <math>(40 \pm 3)</math> mm diametru la partea superioara, de <math>(90 \pm 3)</math> mm, la baza și de <math>(75 \pm 3)</math> mm înaltime. Metalul are o grosime minima de 0,8 mm.</li> <li>2. Mai metalic, cu masa de <math>(340 \pm 15)</math> g, cu o fata de îndesare plata de <math>(25 \pm 3)</math> mm diametru, pentru utilizare în tiparul metalic.</li> <li>3. Palmie, de sticla obișnuita (putand înlocui tiparul și maiul metalic).</li> <li>4. Picnometru conic folosit pentru determinarea gravitației specifice și a absorbției apei a nisipurilor și a agregatelor fine. Borcan de sticlă cu con de aluminiu și sigiliu de cauciuc, capacitate: 1 kg</li> </ol> <p>completată cu c</p>	<p>EN 1097-6 EN 1097-7</p>	

			Este utilizat pentru a determina gravitatea și densitatea specifică a solurilor fine și a materialului de umplere în agregate fine, capacitate 50 ml.	Este utilizat pentru a determina gravitatea și densitatea specifică a solurilor fine și a materialului de umplere în agregate fine, capacitate 50 ml. Conform cu standardele de referința	
V105-...	Italia	Matest	<p><b>Picnometre</b></p> <ul style="list-style-type: none"> <li>- Confectionate din sticlă borosilicată</li> <li>- Complet cu tub capilar, dop și pânză, utilizat pentru a determina golurile și densitatea în vrac a agregatelor</li> <li>- Cu capacitaeta de <ul style="list-style-type: none"> <li>• 500 ml,</li> <li>• 1000ml,</li> <li>• 2000ml</li> </ul> </li> </ul>	<p><b>Picnometre</b></p> <ul style="list-style-type: none"> <li>- Confectionate din sticlă borosilicată</li> <li>- Complet cu tub capilar, dop și pânză, utilizat pentru a determina golurile și densitatea în vrac a agregatelor</li> <li>- Cu capacitaeta de <ul style="list-style-type: none"> <li>• 500 ml,</li> <li>• 1000ml,</li> <li>• 2000ml</li> </ul> </li> </ul> <p>Conform cu standardele de referința</p>	EN 1097-6 EN 932-5
A040-01	Italia	Matest	<p><b>Excicator de vid</b></p> <ul style="list-style-type: none"> <li>- Confectionat din sticlă borosilicată</li> <li>- Dotat cu capac și robinet pentru conectarea la aparatul de vid</li> </ul>	<p><b>Excicator de vid</b></p> <ul style="list-style-type: none"> <li>- Confectionat din sticlă borosilicată</li> <li>- Dotat cu capac și robinet pentru conectarea la aparatul de vid</li> </ul> <p>Conform cu standardele de referința</p>	EN 1097-7
V172-05	Italia	Matest	<p><b>Densimetru</b></p> <ul style="list-style-type: none"> <li>- Calibrat la 20 oC</li> <li>- domeniul 1200 - 1300 g / ml.,</li> <li>- Precizie 0,001 g / ml</li> </ul>	<p><b>Densimetru</b></p> <ul style="list-style-type: none"> <li>- Calibrat la 20 oC</li> <li>- domeniul 1200 - 1300 g / ml.,</li> <li>- Precizie 0,001 g / ml</li> </ul> <p>Conform cu standardele de referința</p>	EN 1367-2 Iso 649-1
A103...	Italia	Matest	<p><b>Coș de densitate</b></p> <ul style="list-style-type: none"> <li>• Coș, plasă din oțel inoxidabil, Ø 120 mm x 160 mm înălțime, deschidere 3,35 mm</li> <li>• Coș, plasă din oțel inoxidabil,</li> </ul>	<p><b>Coș de densitate</b></p> <ul style="list-style-type: none"> <li>• Coș, plasă din oțel inoxidabil, Ø 120 mm x 160 mm înălțime, deschidere 3,35 mm</li> <li>• Coș, plasă din oțel inoxidabil,</li> </ul>	EN 1367-2 Iso 649-1

				<ul style="list-style-type: none"> <li>• Ø 95 mm x 120 mm înălțime, deschidere 1,18 mm</li> <li>• Coș, plasă din oțel inoxidabil, Ø 95 mm x 120 mm înălțime, deschidere de 0.600 mm</li> <li>• Coș, plasă din oțel inoxidabil, Ø 65 mm x 80 mm înălțime, deschidere 0.150 mm</li> <li>• Container etanș cu capacitatea de 5 litri</li> </ul>	<ul style="list-style-type: none"> <li>• Ø 95 mm x 120 mm înălțime, deschidere 1,18 mm</li> <li>• *Coș, plasă din oțel inoxidabil, Ø 95 mm x 120 mm înălțime, deschidere de 0.600 mm</li> <li>• *Coș, plasă din oțel inoxidabil, Ø 65 mm x 80 mm înălțime, deschidere 0.150 mm</li> <li>• *Container etanș cu capacitatea de 5 litri Conform cu standardele de referința</li> </ul>	
A058-05N	Italia	Matest	<p><b>Mașină de cernut cu jet de aer</b></p> <ul style="list-style-type: none"> <li>- echipat cu un sistem de curățare automată a cartușului de filtrare care permite efectuarea multor teste (câteva zeci) înainte de a fi înlocuit.</li> <li>- Dispozitiv aspirator, capac din plexiglas, cartuș filtru, 5 pungă de colectare din plastic, accesorii.</li> <li>- Panoul digital de microprocesor poate ajusta:</li> <li>- timp de setare de la 0 la 99 minute</li> <li>- intervalul de vid de la 0 la 65 bar</li> <li>- funcția de calibrare</li> </ul>	<p><b>Mașină de cernut cu jet de aer</b></p> <ul style="list-style-type: none"> <li>- echipat cu un sistem de curățare automată a cartușului de filtrare care permite efectuarea multor teste (câteva zeci) înainte de a fi înlocuit.</li> <li>- Dispozitiv aspirator, capac din plexiglas, cartuș filtru, 5 pungă de colectare din plastic, accesorii.</li> <li>- Panoul digital de microprocesor poate ajusta:</li> <li>- timp de setare de la 0 la 99 minute</li> <li>- intervalul de vid de la 0 la 65 bar</li> <li>- funcția de calibrare</li> </ul> <p>Conform cu standardele de referința</p>	EN 1097-4 EN 932-5	
S160-01N	Italia	Matest	<p><b>Agitator motorizat pentru testul la echivalențului de nisip</b></p> <ul style="list-style-type: none"> <li>- capabila sa imprime cilindrului o mișcare orizontală, rectilinie, periodică și sinusoidală cu o cursa de (200 ± 1 O) mm și cu o frecvența de o treime de secunda</li> </ul>	<p><b>Agitator motorizat pentru testul la echivalențului de nisip</b></p> <ul style="list-style-type: none"> <li>- Imprima cilindrului o mișcare orizontală, rectilinie, periodică și sinusoidală cu o cursa de (200 ± 1 O) mm și cu o frecvența de o treime de secunda</li> </ul>	EN 933-8	

		A128N	Italia	Matest	<p>- Dotat cu cronometru digital</p> <p>- Dulap de siguranță pentru partea oscilantă</p> <p><b>Masina de polisaj accelerat</b></p> <p>Măsoară rezistența agregatelor rutiere, pavaj, blocuri de pavaj, la acțiunea de lustruire a anvelopelor vehiculului pe o suprafață a drumului. Roata intră în contact cu o anvelopă din cauciuc solid, încărcată cu arc.</p> <p>Sarcinile abrazive sunt introduse continuu de două alimentatoare mecanice automate (buncăruri). Alimentatoarele sunt ținute de un suport adecvat decupat de corpul mașinii; Viteza roții rutiere: 310 până la 330 rpm</p> <p>Apa este furnizată la o viteză controlată printr-un recipient de apă echipat cu regulator de debit.</p> <p>Panoul de control digital, prevăzută în partea din spate a mașinii, permite selectarea timpului de testare. În timpul execuției testului, afișajul arată timpul rămas și rotația de viteză a roții care ține probele.</p> <p>Unitatea trebuie livrată complet cu 2 roți de cauciuc set de 4 matrite și 2 capace.</p>	<p>- Dotat cu cronometru digital</p> <p>- Carcasa de siguranță pentru partea oscilantă Conform cu standardele de referința</p> <p><b>Masina de polisaj accelerat</b></p> <p>Măsoară rezistența agregatelor rutiere, pavaj, blocuri de pavaj, la acțiunea de lustruire a anvelopelor vehiculului pe o suprafață a drumului. Roata intră în contact cu o anvelopă din cauciuc solid, încărcată cu arc.</p> <p>Sarcinile abrazive sunt introduse continuu de două alimentatoare mecanice automate (buncăruri). Alimentatoarele sunt ținute de un suport adecvat decupat de corpul mașinii; Viteza roții rutiere: 310 până la 330 rpm</p> <p>Apa este furnizată la o viteză controlată printr-un recipient de apă echipat cu regulator de debit.</p> <p>Panoul de control digital, prevăzută în partea din spate a mașinii, permite selectarea timpului de testare. În timpul execuției testului, afișajul arată timpul rămas și rotația de viteză a roții care ține probele.</p> <p>Unitatea este livrată complet cu 2 roți de cauciuc set de 4 matrite și 2 capace.</p> <p>Conform cu standardele de referința</p>	<p>EN 1097-8 EN 1341 EN 1342 EN 1343</p>
38000000-5	Lot II Lianți organici	TSQ 2	Italia	Matest	<p><b>Aparat pentru determinarea solubilității</b></p> <p>1. Creuzet Gooch complet cu pânze și inel de cauciuc</p> <p>2. Flacon filtrant cu capacitate de 500 ml cu dop de cauciuc</p> <p>3. Discuri din fibra de sticla filtru Whatman,</p>	<p><b>Aparat pentru determinarea solubilității</b></p> <p>4. Creuzet Gooch complet cu pânze și inel de cauciuc</p> <p>5. Flacon filtrant cu capacitate de 500 ml cu dop de cauciuc</p> <p>6. Discuri din fibra de sticla filtru Whatman,</p>	<p>EN 12592</p>



	25 mm ø (pachet de minim 100 buc)				25 mm ø (pachet de minim 100 buc)	
	<b>Tester cleveland pentru punctul de aprindere și ardere</b>				<b>Tester cleveland pentru punctul de aprindere și ardere</b>	
	<ul style="list-style-type: none"> <li>• cupă de alamă</li> <li>• termometru</li> <li>• încălzitor electric cu termoregulator</li> <li>• dispozitiv de ardere gaz</li> </ul>				<ul style="list-style-type: none"> <li>• cupă de alamă</li> <li>• termometru</li> <li>• încălzitor electric cu termoregulator</li> <li>• dispozitiv de ardere gaz</li> </ul>	EN
	<b>Balanță digitală</b>				<b>Balanță digitală</b>	
	<ul style="list-style-type: none"> <li>- posibilitate de cîntărire hidrostatică (cărlig inclus)</li> <li>- Rezoluția de citire a indicațiilor 0,001g</li> <li>- Acuratețea/toleranța ±0,005 g</li> <li>- Certificat de calibrare</li> </ul>				<ul style="list-style-type: none"> <li>- Cîntărire hidrostatică (cărlig inclus)</li> <li>- Rezoluția de citire a indicațiilor 0,001g</li> <li>- Acuratețea/toleranța ±0,005 g</li> <li>- Certificat de calibrare</li> </ul>	EN 932-5
	<b>Aparat pentru determinarea apei în emulsiile bituminose</b>				<b>Aparat pentru determinarea apei în emulsiile bituminose</b>	
	<ul style="list-style-type: none"> <li>• Balon de sticlă 500 ml</li> <li>• Receptor de sticlă capacitate de 25 ml cu gradatiile de 0,1 ml.</li> <li>• Condensator de reflux din sticlă</li> <li>• Incalzitor electric cu termoregulator</li> </ul>				<ul style="list-style-type: none"> <li>• Balon de sticlă 500 ml</li> <li>• Receptor de sticlă capacitate de 25 ml cu gradatiile de 0,1 ml.</li> <li>• Condensator de reflux din sticlă</li> <li>• Incalzitor electric cu termoregulator</li> </ul>	EN 1428 EN 12847
	<b>Aparat pentru distilarea emulsiilor bituminose</b>				<b>Aparat pentru distilarea emulsiilor bituminose</b>	
	<ul style="list-style-type: none"> <li>- Aparat trebuie să fie alcătuit din aliaj de aluminiu sau de oțel, cu înălțimea de (241 ± 5) mm, diametrul exterior de (101 ± 1) mm, grosimea peretilor de (3,2 ± 0,2) mm și cu un</li> <li>- arzător inelar cu diametrul interior de (125 ± 5) mm, cu orificii pe circumferința</li> </ul>				<ul style="list-style-type: none"> <li>- Este alcătuit din aliaj de aluminiu sau de oțel, cu înălțimea de (241 ± 5) mm, diametrul exterior de (101 ± 1) mm, grosimea peretilor de (3,2 ± 0,2) mm și cu un</li> <li>- arzător inelar cu diametrul interior de (125 ± 5) mm, cu orificii pe circumferința</li> </ul>	EN 1431

	<p>interioara și cu trei ghidaje de poziționare, care sa permita centrarea arzatorului in jurul aparatului de distilare</p> <ul style="list-style-type: none"> <li>- Un capac cu dimensiuni corespunzatoare, care sa permita introducerea a doua termometre printr-un dop și un orificiu de ieșire cu diametru corespunzator, care sa permita conectarea unui tub de legatura tot prin dop.</li> <li>- Aparaturi de legaturi, constand dintr-un tub de legatura din sticla, cu diametrul de (12 ± 1) mm, o protectie de staniu și un tub refrigerant de sticla standard, racit cu apa, cu manta metalica sau de sticla borosilicatica</li> <li>- Cilindru gradat, de 100 ml, cu gradatiile la intervale de 0,5 ml, conform ISO 4788</li> <li>- Doua termometre pentru distilare la temperatura joasa, gradate in grade Celsius, 300 °C.</li> <li>- Bec de gaz Bunsen sau un mijloc de incalzire echivalent</li> </ul>	<p>interioara și cu trei ghidaje de poziționare, care sa permita centrarea arzatorului in jurul aparatului de distilare</p> <ul style="list-style-type: none"> <li>- Un capac cu dimensiuni corespunzatoare, care sa permita introducerea a doua termometre printr-un dop și un orificiu de ieșire cu diametru corespunzator, care sa permita conectarea unui tub de legatura tot prin dop.</li> <li>- Aparaturi de legaturi, constand dintr-un tub de legatura din sticla, cu diametrul de (12 ± 1) mm, o protectie de staniu și un tub refrigerant de sticla standard, racit cu apa, cu manta metalica sau de sticla borosilicatica</li> <li>- Cilindru gradat, de 100 ml, cu gradatiile la intervale de 0,5 ml, conform ISO 4788</li> <li>- Doua termometre pentru distilare la temperatura joasa, gradate in grade Celsius, 300 °C.</li> <li>- Bec de gaz Bunsen sau un mijloc de incalzire echivalent</li> </ul>	
	<p><b>Etuvă RTFOI</b></p> <ul style="list-style-type: none"> <li>- Cadrul și camera interioară realizate din oțel inoxidabil de înaltă calitate.</li> <li>- panou digital cu ecran tactil pornirea și oprirea sistemului de rotație și ventilație a cămării</li> <li>- La începerea testului, pe afișajul digital trebuie afișate în timp real temperatura camerei (rpm ± 0,2).</li> </ul>	<p><b>Etuvă RTFOI</b></p> <ul style="list-style-type: none"> <li>- Cadrul și camera interioară realizate din oțel inoxidabil de înaltă calitate.</li> <li>- panou digital cu ecran tactil pornirea și oprirea sistemului de rotație și ventilație a cămării</li> <li>- La începerea testului, pe afișajul digital trebuie afișate în timp real temperatura camerei (rpm ± 0,2).</li> </ul>	<p>EN 12607-1</p>



				<p><b>Cilindru cu tuburi laterale</b></p> <ul style="list-style-type: none"> <li>- Cilindrul are o capacitate de 600 ml, este marcat la 500 ml și sunt prevăzute două tuburi laterale</li> </ul>	<p><b>Cilindru cu tuburi laterale</b></p> <ul style="list-style-type: none"> <li>- Cilindrul are o capacitate de 600 ml, este marcat la 500 ml și sunt prevăzute două tuburi laterale</li> </ul>	EN 12847
				<p><b>Corotiera</b></p> <ul style="list-style-type: none"> <li>- Puterea nominală de la 12,5 CP</li> <li>- Dimaterul probei extrase pîna la 200mm</li> <li>- Extragere verticală</li> <li>- Platformă mobilă cu regulator de adîncime pentru pentru carota extrasă</li> <li>- Tip combustibil: benzină</li> </ul>	<p><b>Corotiera</b></p> <ul style="list-style-type: none"> <li>- Puterea nominală de la 12,5 CP</li> <li>- Dimaterul probei extrase pîna la 200mm</li> <li>- Extragere verticală</li> <li>- Platformă mobilă cu regulator de adîncime pentru pentru carota extrasă</li> <li>- Tip combustibil: benzină</li> </ul>	Echipam ent auxiliar
				<p><b>Balanță digitală</b></p> <ul style="list-style-type: none"> <li>- posibilitate de cîntărire hidrostatică (cărlig inclus)</li> <li>- Rezoluția de citire a indicațiilor 0,01g</li> <li>- Acuratețea/toleranța ±0,01 g</li> <li>- Certificat de calibrare</li> </ul>	<p><b>Balanță digitală</b></p> <ul style="list-style-type: none"> <li>- Cîntărire hidrostatică (cărlig inclus)</li> <li>- Rezoluția de citire a indicațiilor 0,01g</li> <li>- Acuratețea/toleranța ±0,01 g</li> <li>- Certificat de calibrare</li> </ul>	EN932- 5
				<p><b>Mașina de rulare a sticlelor</b></p> <ul style="list-style-type: none"> <li>- Viteza de rotație reglabilă de la 0 până la 85 rpm. Mașina poate rula până la 3 sticle în același timp. Cronometru 0 - 99 ore pentru a efectua complet ciclul de testare.</li> <li>- Alimentare: 230V 50-60Hz</li> <li>- Accesorii:</li> <li>1. 9 sticle cu capacitatea de 500 ml</li> <li>2. Tije de sticlă (3 buc)</li> </ul>	<p><b>Mașina de rulare a sticlelor</b></p> <ul style="list-style-type: none"> <li>- Viteza de rotație reglabilă de la 0 până la 85 rpm. Mașina poate rula până la 3 sticle în același timp. Cronometru 0 - 99 ore pentru a efectua complet ciclul de testare.</li> <li>- Alimentare: 230V 50-60Hz</li> <li>- Accesorii:</li> <li>1. 9 sticle cu capacitatea de 500 ml</li> <li>2. Tije de sticlă (3 buc)</li> </ul>	EN 12697- 11
				<p><b>Malaxor pentru mixturi asfaltice</b></p> <ul style="list-style-type: none"> <li>- Capacitatea de cel puțin 20 litri</li> <li>- Bol, oțel inoxidabil, capacitate 20 litri</li> <li>- Cronometru pentru selectarea timpului</li> </ul>	<p><b>Malaxor pentru mixturi asfaltice</b></p> <ul style="list-style-type: none"> <li>- Capacitatea de 20 litri</li> <li>- Bol, oțel inoxidabil, capacitate 20 litri</li> <li>- Cronometru pentru selectarea timpului</li> </ul>	EN 12697- 35
38000000-5			<p>Lot III Betón asfaltic</p>	TSQ 3	Italia	Matest

				<p>de malaxare</p> <ul style="list-style-type: none"> <li>- Paletă standard pentru malaxarea mixturilor asfaltice</li> <li>- Paletă cărlig și spirală pentru alte tipuri de material</li> </ul>	<p>de malaxare</p> <ul style="list-style-type: none"> <li>- Paletă standard pentru malaxarea mixturilor asfaltice</li> <li>- Paletă cărlig și spirală pentru alte tipuri de material</li> </ul>		
				<p><b>Cameră climatică</b></p> <ul style="list-style-type: none"> <li>- Ventilație internă</li> <li>- Capacitate ≥500 litri</li> <li>- Controler de temperatură/umiditate cu microprocesor cu mai multe segmente cu cicluri integrate</li> <li>- Cu rafturile decolate și reglabile în înălțime;</li> <li>- Picioare reglabile.</li> <li>- Senzori de temperatură și umiditate montați în interiorul dulapului</li> </ul>	<p><b>Cameră climatică</b></p> <ul style="list-style-type: none"> <li>- Ventilație internă</li> <li>- Capacitate ≥500 litri</li> <li>- Controler de temperatură/umiditate cu microprocesor cu mai multe segmente cu cicluri integrate</li> <li>- Cu rafturile decolate și reglabile în înălțime;</li> <li>- Picioare reglabile.</li> <li>- Senzori de temperatură și umiditate montați în interiorul dulapului</li> </ul>	<p>EN 1367-1 SM CEN/TS 12390- 9:2017 EN 196-1 EN 12690-1</p>	
				<p><b>Bazin pentru păstrarea probelor de beton de ciment</b></p> <ul style="list-style-type: none"> <li>- Capacitatea de minim 650 l</li> <li>- Sistem de încălzire termostatare digitală</li> <li>- Capac pentru acoperire</li> <li>- Pompă pentru circulara apei</li> <li>- Carcase pentru poziționarea cuburilor de beton</li> </ul>	<p><b>Bazin pentru păstrarea probelor de beton de ciment</b></p> <ul style="list-style-type: none"> <li>- Capacitatea de 650 l</li> <li>- Sistem de încălzire termostatare digitală</li> <li>- Capac pentru acoperire</li> <li>- Pompă pentru circulara apei</li> <li>- Carcase pentru poziționarea cuburilor de beton</li> </ul>	<p>EN 12390-2</p>	
				<p><b>Dispozitiv pentru testarea la tracțiune indirectă (despicare)</b></p> <ul style="list-style-type: none"> <li>• Pentru cilindrii cu diametrul 150x300 mm, 160x320 mm</li> <li>• Pentru cilindrii cu diametrul 100x200 mm, 110x220 mm</li> <li>• Pentru cilindrii cu diametrul cilindrilor</li> </ul>	<p><b>Dispozitiv pentru testarea la tracțiune indirectă (despicare)</b></p> <ul style="list-style-type: none"> <li>• Pentru cilindrii cu diametrul 150x300 mm, 160x320 mm</li> <li>• Pentru cilindrii cu diametrul 100x200 mm, 110x220 mm</li> <li>• Pentru cilindrii cu diametrul cilindrilor</li> </ul>	<p>EN 12390-6</p>	
38000000-5							
	<b>Lot IV</b>						
	<b>Beton de ciment</b>						
		TSQ 4	Italia	Matest			

					<ul style="list-style-type: none"> <li>40x80 mm; inaltime 90 mm</li> <li>Pentru cilindrii cu diametrul cilindrilor de la Ø 100x200 mm la Ø 160x320 mm, înălțime 264 mm</li> </ul>			
					<ul style="list-style-type: none"> <li>40x80 mm; inaltime 90 mm</li> <li>Pentru cilindrii cu diametrul cilindrilor de la Ø 100x200 mm la Ø 160x320 mm, înălțime 264 mm</li> </ul>			
					<p><b>Compactor proctor automat</b></p> <ul style="list-style-type: none"> <li>- Posibilitatea compactării probelor pentru testul proctor și CBR</li> <li>- Software-ul cu microprocesor care permite selectarea și efectuarea diferitelor cicluri de compactare într-un sistem complet automat, respectând strict standardele internaționale menționate. Loviturile sunt distribuite în mod automat conform cerințelor standardului selectat, cu rotație automată a probei sub loviturile berbecului</li> <li>- Acceptarea tiparelor cu diametrul de 100 și 150 mm</li> <li>- Înălțimea de cădere a berbecului reglabilă (300 sau 450 mm)</li> <li>- Dotat cu berbec cu diametrul de 50 mm și greutatea de 2500 g,</li> <li>- Dotat cu berbec cu diametrul de 50 mm și greutatea de 4500 g</li> <li>- Aparat de protecție a părților mobile în conformitate cu cerințele CE</li> </ul>	<p><b>Compactor proctor automat</b></p> <ul style="list-style-type: none"> <li>- Destinat Compactării probelor pentru testul proctor și CBR</li> <li>- Software-ul cu microprocesor care permite selectarea și efectuarea diferitelor cicluri de compactare într-un sistem complet automat, respectând strict standardele internaționale menționate. Loviturile sunt distribuite în mod automat conform cerințelor standardului selectat, cu rotație automată a probei sub loviturile berbecului</li> <li>- Acceptarea tiparelor cu diametrul de 100 și 150 mm</li> <li>- Înălțimea de cădere a berbecului reglabilă (300 sau 450 mm)</li> <li>- Dotat cu berbec cu diametrul de 50 mm și greutatea de 2500 g,</li> <li>- Dotat cu berbec cu diametrul de 50 mm și greutatea de 4500 g</li> <li>- Aparat de protecție a părților mobile în conformitate cu cerințele CE</li> </ul>	<p>EN 13286-47</p> <p>EN 13286-2</p>	
38000000-5	Lot V Pământ	TSQ 5	Italia	Matest	<p><b>Tipar proctor standard</b></p> <ol style="list-style-type: none"> <li>Diametrul 100±1 mm Înălțimea 120±1 mm</li> <li>Diamtrul 150±1 mm Înălțimea 120±1 mm</li> </ol> <p>dotate cu o extensie detașabila de cel puțin</p>	<p><b>Tipar proctor standard</b></p> <ol style="list-style-type: none"> <li>Diametrul 100±1 mm Înălțimea 120±1 mm</li> <li>Diamtrul 150±1 mm Înălțimea 120±1 mm</li> </ol> <p>dotate cu o extensie detașabila de cel puțin</p>	<p>EN 13286-2</p>	

				50 mm inaltime și o placa de baza detașabila de oțel,	50 mm inaltime și o placa de baza detașabila de oțel,		
				<b>Tipar CBR</b> 1. Diametrul 150±1 mm înălțimea 120±1 mm 2. Placă de bază perforată 3. Placă superioară perforată cu tijă pentru poziționarea manometrului 7. Placă superioară cu grosimea de 10 mm și orificiu central 8. Inele de suprasarcină cu greutatea de 100 g 9. Manometru pentru măsurarea extensiei verticale cu o precizie de 0,01 mm (manometrele utilizate doțate de către manometrele recunoscute internațional) 10. Dispozitiv pentru menținerea manometrului în centru probei (treped)	<b>Tipar CBR</b> 2. Diametrul 150±1 mm înălțimea 120±1 mm 2. Placă de bază perforată 3. Placă superioară perforată cu tijă pentru poziționarea manometrului 11. Placă superioară cu grosimea de 10 mm și orificiu central 12. Inele de suprasarcină cu greutatea de 100 g 13. Manometru pentru măsurarea extensiei verticale cu o precizie de 0,01 mm (manometrele utilizate doțate de către manometrele recunoscute internațional) 14. Dispozitiv pentru menținerea manometrului în centru probei (treped)	EN 13285-47	
				<b>Placă cu încărcare statică</b> - Dispozitiv electronic de măsurare și evaluare, card de stocare a informației - Picor de suport pentru poziționare pe suprafețe moi sau dure - Dispozitiv scurt (250 mm) sau lung (500mm) pentru senzorul de deplasare - Carcasă din PET sau alt material rezistent la zgârnieturi pentru transportarea plăcii. - Baterie reîncărcabilă cu durata de viață min 48 ore - Tripod Dotarea aparatului:	<b>Placă cu încărcare statică</b> - Dispozitiv electronic de măsurare și evaluare, card de stocare a informației - Picor de suport pentru poziționare pe suprafețe moi sau dure - Dispozitiv scurt (250 mm) sau lung (500mm) pentru senzorul de deplasare - Carcasă din PET sau alt material rezistent la zgârnieturi pentru transportarea plăcii. - Baterie reîncărcabilă cu durata de viață min 48 ore - Tripod Dotarea aparatului:	DIN 18134	
38000000-5	Lot VI Echipament de încercare în situ 1	TSQ 6	Germânia	Anix			

				<p>1. Placă din oțel inoxidabil cu diametre de ajustabile:  1.1.300 mm,  1.2.600mm,  1.3.762mm</p> <p>2. Senzor de deplasare din oțel inoxidabil cu cursa de min 15 mm și cu precizie măsurare: ± 0,01 mm (obligatoriu cu certificat de calibrare/etalonare recunoscut internațional);</p> <p>3. Senzor de forță din oțel inoxidabil, stres normal: 0,0001 MN/mp (obligatoriu cu certificat de calibrare/etalonare recunoscut internațional);</p> <p>4. Set extensie (2x25 mm, 2x50 mm, 2x150mm)</p>	<p>1. Placă din oțel inoxidabil cu diametre de ajustabile:  1.4.300 mm,  1.5.600mm,  1.6.762mm</p> <p>2. Senzor de deplasare din oțel inoxidabil cu cursa de min 15 mm și cu precizie măsurare: ± 0,01 mm (obligatoriu cu certificat de calibrare/etalonare recunoscut internațional);</p> <p>3. Senzor de forță din oțel inoxidabil, stres normal: 0,0001 MN/mp (obligatoriu cu certificat de calibrare/etalonare recunoscut internațional);</p> <p>4. Set extensie (2x25 mm, 2x50 mm, 2x150mm)</p>	
38000000-5	<p><b>Lot VII</b>  <b>Echipament de încercare în situ</b>  <b>2</b></p>	TSQ 7	Dane marca	<p><b>Delta</b></p> <p><b>Retroreflectometru R<sub>L</sub>/Q<sub>a</sub></b></p> <ul style="list-style-type: none"> <li>- Determinarea vizibilității nocturne (R L ) a marcajelor rutiere</li> <li>- Determinarea vizibilității de zi (Qd) a marcajelor rutiere</li> <li>- Utilizați pe toate tipurile de marcaje rutiere</li> <li>- Posibilitatea utilizării pe teren și în laborator etalon pentru calibrare (etalonul trebuie să fie livrat împreună cu certificat de etalonare recunoscut internațional)</li> <li>- Certificat de calibrare recunoscut internațional</li> <li>- Ecran LCD luminos</li> <li>- Geantă de transportare cu roțile</li> </ul>	<p><b>Retroreflectometru R<sub>L</sub>/Q<sub>a</sub></b></p> <ul style="list-style-type: none"> <li>- Determinarea vizibilității nocturne (R L ) a marcajelor rutiere</li> <li>- Determinarea vizibilității de zi (Qd) a marcajelor rutiere</li> <li>- Utilizați pe toate tipurile de marcaje rutiere</li> <li>- Posibilitatea utilizării pe teren și în laborator etalon pentru calibrare (etalonul trebuie să fie livrat împreună cu certificat de etalonare recunoscut internațional)</li> <li>- Certificat de calibrare recunoscut internațional</li> <li>- Ecran LCD luminos</li> <li>- Geantă de transportare cu roțile</li> </ul>	EN 1436



				<p><b>Trusă pentru controlul calității marcajului rutier</b></p> <ul style="list-style-type: none"> <li>• aparat digital pentru măsurarea grosimii peliculei uscate a marcajelor rutiere (mm), Certificat de calibrare recunoscut internațional</li> <li>• instrumentn pentru măsurarea grosimii pelicolei umede a marcajului rutier ( diapazon 100-950 microni, cu pasul de măsurare de 25 microni)</li> <li>• termometru (diapazon -10 oC până la 200 oC)</li> <li>• Higrometru</li> <li>• Cîntar ( de la 0 la 2000 g)</li> </ul>	<p><b>Trusă pentru controlul calității marcajului rutier</b></p> <ul style="list-style-type: none"> <li>• aparat digital pentru măsurarea grosimii peliculei uscate a marcajelor rutiere (mm), Certificat de calibrare recunoscut internațional</li> <li>• instrumentn pentru măsurarea grosimii pelicolei umede a marcajului rutier ( diapazon 100-950 microni, cu pasul de măsurare de 25 microni)</li> <li>• termometru (diapazon -10 oC până la 200 oC)</li> <li>• Higrometru</li> <li>• Cîntar ( de la 0 la 2000 g)</li> </ul>	EN 13197	
38000000-5	<p><b>Lot VIII</b> <b>Echipament de încercare în situ</b> <b>3</b></p>	TSQ 8	Germania	Zorn	<p><b>Placă dinamică</b></p> <ul style="list-style-type: none"> <li>- Placă de încercare cu diametru de 300 mm și senzor de accelerare</li> <li>- Dispozitiv încărcare cu greutate de 10 kg, arc de eliberare și fixare a plăcii cu interval de măsurare 15-70 MN/mp</li> <li>- Dispozitiv de încărcare cu greutate de 15 kg, arc de eliberare și fixare a plăcii cu interval de măsurare pînă la 105 MN/mp</li> <li>- Geantă din piele pentru instrumentele de măsurare</li> <li>- Afișaj electronic cu LCD, afișarea valorii medii Evd</li> <li>- Displău grafic iluminat</li> <li>- Posibilitate înțroducere text</li> <li>- Cablu cu mufă de rezistență</li> </ul>	<p><b>Placă dinamică</b></p> <ul style="list-style-type: none"> <li>- Placă de încercare cu diametru de 300 mm și senzor de accelerare</li> <li>- Dispozitiv încărcare cu greutate de 10 kg, arc de eliberare și fixare a plăcii cu interval de măsurare 15-70 MN/mp</li> <li>- Dispozitiv de încărcare cu greutate de 15 kg, arc de eliberare și fixare a plăcii cu interval de măsurare pînă la 105 MN/mp</li> <li>- Geantă din piele pentru instrumentele de măsurare</li> <li>- Afișaj electronic cu LCD, afișarea valorii medii Evd</li> <li>- Displău grafic iluminat</li> <li>- Posibilitate înțroducere text</li> <li>- Cablu cu mufă de rezistență</li> </ul>	

					<ul style="list-style-type: none"> <li>- Card de memorie SD pentru min 10000 seturi de date</li> <li>- Port pentru imprimantă</li> <li>- Posibilitatea alimentării de la baterii</li> <li>- Soft licențiat de prelucrare a datelor cu capacitate de arhivare și procesare a datelor pe PC. Compatibil cu Windows Vista, Windows 7, Windows 8 și 10</li> <li>- Imprimantă termică în cutie de aluminiu cu sursă de alimentare(baterii) și cabluri incluse</li> <li>- Cărucior pentru transportarea plăcii</li> </ul>	<ul style="list-style-type: none"> <li>- Card de memorie SD pentru min 10000 seturi de date</li> <li>- Port pentru imprimantă</li> <li>- Posibilitatea alimentării de la baterii</li> <li>- Soft licențiat de prelucrare a datelor cu capacitate de arhivare și procesare a datelor pe PC. Compatibil cu Windows Vista, Windows 7, Windows 8 și 10</li> <li>- Imprimantă termică în cutie de aluminiu cu sursă de alimentare(baterii) și cabluri incluse</li> <li>- Cărucior pentru transportarea plăcii</li> </ul>	
38000000-5	<p style="text-align: center;"><b>Lot IX</b> <b>Echipament de încercare beton asfaltic 1</b></p>	TSQ 9	Italia	Matest	<p><b>Dispozitiv de testare la tracțiune pentru epruvete cilindrice</b></p> <ul style="list-style-type: none"> <li>- Dispozitiv de testare la tracțiune pentru epruvete cilindrice folosit pentru a măsura rezistența la tracțiune și deformarea radială a unui exemplar Marshall, unde se aplică o sarcină verticală.</li> <li>- Oțel fabricat, placat împotriva coroziunii.</li> <li>- Dotat cu suporturi pentru încercarea epruvetelor cilindrice cu diametrul de 100, 150, 160 mm</li> <li>- Lățimea suporturilor de încercare trebuie să fie de</li> </ul> <ol style="list-style-type: none"> <li>1. 12.7±0.2 mm</li> <li>2. 19.1±0.2 mm</li> <li>3. 20.0±0.2 mm</li> </ol>	<p><b>Dispozitiv de testare la tracțiune pentru epruvete cilindrice</b></p> <ul style="list-style-type: none"> <li>- Dispozitiv de testare la tracțiune pentru epruvete cilindrice folosit pentru a măsura rezistența la tracțiune și deformarea radială a unui exemplar Marshall, unde se aplică o sarcină verticală.</li> <li>- Oțel fabricat, placat împotriva coroziunii.</li> <li>- Dotat cu suporturi pentru încercarea epruvetelor cilindrice cu diametrul de 100, 150, 160 mm</li> <li>- Lățimea suporturilor de încercare trebuie să fie de</li> </ul> <ol style="list-style-type: none"> <li>1. 12.7±0.2 mm</li> <li>2. 19.1±0.2 mm</li> <li>3. 20.0±0.2 mm</li> </ol>	<p style="text-align: center;">EN 12697- 23</p>

38000000-5					4. Set de 2 traductoare digitale laterale cu diapazon de măsurarea min 10 mm compatibile cu presa Cyber-Plus Evolution		
					4. Set de 2 traductoare digitale laterale cu diapazon de măsurarea min 10 mm compatibile cu presa Cyber-Plus Evolution		
<b>TOTAL</b>	<b>Lot X</b> <b>Equipamente de</b> <b>încercare beton</b> <b>asfaltic</b> <b>2</b>	TSQ 10	Italia	Matest	<b>Densimetru cu balon și membrană cu capacitatea de 3 litri</b> <ul style="list-style-type: none"> <li>- Se folosește pentru a determina densității solului compactat sau legat.</li> <li>- Aparatul este plasat peste orificiul excavat în sol, iar apa este pompată într-un balon de cauciuc și forțată în gaură. Cantitatea de apă deplasată în balon este măsurată de la scara gradată.</li> </ul> <p>Instrumentul constă dintr-un cilindru gradat de plexiglas cu capacitate de 3000 ml găzduit într-o turnare din aliaj de aluminiu, o pompă de cauciuc cu supapă de oprire, o placă de densitate și 12 baloane de cauciuc.</p>	<b>Densimetru cu balon și membrană cu capacitatea de 3 litri</b> <ul style="list-style-type: none"> <li>- Se folosește pentru a determina densității solului compactat sau legat.</li> <li>- Aparatul este plasat peste orificiul excavat în sol, iar apa este pompată într-un balon de cauciuc și forțată în gaură. Cantitatea de apă deplasată în balon este măsurată de la scara gradată.</li> </ul> <p>Instrumentul constă dintr-un cilindru gradat de plexiglas cu capacitate de 3000 ml găzduit într-o turnare din aliaj de aluminiu, o pompă de cauciuc cu supapă de oprire, o placă de densitate și 12 baloane de cauciuc.</p>	NF P94-061-2

Semnăt: \_\_\_\_\_ Numele, Prenumele: Ciornei Andrei În calitate de: Administrator  
Ofertantul: **TECNOS QUALITY SRL** Adresa: str. Calea Lesilor nr. 10 Chisinau



## ELECTROMAGNETIC SIEVE SHAKERS

STANDARDS: EN 932-5 | ISO 3310-1

These Sieve Shakers are activated by electromagnetic impulses and thanks to the triple vibrating action (vertical, lateral and rotational) they are recommended to perform sieving tests where high precision and performance are important, and where continual and intense uses are required. Therefore they are suggested for accurate sieving tests, on fine materials too.

These Electromagnetic Shakers are of simple and sturdy construction, they can hold up to 10 sieves and are also suitable for wet sieving tests (accessory mod. A046, A047).

**Power supply:** 230V 50Hz 1ph 450/750W

### MAIN FEATURES

Triple vibrating action:

- Vertical
- Lateral
- Rotational

Digital microprocessor control panel can adjust:

- Timer 0-999 minutes
- Vibration intensity
- Continuous or intermittent vibrating action
- Pause between vibrations (indicated for fine material sieving)
- The control panel can be wall fixed or placed on a bench



**A059-01 KIT**



**A059-02 KIT**

Model	Dimensions sieves Ø	Dimensions mm	Weight kg
A059-01 KIT	200 mm - 8"	320x380x850	40 approx.
A059-02 KIT	200 - 250 - 300 - 315 mm - 8" - 12"	380x440x1080	65 "
A059-03 KIT	200 - 250 - 300 - 315 - 350 - 400 mm - 8" - 12"	430x460x1150	80 "
A059-04 KIT	200 - 250 - 300 - 315 - 400 - 450 mm - 8" - 12" - 18"	480x500x1150	85 "

## SAMPLE SPLITTERS (RIFFLE BOXES)

STANDARDS: EN 933-3 | ASTM C136, 702 | NF P18-553  
UNI 8520 | AASHTO T27, T67  
BS 812:1, 1377:2, 1924:1 | UNE 83120

Used for splitting materials such as aggregates, sand, gravel and similar into two representative portions. Painted or stainless steel made, they are supplied with two collecting pans.



A063

A062

Model	Material Steel	Slot width	Max. Size Sample mm	Slot Number	Weight kg	Spare collecting pan
A062	Stainless	1-4" - 6.3 mm	5	12	0.8	A062-02
A063	Stainless	1-2" - 12.7 mm	10	12	1.2	A063-02
A064	Painted	3-4" - 19 mm	13	12	11	A064-02
A065	"	1" - 25.4 mm	20	12	11	A065-02
A065-01	"	1 1/2" - 38 mm	25	8	11	A065-02
A065-03	"	= = - 45 mm	35	8	12	A065-04
A066	"	2" - 50.8 mm	40	8	13	A066-02
A067	"	2 1/2" - 63.5 mm	50	8	18	A067-02

A064 ... A067



A068

## LARGE CAPACITY SAMPLE SPLITTER

STANDARDS: EN 933-3 | ASTM C136 | NF P18-553 | UNI 8520  
AASHTO T27, T87 | BS 812:1, 1377:2, 1924:1  
UNE 83120

Designed for the reduction of test samples which are too large in volume to be conveniently handled. Suitable for any material from sand sizes up to  $\varnothing$  108 mm. Each chute bar is 12 mm wide to get openings of 12 - 24 - 36 - 48 - 60 - 72 - 84 - 96 - 108 mm. Complete with two collecting pans.

Clam shell hopper: 30 litres capacity.

Very sturdily constructed, it is totally galvanized for rust protection.

**Weight:** 55 kg approx.

### ACCESSORY

**A068-11** WHEELS (Kit of 4) with brake for an easy displacement of the large splitter in the laboratory.

### SPARE

**A068-01** Collecting pan for mod. A068



A068-11



A068

## BULK DENSITY AND VOIDS MEASURES

STANDARDS: EN 1097:3 | ASTM C29-97 | BS 812  
UNI 8520 :6 | ISO 6872 | CNR N. 62, 63, 64

Used to determine the loose bulk density and voids of aggregates. Stainless steel made, the 10, 20 and 50 litres models have handles.

### A069

Measure 1 litre cap.

### A069-01

Measure 5 litres cap.

### A069-02

Measure 10 litres cap.

### A069-03

Measure 20 litres cap.

### A069-04

Measure 50 litres cap.



A069-02

A069-01

## TEST SIEVES

STANDARDS: EN 933-2 | ISO 3310-1, ISO 3310-2, ISO 565 | ASTM E 11 | BS410 | NF X11-504 | UNI 2331, UNI 2333 | DIN 4187-1 | UNE 7050

All sieves are made with stainless steel woven wire and frame and meet International Specifications.

Perforated plates are made of tinned steel, both square and round holes.

The sieves are available in the following diameters: 200 - 250 - 300 - 315 - 400 - 500 mm and 8" and 12".

Their apertures are clearly marked on the label, including the serial number for the identification and traceability of the sieve.

Each sieve is supplied complete with certificate of conformity.

### HOW TO BUY WOVEN WIRE MESH SIEVES

STANDARDS: ISO 3310-1 | EN 933-2, | BS410 | UNE 7050  
DIN 4187-1 | NF X11-504 | UNI 2331, 2333  
ASTM E11

The available openings of the woven wire mesh sieves are listed in the next pages and are coded from n° 00 to 77.

The buyer has to add to this number:

- A052-...** for the frame Ø 200 mm
- A051-...** for the frame Ø 250 mm
- A053-...** for the frame Ø 300 mm
- A054-...** for the frame Ø 315 mm
- A055-...** for the frame Ø 400 mm
- A050-...** for the frame Ø 8"
- A043-...** for the frame Ø 12"



**A052-...**

**Note:** It is possible to test approx. 1000 g of material by using Ø 200 mm sieves; and 3000 g with Ø 300 mm sieves.

### HOW TO BUY PERFORATED PLATE SIEVES

#### "Square Hole"

STANDARDS: EN 933-2 | ISO 3310-2 | BS 410 | DIN 4187-1

The available openings of the perforated plate square hole sieves are listed in the next page, and are coded from n° 01 to 37.

The buyer has to add to this number:

- A031-...** for the frame Ø 200 mm
- A032-...** for the frame Ø 300 mm
- A033-...** for the frame Ø 400 mm



**A031-...**

**Note:** EN 933-2 Standard specifies that "sieves with opening 4 mm and over shall be perforated plate square hole". Below 4 mm they shall be woven wire.

### HOW TO BUY PERFORATED PLATE SIEVES

#### "Round Hole"

STANDARDS: UNI 2334

The available openings of the perforated plate round hole sieves are listed in the next page, and are coded from n° 01 to 38.

The buyer has to add to this number:

- A037-...** for the frame Ø 200 mm
- A038-...** for the frame Ø 300 mm



**A037-...**

**WET WASHING SIEVES**

STANDARDS: ASTM E 11

Used for wet testing of fine granulated materials.

Frame and woven wire cloth are stainless steel made.

Frame dimensions: Ø 200 mm by 100 or 200 mm height

**MODELS****A045** Cloth opening 0.074 mm by 200 mm height**A045-02** Cloth opening 0.063 mm by 200 mm height**A045-05** Cloth opening 0.074 mm by 100 mm height**A045-06** Cloth opening 0.063 mm by 100 mm height**WET SIEVING PAN+LID STAINLESS STEEL**

The water enters through the spray nozzle mounted on top of the lid and spill out of the pan with the finest granulated material.

Supplied complete with two watertight seals.

Model	Description	Set of 10 seals
<b>A046</b>	Pan + Lid, Ø 200 mm	<b>A046-11</b>
<b>A046-02</b>	Pan + Lid, Ø 8"	<b>A046-11</b>
<b>A047</b>	Pan + Lid, Ø 300 mm	<b>A047-11</b>
<b>A047-02</b>	Pan + Lid, Ø 400 mm	<b>A047-12</b>



	Ø 200 mm	Ø 300 mm	Ø 250 mm	Ø 315 mm	Ø 8"	Ø 400 mm	Ø 12"
LID	A056	A056-01	A056-02	A056-03	A056-04	A056-06	A056-07
RECEIVER	A057	A057-01	A057-02	A057-03	A057-04	A057-06	A057-07



- V179** Bristle Brush, soft hair, Ø 35 mm
- V179-02** Double ended, brass and nylon bristle
- V179-03** Double ended soft/hard nylon
- V179-05** Soft hair Brush, Ø 3 mm BS 812
- V179-06** Hard nylon sieve Brush, flat 60 mm

## A070 FLAKINESS | THICKNESS GAUGE

STANDARD: BS 812:105.1

Suitable to verify if aggregate is flaky; i.e. if its thickness is less than 0.6 of its nominal size. Constructed of heavy gauge stainless steel sheet.

Weight: 600 g



## A071 LENGTH GAUGE

STANDARD: BS 812:105.1

Ideal to determine if aggregate is elongated; i.e. if length is more than 1.8 of nominal size. Mounted on a hardwood base.

Weight: 1 kg approx.

## DETERMINATION OF THE LIGHTWEIGHT AGGREGATES CRUSHING RESISTANCE

STANDARD: EN 13055-1 method 1 and 2

### MODELS

#### A081-01 METHOD 1

Apparatus for the determination of the crushing resistance of lightweight aggregates having diameter from 4 to 22 mm, and a volumic mass over 150kg/m<sup>3</sup>. Composed of: upper and lower cylinder inside diameter 113 mm, ring with adjustable height, piston, base. Made of steel, plated against corrosion.

Dimensions: Ø 180 mm by 260 mm height

Weight: 15 kg approx.

#### A081-02 METHOD 2

Apparatus for the determination of the crushing resistance of lightweight aggregates having volumic mass lower than 150kg/m<sup>3</sup>. Composed of: upper and lower cylinder inside diameter 76 mm, piston, base. Made of steel, plated against corrosion.

Dimensions: Ø 100 mm by 200 mm height.

Weight: 6 kg approx.

**Note:** A Servoplus testing machine equipped with Servostrain (see p. 283) is needed to carry out this test.

## A072 SHAPE GAUGE - SHAPE INDEX

STANDARDS: EN 933-4, EN 933-5, EN 933-7  
DIN 4226 | CNR N.95 | NLT 354

For measuring the length/thickness ratio of individual particles.

Weight: 500 g

## A072-10 PROPORTIONAL CALIPER **NEW**

STANDARD: ASTM D4791

Used either for rapid determination of percentages of flat and elongated particles in coarse aggregate fractions of 3/8" (9.5 mm) or larger. Consisting of 8"x16" (203.2x406.4 mm) base plate with rubber feet, two fixed posts and a 12" (305 mm) pivoting arm, allowing ratios of 1:2, 1:3, 1:4, 1:5 to be obtained.

Weight: 3 kg approx.



## GEOMETRICAL PROPERTIES OF AGGREGATES EFFLUX INDEX OF FINE AGGREGATES

STANDARDS: EN 933-6:2014 | NF P18-564 | CNR No. 113  
ASTM C1252

## A073N EFFLUX INDEX APPARATUS **NEW**

Used to measure the efflux index of fine aggregates (shape and angularity). The efflux index of an aggregate is the required time in seconds of a known volume of aggregates to flow from a known opening.

The unit is basically formed by aluminium body, Ø 90 mm by 125 mm height, aluminium feed hopper Ø 100 mm by 170 mm height, control shutter, polycarbonate funnel having 85 mm height, 60° conical part, which end has Ø 12 mm, base support, valve, decanter.

Dimensions: 200x240x600 mm

Weight: 8 kg approx.





## A124 FILLER COMPACTION APPARATUS

DETERMINATION OF THE VOIDS CONTENT OF DRY COMPACTED FILLER.

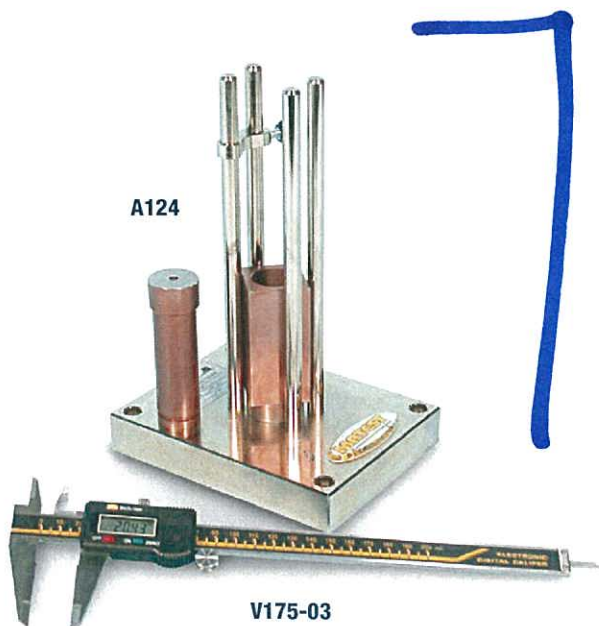
STANDARDS: EN 1097-4 comparable to BS 812 | CNR N° 123 NLT 177

The apparatus consists of:  
cylinder with an inside diameter of 25.4 mm; plunger freely sliding into the cylinder with max. lateral play of  $0.20 \pm 0.05$  mm; four columns and metallic base holding the whole.  
To perform the test a measuring device (vernier caliper with 0.01 mm accuracy) is required: see accessory.

Weight: 4 kg approx.

### ACCESSORIES

- A124-01** FILTER PAPER Ø 25 mm (pack of 100).  
**V175-03** DIGITAL VERNIER CALIPER 0 - 150 mm x 0.01 mm sens.



## A084 SIPHON CAN APPARATUS

STANDARD: BS 812 - part 2

Used to determine the moisture content at known conditions.  
Supplied complete with measuring cylinder, rubber pipes fitted with screw clips, stirring rod.

Weight: 5 kg approx.



## A082 AGGREGATE CRUSHING VALUE APPARATUS DIAMETER 150 MM

STANDARD: comparable to BS 812:110

Comprising 150 mm nominal diameter steel cylinder, plunger, base plate, tamping rod and measure 115 mm diameter x 180 mm deep.  
Used for aggregate passing 12.7 mm and retained by 9.52 mm sieve.

The complete assembly is cadmium plated for corrosion protection.

Weight: 20 kg approx.

## A083 AGGREGATE CRUSHING VALUE APPARATUS DIAMETER 75 MM

STANDARD: comparable to BS 812:110

Comprising 75 mm nominal diameter steel cylinder, plunger, base plate, tamping rod and measure 57 mm diameter x 90 mm deep.  
Used for aggregate smaller than 9.52 mm

The complete assembly is cadmium plated for corrosion protection.

Weight: 8 kg approx.



## A085 QUARTERING CANVAS (not illustrated)

STANDARD: ASTM C702 - Method B

Used in field for quartering soil and aggregates.

Size: 140x140 cm

## A086 VOLUMETER FOR AGGREGATES

STANDARD: BS 812

Used to measure coarse aggregate density through water displacement method.  
Formed by a cylindric metal container Ø 150x350 mm fitted with a siphon tube at 250 mm from bottom.

Weight: 3 kg approx.



### ACCESSORY

- V101-04** GRADUATED GLASS CYLINDER 250 ml capacity

**DETERMINATION OF PARTICLE DENSITY AND WATER ABSORPTION OF AGGREGATES**

STANDARDS: EN 12390-7 | EN 1097-6 | UNI 6394-2 | BS 812, 1881:14 | ASTM C127, C128 | AASHTO T84 | DIN 12039 | NLT 154

To perform this test, additional general purpose equipment are required, such as: oven, sieves, balances etc., and the following specific apparatus:

**V041**

**DENSITY BASKET**, Ø 200 mm by 200 mm high, mesh size 3.35 mm, all stainless steel made.

Other models of density baskets listed at p. 582

**V085**

**SPECIFIC GRAVITY FRAME**

Technical data: see Section "V" p. 582

**PYKNOMETER,**

pyrex glass, complete with stopper, capillary tube and funnel; used to determine the voids and bulk density of aggregates.

**V103** Capacity 500 ml

**V103-01** Capacity 1000 ml

**PYKNOMETER,**

pyrex glass, wide mouth Ø 50 mm, complete with capillary tube stopper, used to evaluate the volume density and voids of aggregates.

**V105-04** Capacity 500 ml

**V105-05** Capacity 1000 ml

**V105-06** Capacity 2000 ml

**S148**

**SAND ABSORPTION CONE AND TAMPER**, used in determining the specific gravity and absorption of fine aggregates.

**DETERMINATION OF THE PARTICLE DENSITY OF FILLER. PYKNOMETER METHOD**

STANDARDS: EN 1097-7 | NF P18-558 | BS 812

To perform this test additional general purpose equipment are required such as: oven, sieves, balance etc., and the following specific apparatus:

**SPECIFIC GRAVITY BOTTLE, GAY LUSSAC TYPE,**

pyrex glass, complete with capillary tube stopper, to determine the particle density and specific gravity of filler in fine aggregates.

**V108-01** Capacity 50 ml

**V108-02** Capacity 100 ml

**V108-03** Capacity 250 ml

**E136****WATER BATH**

Heating/circulating system, all stainless steel made. Equipped with cooling coil device for connection to water net.

Capacity: 40 litres. Digital thermostat

Temperature range: ambient to 60 °C.

Accuracy: ± 0.5 °C.

**Inside dimensions:**

510x350x230 mm

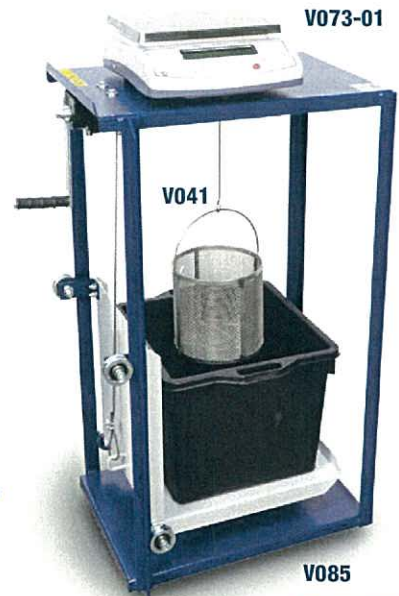
**Overall dimensions:**

680x420x420 mm

**Power supply:**

230V 50-60Hz 1ph 2000W

**Weight:** 28 kg approx.

**E136****V041****V073-01****V085****V103****V105-05****S148****V108-01****V108-02****MAX. 10 MM SIZE DETERMINATION OF THE RELATIVE DENSITY AND WATER ABSORPTION OF AGGREGATES**

STANDARDS:

BS 812:2, 1377:2 | ASTM D 854

AASHTO T100 | EN 1097-6

**S147**

**PYKNOMETER,**

glass made, with aluminium cone and rubber seal.

Capacity: 1 kg

**S147**

## SPECIFIC GRAVITY OF SOILS

E136

### WATER BATH, DIGITAL

STANDARD: BS 1377:2

For the determination of particle density, pycnometer method, according to BS 1377:2 Specifications, and for general laboratory purposes.

All stainless steel made, with wool insulation and water circulation electric stirrer, the bath ensures an uniform and constant temperature. Complete with digital thermostat and dual safety thermostat with higher thermic threshold ensuring safe working conditions.

A cooling device to be connected to the water net is used when room temperature exceeds the requested one.

Capacity: 40 litres

Temperature range: ambient to 60 °C, accuracy  $\pm 0.5$  °C

**Internal dimensions:** 510x350x230 mm

**Overall dimensions:** 680x420x420 mm

**Power supply:** 230V 1ph 50Hz 1200W

**Weight:** 28 kg approx.



E136

## SPECIFIC GRAVITY BOTTLE, GAY LUSSAC TYPE

STANDARDS: BS 1377:2 | ASTM D854 | AASHTO T100

NF P18-054, NF P94-054

Pyrex glass made, complete with capillary tube stopper, these bottles are used to determine the specific gravity and density of fine soils and filler in fine aggregates.

Models	Capacity
V108	25 ml
V108-01	50 ml
V108-02	100 ml
V108-03	250 ml



V108-01

V108-02

## DESICCATORS BOROSILICATE GLASS

Complete with perforated porcelain plate.

Without vacuum		With vacuum	
A035	Ø 200 mm	A039	Ø 200 mm
A036	Ø 250 mm	A040	Ø 250 mm
A036-01	Ø 300 mm	A040-01	Ø 300 mm

## ACCESSORY

V300-15 DESICCATORS SALTS Silica gel box 1000 g



A039

A035

V202

## ASPIRATOR PUMP

To be connected to the water net with a minimum pressure of 0.7 kg/cm<sup>2</sup>, it produces a moderate vacuum pressure.

**Weight:** 100 g



V202

S147

## CONE PYCNOMETER

STANDARDS: EN 1097-6 | BS 1377:2

Used for the determination of specific gravity and water absorption of sands and fine aggregates.

Glass jar with aluminium cone and rubber seal.

Capacity: 1 kg



S147

S148

## SAND ABSORPTION CONE AND TAMPER

STANDARDS: EN 1097-6 | BS 812

Used to determine the specific gravity and water absorption of fine aggregates.

**Weight:** 500 g approx.



S148

## TESTS FOR THERMAL AND WEATHERING PROPERTIES OF AGGREGATES

### DETERMINATION OF RESISTANCE TO FREEZING AND THAWING

STANDARDS: EN 1367-1 | EN 932-5

It provides the needed informations on aggregates subject to freeze and thaw test cycles.

The cold stress on aggregates depends on the water saturation degree and the freeze percentage. The test can be performed on aggregates having dimensions from 4 to 63 mm.

**A103-10** CONTAINER, stainless steel made, having nominal capacity of 2000 ml.  
Supplied complete with stainless steel cover.  
**Weight:** 600 g approx.

**A103-11** BALLAST for the test container, plated steel made, used for tests on lightweight aggregates.  
**Weight:** 2 kg approx.

**Note:** To perform the test sieves with different openings according to the dimensions of the aggregates are also requested.

### MAGNESIUM SULPHATE TEST

Tests for thermal and weathering properties of aggregates.

STANDARDS: EN 1367-2, also comparable to ASTM C88  
UNE 7136 | UNI 8520-10



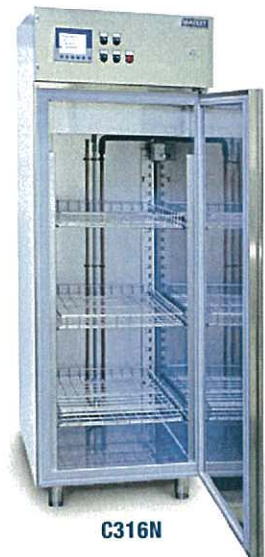
- A103** BASKET, stainless steel mesh,  $\varnothing$  120 mm x 160 mm high, 3.35 mm opening
- A103-01** BASKET, stainless steel mesh,  $\varnothing$  95 mm x 120 mm high, 1.18 mm opening
- A103-02** BASKET, stainless steel mesh,  $\varnothing$  95 mm x 120 mm high, 0.600 mm opening
- A103-03** BASKET, stainless steel mesh,  $\varnothing$  65 mm x 80 mm high, 0.150 mm opening
- V172-05** HYDROMETER, calibrated at 20 °C, range 1200 – 1300 g/ml, accuracy 0.001 g/ml
- V125-03** CONTAINER, tinned steel with airtight lid,  $\varnothing$  200 mm x 200 mm high.



### DETERMINATION OF THE BEHAVIOUR AND RESISTANCE TO FREEZING AND THAWING OF AGGREGATES

STANDARDS: EN 1367-1 | CNR N° 80 | UNI 8520-20  
BS 812:124 | ASTM C671, C682

**C316N**  
**CLIMATIC CHAMBER,**  
535 LITRES CAPACITY  
Temperature range -30 +70 °C.  
Technical details and other models described in section Aggregates p. 26 or Concrete p. 348



### **C348T \*** **ROCK AND MASONRY SAW**

It accepts blades up to  $\varnothing$  400 mm.  
Useful cutting height: 130 mm

#### ACCESSORIES:

- C350-14**  
DIAMOND BLADE  $\varnothing$  400 mm
- C352**  
DEVICE to clamp cylinders and cores
- C353**  
DEVICE to clamp irregular shaped specimens



**Note:** Technical details and other saw models described in Section "C" Concrete p. 358

## A058-05N AIR JET SIEVING MACHINE

STANDARD: EN 933-10

The Air Jet Machine is suitable for sieving powder and drying grain products in order to obtain sieving results between 5 to 4000 microns, through appropriate test sieves 200 mm diameter. Its working foundation is based on the use of air that tugs thin particles to make them pass through the sieve.

This effect is obtained with a vacuum machine that provokes a controlled decrease of pressure. It is equipped with an automatic cleaning system of the filter cartridge allowing **to perform many tests** (some tens) before being replaced.

The unit is supplied complete with aspirator device, plexiglass cover, filter cartridge, 5 collecting plastic bags, accessories.

**Power supply:** 230V 1ph 50-60Hz

**Dimensions:** 450x600x400 mm

**Weight:** 25 kg approx.

### MAIN FEATURES

- Sieving time from 0 to 99 minutes.
- Vacuum range from 0 to 65 mbar.
- Adjustable calibration function.
- Sieving results from 5 to 4000 microns.
- Automatic cleaning system.



### SPARE

**A058-14N** Filter cartridge.

**A058-15N** Plastic bags (pack of 5 pcs).

## MEASURING CYLINDERS

Available Models :

### S158-01N

STANDARDS: ASTM D2419 | AASHTO T176

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm, with transparent adhesive label graduated in mm and inches.

AS ALTERNATIVE:

### S158-01GN

STANDARDS: ASTM D2419 | AASHTO T176

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm with additional engraved scale from 0 to 380 mm

### S158-03N

STANDARDS: EN 933-8 | NF XP18-598

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm

## S160 N

### MOTORIZED SAND EQUIVALENT SHAKER

STANDARDS: EN 933-8 | ASTM D2419 | AASHTO T176

NF XP18-598 | UNE 83131 | CNR N.27 | UNI 8520-15

The unit provides a constant uniform shaking with automatic cycle test. Oscillating excursion is 203 mm at 175...180 adjustable strokes/min. rate. Complete with digital timer that automatically stops the shaker at the end of the test. It cannot be sold in CE markets without security cabinet (see model S160-01 N)

**Power supply:** 230V 1ph 50Hz 250W

**Dimensions:** 700x360x350 mm

**Weight:** 30 kg approx.



S160N + S158-03N + S158-02

## S161

### SAND EQUIVALENT SHAKER HAND OPERATED

STANDARDS: EN 933-8 | ASTM D2419 | NF XP18-598

AASHTO T176 | UNI 8520-15 | UNE 83131

Hand operated working through handwheel. Complete with mechanical strokes counter.

**Dimensions:** 700x350x420 mm approx.

**Weight:** 20 kg approx.



S161



S158-03N

S158-01GN

S158-01N

## S160-01N

### MOTORIZED SAND EQUIVALENT SHAKER

Same as S160N, but equipped with steel Security Cabinet, conforming to CE Safety Directive. When opening cabinet's door during shaker working, a microswitch automatically stops the machine.



S160-01N + S158-03N + S158-02

## ASSESSMENT OF FINES

### GRADING OF FILLERS

STANDARD: EN 933-10

### A058-05N

#### AIL JET SIEVE SHAKER

Suitable for sieving powder and dry grain products up to 5 microns.

Technical details: see p. 38



A058-05N

**A128N****ACCELERATED POLISHING MACHINE**

## DETERMINATION OF THE POLISHED STONE VALUE

STANDARDS: EN 1097-8, EN 1341, 1342, 1343 | BS 812:114 | NF P18-575 | CNR N.105

**MAIN FEATURES**

- Up to 14 specimens simultaneously.
- Road wheel speed, from 310 to 330 RPM.
- Digital control panel for an easy test execution.
- Resultant specimens perfectly suitable for the skid resistance tester.

It measures the resistance of road aggregates, paving stones and paving blocks to the polishing action of vehicle tyres on a road surface.

The specimens are manufactured with suitable moulds and located on the Road Wheel.

The wheel is now rotated and enters in contact with solid rubber tyre, spring loaded. Abrasive charges are continuously introduced by two automatic mechanical feeders (hoppers).

The feeders are held by a suitable support disjoined from the machine body; this solution safeguards feeding calibration and reliability/life of the hoppers from the influence of test execution vibrations.

The water is supplied at a controlled rate through a water container equipped with flow regulator.

During the test execution the display shows the remaining time and the speed rotation of the wheel holding the specimens.

Supplied complete with 2 rubber wheels (one for corn and one for flour emery), set of 4 specimen moulds and 2 mould covers, while control stone, corn and flour emery have to be ordered separately (see accessories).

**Power supply:** 230V 50Hz 1ph 750W

**Dimensions:** 1800x820x600 mm

**Weight:** 175 kg approx.

**ACCESSORIES**

- A128-02** CORN EMERY, 25 kg pack
- A128-03** FLOUR EMERY, 5 kg pack
- A128-13** FLOUR EMERY "Original", 5 kg pack
- A128-04** CONTROL STONES, ungraded, 25 kg bag.
- A128-05** FRICTION TESTER REFERENCE STONE (Criggion Stone), ungraded, 25 kg bag.
- A049-02** FLAKINESS SIEVE, slot 7.2 by 40 mm, used to retain the road aggregates.

**SPARES**

- A128-11** Mould (without cover) to prepare the specimen.
- A128-12** Cover for the mould.

**A128N****C129****ABRASION BÖHME TESTER**STANDARDS: EN 1338:2004 | EN 1339, 1340, 13892-3  
EN 14157 | EN 13748-2 | DIN 52108

Used to measure volume loss in a specimen under abrasion stress in tests, such as:

- Paving stones
- Concrete slabs
- Slabs made of natural rocks
- Natural stone slabs

See section "C" Concrete pag. 324

**C129**

**B065**
**ROTOVAPOR**
**ROTARY EVAPORATION APPARATUS**

BITUMINOUS BINDERS. RESISTANCE OF HARDENING. ROTATING FLASK TEST: RFT METHOD

STANDARD: EN 12607-3

This unit is used to evaluate the hardening effect of a treated bituminous binder sample. The test is performed by putting 100 g of bituminous binder into the rotating flask. The sample is heated at 165°C and ambient temperature air is blown into the flask containing the binder hardening the same. The hardening effect is evaluated according to penetration, viscosity and softening point tests.

The Rotary Evaporation Apparatus is essentially composed of:

distillation flask 1000 ml capacity rotated by a speed motor at an adjustable rate between 20 and 280 rpm, condenser, solvent recovery flask, heated oil bath.

The angle of the rotary/distillation flask is 15°

The instrument is supplied complete with glass tubing with three way valves and transparent flexible hose for solution intake.

The Rotatory Apparatus requires a vacuum pump and a vacuum regulating system (see accessories at p. 84).

**Power supply:** 230V 1ph 50-60Hz

**Dimensions:** 500x400x500 mm

**Weight:** 27 kg approx.


**B065**
**B075-05**
**SOLUBILITY OF BITUMINOUS BINDERS**

STANDARDS: EN 12592 | ASTM D2042

The set comprises :

Gooch crucible complete with funnel and rubber ring.

Filter flask 500 ml capacity with rubber stopper.

Whatman filter discs, Ø 25 mm (pack of 100)

**Weight:** 1000 g approx.

BITUMEN EMULSIONS:

**B075-01**
**GRADUATED CYLINDER WITH SIDE TUBES AND STOPPER**

DETERMINATION OF SETTLING TENDENCY

STANDARDS: EN 12847 | IP 485

The cylinder has 600 ml capacity, it is marked at 500 ml and two side tubes are foreseen.

**Weight:** 800 g approx.

**Note:** To perform this test the water in petroleum emulsion, equipment mod. B075 is also required. See p. 147

**B075-08**
**GLASS TUBE WITH GLASS FILTER**

DETERMINATION OF PENETRATION POWER

STANDARDS: EN 12849 | IP 487

The glass tube has 41.5 mm inside diameter by 115 mm height, and a fused-on glass filter with holes size between 0.160 and 0.250 mm is fitted.

**Weight:** 300 g approx.


**B075-05**

**B075-01**
**B075-08**



## B086 KIT CLEVELAND OPEN CAP FLASH AND FIRE POINT TESTER

STANDARDS: EN 22592 | ASTM D92 | AASHTO T48  
IP 36 | NF T60-118 | ISO 2592

Used to measure the flash and fire points of lubricated oils and petroleum products.

Complete with brass cup, thermometer IP 28C (ASTM 11C) range -6 +400 °C, electric heater with thermoregulator, double line fuse. Supplied **without** flame gas device to be ordered separately.

**Power supply:** 230V 1ph 50-60Hz 600W

**Dimensions:** 220x285x265 mm approx.

**Weight:** 10 kg approx.

### NEEDED ACCESSORY

#### B086-02

FLAME GAS device, complete with gas-stop valve controlled by a flame sensor and maximum thermostat with reset button. It can be sold in CE markets, but not usable in closed spaces.

### SPARE

**B086-10** Thermometer IP 28C (ASTM 11C), range -6 +400 °C.

#### B087

## SAYBOLT DIGITAL VISCOMETER

STANDARDS: ASTM D88 | AASHTO T72

Used to determine the viscosity of petroleum products at specified temperatures between 70 to 210 °F. Stainless steel made, the Saybolt viscometer is supplied complete with two interchangeable orifices **Furol** and **Universal**, oil bath, electric heater with digital thermoregulator, stirrer, cooling coil, viscosity flask. Thermometers, filter funnel, withdrawal tube **are not included** and must be ordered separately. The viscometer is equipped of a dual safety thermostat to prevent accidental over-heatings.

**Power supply:** 230V 1ph 50-60Hz 500W

**Dimensions:** 280x260x510 mm

**Weight:** 12 kg approx.

### ACCESSORIES

Saybolt Thermometers	Range	Subd.
<b>B089</b> ASTM 17C	+19 a +27 °C	0.1 °C
<b>B089-01</b> ASTM 18C	+34 a +42 °C	0.1 °C
<b>B089-02</b> ASTM 19C	+49 a +57 °C	0.1 °C
<b>B089-03</b> ASTM 20C	+57 a +65 °C	0.1 °C
<b>B089-04</b> ASTM 21C	+79 a +87 °C	0.1 °C
<b>B089-05</b> ASTM 22C	+95 a +103 °C	0.1 °C

#### B087-11

FILTER FUNNEL complete with wire filter ring mesh.



**B087-11**

#### B087-12

WITHDRAWAL TUBE complete.

**B087-12**

### SPARES for SAYBOLT

**B089-06** Furol orifice

**B089-07** Universal orifice

**B089-08** Saybolt flask 60 ml capacity



**B086 KIT**

#### B087-01

## TWO TUBE SAYBOLT VISCOMETER

Basically structured as mod. B087 but with two tubes. Supplied complete except thermometers, filter funnel and withdrawal tube.

**Dimensions:** 270x270x550 mm approx.

**Weight:** 14 kg approx.



**B087-01**

## B075 WATER IN BITUMEN EMULSIONS

STANDARDS: EN 1428, 12847 | ASTM D244 | NF T66-023

Used to determine the water in petroleum products or bituminous materials, by distilling them with a water immiscible, volatile solvent.

The equipment comprises:

- Glass balloon 500 ml
- Glass receiver 25 ml capacity with 0.1 ml grad.
- Glass reflux condenser

Electric heater with thermoregulator, clamps.

**Power supply:** 230V 1ph 50Hz 500W

**Weight:** 8 kg approx.



**B075**

## B076 WATER IN BITUMINOUS MATERIALS (DEAN-STARK)

STANDARDS: ASTM D95, D244

AASHTO T55 | IP 74-77

CNR No. 101 | NLT 123

Identical to mod. B075 except for the receiver having 10 ml capacity.

## BITUMINOUS EMULSIONS

### RESIDUE ON SIEVING

STANDARD: EN 1429

**B076-21** Sieve, stainless steel, Ø 75 mm, 0.5 mm opening

**B076-22** Sieve, stainless steel, Ø 75 mm, 0.16 mm opening

**B076-24** Pan and Cover, stainless steel, Ø 75 mm.



**B076-21...B076-24**

## BITUMINOUS EMULSIONS

### MIXING STABILITY WITH CEMENT

STANDARD: EN 12848

**B076-23** Sieve, stainless steel, Ø 75 mm, 2 mm opening

**B076-22** Sieve, stainless steel, Ø 75 mm, 0.16 mm opening

**B076-24** Pan and Cover, stainless steel, Ø 75 mm.

## B079N CABINET WITH ASPIRATOR

Double aspiration system, certified to EN 14175-2-3 Bureau Veritas. Used to exhaust vapors and toxic solvents caused by Centrifuge Extractors, Hot Extractors etc., by avoiding they are diffused in the laboratory. Metal frame, monolithic stoneware, 4 sockets + switch, water spout and cock, electric aspirator, electric lighting.

The front transparent door can be lifted by vertical counterweights for an easy access to the operation desk.

**Power supply:** 230V 1ph 50-60Hz

**Dimensions:** 1800x830x2500 mm

**Weight:** 380 kg approx.



**B079-01**

**B079N**

### ACCESSORY

#### B079-01

LOWER CUPBOARDS, bilaminated plastic made, complete with doors and shelves.

## B069 KIT DISTILLATION OF CUT-BACK ASPHALTS, ELECTRIC

STANDARDS: ASTM D402 | AASHTO T78 | NF T66-003

UNE 7112, 7072

Used to measure the amount of the most volatile constituents in cut-back asphaltic products.

The apparatus consists of: electric heater with thermoregulator, distillation flask, condenser tube, adapter, shield, receiver, supports, graduated cylinder, thermometer ASTM 8C -2 to +400 °C, subd.1 °C

**Power supply:** 230V 1ph 50-60Hz 750W

**Weight:** 12 kg approx.



**B069 KIT**

### SPARE

**B069-11** Thermometer -2 +400 °C subd. 1 °C, ASTM 8C

### B063-10 PARTICLE CHARGE TESTER

#### PARTICLE POLARITY OF BITUMEN EMULSIONS

STANDARDS: EN 1430 | ASTM D244 | CNR N. 99

This apparatus is used to identify the particle charge of bitumen emulsions.

The equipment comprises:

- Milliammeter scale up to 10 mA on support base
- Variable resistor
- Two stainless steel electrodes
- Insulating device
- Beaker 250 ml capacity to EN spec.
- Glass rod

**Power supply:** 250V 1ph 50-60Hz

**Dimensions:** 200x200x600 mm

**Weight:** 3 kg approx.



B063-10

#### ACCESSORY

##### B063-11

BEAKER 500 ml capacity to ASTM spec.

### B072-20

#### WILHELMI SOFTENING POINT APPARATUS

STANDARDS: EN 1871 | DIN 1996-15

Used for determining the softening point of bituminous materials for road construction, according to Wilhelmi method.

The softening point is the temperature where a layer of thermoplastic material has a deformation given by a steel sphere weighting 13.9 g. The apparatus comprises a ring divided in two halves on a metal support frame, glass beaker, steel ball 15 mm diameter.

**Weight:** 2 kg approx.



B072-20 + B072-02

#### ACCESSORIES for B072-20

##### B072-02

THERMOMETER, ASTM 16C, scale +30 °C +200 °C, subd. 0.5 °C.

##### B073-02

ELECTRIC HEATER WITH MAGNETIC STIRRER, suitable for still water and glycerine tests, with softening point up to 150 °C.

**Power supply:** 230V 1ph 50-60Hz 700W

**Weight:** 4 kg approx.

See p. 150

### B063 KIT EMULSIFIED ASPHALT DISTILLATION APPARATUS

STANDARDS: EN 1431 | ASTM D 244 | AASHTO T 59 | CNR N° 100

Used for the determination of cut-back asphaltic materials by the distillation test. The set is formed by: aluminium still container, glass connectors including condenser, stands, graduated cylinder, two thermometers ASTM 7C range -2 to +300 °C, gas ring burner with gas stop valve controlled by a flame sensor.

It can be sold on CE markets, but not usable in closed spaces.

**Weight:** 12 kg approx.

#### SPARE

**B063-01** Thermometer -2 to +300 °C ASTM 7C



B063 KIT

### B063-05 STORAGE STABILITY OF ASPHALT EMULSIONS

STANDARD: NF T66-022

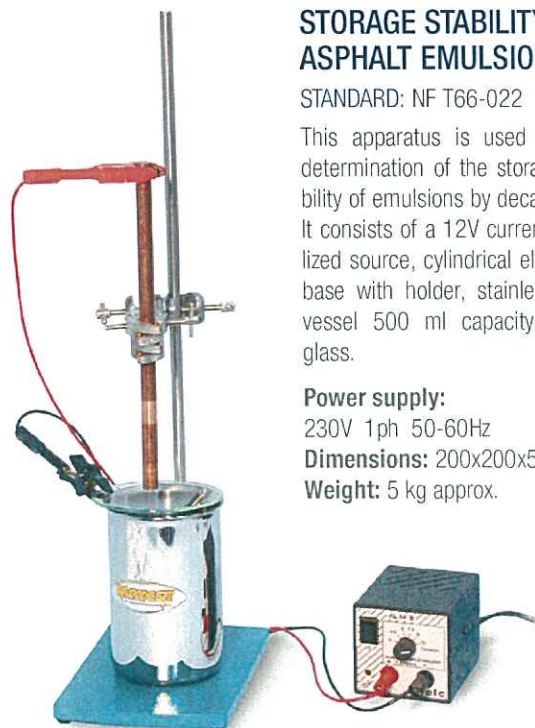
This apparatus is used for the determination of the storage stability of emulsions by decantation. It consists of a 12V current stabilized source, cylindrical electrode, base with holder, stainless steel vessel 500 ml capacity, watch glass.

**Power supply:**

230V 1ph 50-60Hz

**Dimensions:** 200x200x500 mm

**Weight:** 5 kg approx.



B063-05

**EFFECT OF HEAT AND AIR ON A MOVING FILM OF ASPHALT****B066M KIT  
ROLLING THIN-FILM OVEN HIGH PERFORMANCE**

STANDARDS: EN 12607-1 | ASTM D2872 | AASHTO T240

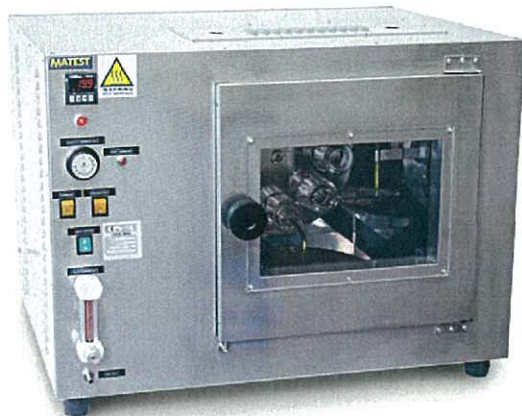
New model with enhanced performance and reliable technology needed to study the aging phenomena on traditional and innovative bituminous binders.

The frame and the internal chamber are made of high quality stainless steel with a large door to detect the test room.

This new version is totally controlled by 7" digital touch-screen panel in terms of test temperatures, start and stop carriage rotation and ventilation system.

Also, when the test starts, the internal room temperature, the air flow and the carriage speed (15 rpm  $\pm$  0.2) are shown in real time on the digital display.

Supplied complete with digital flow meter, precision digital thermostat to maintain 163 °C temperature, control thermometer ASTM 13C, ventilation device, eight glass containers  $\varnothing$  64x140 mm. The unit includes a dual safety thermostat to prevent overheating.

**Power supply:** 230V 1ph 50Hz 1700W**Dimensions:** 620x620x910 mm**Weight:** 55 kg approx.**B066M KIT** closed door**B066N KIT  
ROLLING THIN-FILM OVEN RTFOT | ASTM | EN**

STANDARDS: EN 12607-1 | ASTM D2872 | AASHTO T240

Used to measure the air and heat effect on a moving film of asphaltic semisolid materials. External frame and internal chamber are stainless steel made with insulated fiberglass intermediate chamber.

Rotation speed of the plate: 15 rpm  $\pm$  0.2.

Provided with a large glass door for inspections. The oven must be connected to an air compressor 2 bar max. pressure, or to a diaphragm pump (see accessory). Supplied complete with flow meter, precision digital thermostat to maintain 163 °C temperature, control thermometer ASTM 13C,

ventilation device, eight glass containers  $\varnothing$  64x140 mm.

The oven is equipped with a dual safety thermostat to prevent accidental over-heatings.

**Power supply:** 230V 1ph 50Hz 1700W**Dimensions:** 620x620x910 mm**Weight:** 55 kg approx.**MAIN FEATURES**

- 7" Touch-screen color display.
- Temperature ramp designed to achieve the target temperature within 10 minutes when the door is closed.
- Flow meter range: from 200 to 14.000 mm/min.
- Temperature accuracy  $\pm$  0.1 °C when the target temperature test is achieved.

**B066M KIT** open door with touch screen display**B066-02N****ACCESSORY**

- B066-11** DIAPHRAGM PUMP, free air displacement 6 litres/min, max. pressure 2.4 bar, ultimate vacuum 100 mbar.  
**Power supply:** 230V 1ph 50Hz 65W

**B066-11****SPARES**

- B066-02N** Glass container  $\varnothing$  64x140 mm, top quality product with improved finishing.
- B064-03** Thermometer, ASTM 13C.  
Range: +155 °C to +170 °C div. 0.5 °C.



### B058 THERMOSTATICALLY CONTROLLED WATER BATH FOR PENETROMETER

Provides water at the required temperature of  $25 \pm 0.1$  °C. The unit consists of a stainless steel water bath 10 litres capacity with wool insulation, immersion heater with digital thermostat, motor pump with connections, cooling coil device, current water operated, to maintain a constant temperature of the bath when room temperature is slightly higher. The bituminous sample is immersed into the water bath, and placed on the penetrometer only at the time of the test, by eventually using the transfer dish (accessory mod. B057-03).

**Power supply:** 230V 1ph 50-60Hz 350W  
**Dimensions:** 375x335x420 mm  
**Weight:** 12 kg approx.



B058 detail

#### ACCESSORY

##### B058-01

WATER BATH DISH with incorporated thermostatic coil, to be connected to the bath mod. B058. It keeps the temperature of the bitumen sample directly on the penetrometer, by avoiding to transfer it. Dimensions  $\varnothing$  151x90 mm

### B060 BACON SAMPLER

STANDARDS: EN 58 | CNR N° 81, N° 98  
 ASTM D140 | AASHTO T40

Used to obtain asphalt or oil samples from various levels within a storage tank by the "thief" method. Made from brass. Capacity 237 ml

**Dimensions:**  $\varnothing$  50x250 mm  
**Weight:** 2 kg approx.



B060

### B090 BREAKING VALUE OF CATIONIC BITUMEN EMULSIONS: MINERAL FILLER METHOD

STANDARDS: EN 13075-1 | IP 494

Equipment for the determination of the breaking value of cationic emulsions, (manual version) comprising: Filler feeding pan, complete with support base and clamp, nickel spatula, two round porcelain dishes.

**Weight:** 2 kg approx.



#### ACCESSORIES for Automatic Version

- B090-10** ELECTRIC STIRRER having 260 rpm, 230V 50-60Hz 1ph
- S157-06** SUPPORT BASE for stirrer.
- B090-11** PROPELLER for electric stirrer.
- B090-12** METALLIC CONTAINER, 500 ml capacity.
- B090-19** REFERENCE FILLER, original Forshammar, recommended by EN Spec. Bucket of 10 kg
- B090-20** REFERENCE FILLER, 50 kg (two bags of 25 kg) where  $\text{SiO}_2$  content and Volumetric Mass conform to EN 13075-1; while grading composition does not conform.

## CORE DRILLING MACHINES HIGH PERFORMANCE

These drilling machines are extremely robust, heavy duty, compact and reliable.

The sliding group is rectified in order to assure a very soft and accurate drilling movement.

The drilling excursion is 550 mm and the machine can drill cores up to 200 mm of diameter.

Built in water swivel to cool the diamond bit.

The robust steel base is equipped with wheels for easy site displacements, together with four levelling and stabilizing feet.

All working and moving parts are cadmium plated for rust protection.

The machine is supplied complete **except** for: diamond bit, core extractor and spanner (see accessories) which have to be ordered separately.

### MODELS

#### C319 PAVEMENT CORE DRILLING MACHINE 5HP 4-STROKE PETROL ENGINE

This rugged, compact and portable machine with vertical screw feed, is used for pavement core sampling where it is not easy to get electrical power.

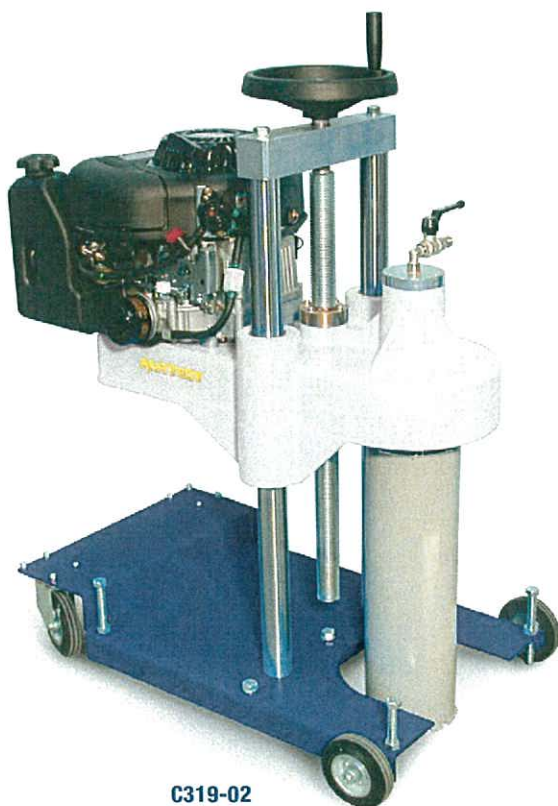
Petrol engine 5 HP power, 4-stroke Briggs & Stratton model.

**Dimensions:** 850x580x1230 mm

**Weight:** 135 kg approx.

#### MAIN FEATURES

- Original Briggs & Stratton motor.
- It can drill cores up to  $\varnothing$  200 mm.
- Vertical rectified screw feed.
- Built in water swivel to cool the bit.
- Rugged, compact, wheels mounted.



#### C319-02 PAVEMENT CORE DRILLING MACHINE 12.5 HP 4-STROKE PETROL ENGINE

Same as mod. C319, but activated by a petrol engine 12.5 HP power 4-stroke Briggs & Stratton model.

**Weight:** 150 kg approx.



### SPARES

**C331** Petrol engine, for C319 machine 5 HP power, 4-stroke Briggs & Stratton model. Supplied complete with tank, accessories. Weight: 20 kg approx.

**C331-02** Petrol engine for the C319-02 drilling machine. 12.5 HP power, 4-stroke Briggs & Stratton model. Supplied complete with tank, accessories. Weight: 25 kg approx.

**PARTICLE LOSS AND RESISTANCE TO FUEL**

STANDARDS: EN 12697-17, 12697-43 | EN 1097-2 | ASTM C131  
 The test concerns the determination of the particle loss by abrasion of porous asphalt mixtures, and the determination of the resistance of a pavement or a bituminous mixture to aviation fuel. These Standards require, within other specific tests, the abrasion tester:

**A075N**  
**LOS ANGELES ABRASION MACHINE**

Technical details:  
 see Section "A"  
 Aggregates, p. 46

**A075N**
**B022SP**  
**BOTTLE ROLLING MACHINE**

STANDARD: EN 12697-11

To determine the affinity between aggregate and bitumen, expressed by visual registration of the degree of bitumen coverage on uncompacted bitumen-coated mineral aggregate particles after influence of mechanical stirring action in the presence of water. Rotation speed adjustable from 0 up to 85 rpm.

The machine can roll up to 3 bottles at the same time.

Supplied complete with timer **range 0 - 99 hours**, to fully perform the test cycle.

**Power supply:** 230V 50-60Hz 1ph

**Dimensions:** 385x295x160 mm

**Weight:** 10 kg approx.

**B022SP + S132-01****B022-12****S132-01****NEEDED ACCESSORIES**

**S132-01** TEST BOTTLE, made of borosilicate glass, 500 ml capacity, diameter 86 mm, height 176 mm, 30 mm neck diameter, as expressly requested by EN Specification.

**B022-12** GLASS ROD with a diameter of 6 mm equipped with 35 mm long fitting rubber tube.

**A122-10**  
**TILT TEST**

The instrument measures the roughness coefficient of a joint. The unit is also designed to test the possible fluage tendency of bituminous mixtures covering a slope of a dam subject to high sun radiations. The fluage tendency is the permanent viscous deformation of a material. The apparatus consists of an inclined adjustable plane on which the sample is placed.

Inclination angle: 0 - 75°

Max. sample diameter: 100 mm

The plane is slowly tilted until sliding of the upper surface of specimen on the lower one occurs. The roughness index can be evaluated from the measured inclination angle.

**Dimensions:** 270x175x265 mm

**Weight:** 5 kg approx.

**A122-10**

## MIXERS 20 AND 30 LITRES CAPACITY

These large capacity mixers have been designed to mix bituminous samples for compaction tests, Marshall and tensile splitting test and for other tests where uniformity is required. Thanks to the planetary action this mixer ensures a complete and uniform mixing. The machine is provided with a variable speed drive allowing to set a wide range of speeds:

- from 20 to 130 rpm for the planetary action
- from 60 to 390 rpm for the revolving action

The stainless steel protection grid can be lifted to inspect the bowl, and in this case the motor automatically turns off to prevent accidents to CE safety Directive. A timer allows to select the mixing time or the continuous mixing.

The mixer is supplied complete with stainless steel bowl, but **without** whisk beater, **without** coupling and **without** electric heater that must be ordered separately (see accessories).

**Note:** Mixer 20 litres capacity are bench type.  
Mixer 30 litres capacity are column freestanding type.

### AVAILABLE MODELS

#### B027

#### MIXER 20 LITRES CAPACITY

**Power supply:** 400V 3ph 50Hz 1.1kW

**Dimensions:** 700x570x950 mm. **Weight:** 135 kg approx.

#### B027SP

#### MIXER 20 LITRES CAPACITY

Identical to mod. B027 but with power supply:

230V 1ph 50Hz 1.1kW

#### B027L

#### MIXER 30 LITRES CAPACITY

**Power supply:** 400V 3ph 50Hz 1.1kW

**Dimensions:** 750x600x960 mm. **Weight:** 200 kg approx.

#### B027LSP

#### MIXER 30 LITRES CAPACITY

Identical to mod. B027L, but with power supply: 230V 1ph 1.1kW



Model	B027 (20 litres)	B027L (30 litres)
WHISK THIN wire beater, EN Specifications	B027-03	B027-03L
WHISK THICK wire beater, EN Specifications	B027-06	B027-06L
COUPLING beater/shaft for B027-03(L), B027-06(L), B027-04(L)	B025-08	B025-08L
OTHER MODELS OF BEATERS, NOT CONFORMING TO STANDARDS:		
BEATER, STAINLESS STEEL	B027-07	-----
BEATER, aluminium	-----	B027-02L
SPIRAL Beater	B027-04	B027-04L
HOOK Beater	B027-05	B027-05L
COUPLING beater/shaft for B027-02(L), B027-05(L), B027-07	B025-09	B025-09L
ISOMANTLE HEATER, electric, complete with thermoregulator.		
The isomantle winding action of the bowl allows a more uniform heating of the bituminous sample.		
Power supply: 230 V 1ph 50-60 Hz 1000 W	B027-01N	B027-01L
BOWL, Stainless Steel, spare-part	B027-11	B027-11L



## CLIMATIC CABINETS



The climatic cabinet is available in two versions:

- **C313N** Temperature and humidity controlled from -30 to +70 °C and 20% to 95% respectively for testing concrete (EN 12390-2), cement (EN 196-1), aggregates (EN 1367-1) and many other applications.
- **C316N** Only temperature controlled from -30 to +70 °C for the determinations of the behavior and resistance to freezing and thawing of aggregates (EN 1367-1) and different other applications on concrete and building materials.

### MAIN FEATURES

- Real-Time display of temperature and humidity parameters.
- High quality thermal insulation material.
- Temperature control from -30 to +70 °C with high stability ( $\pm 0.15$  °C).
- Humidity control from 20% to 95% with  $\pm 5\%$  stability and  $\pm 1\%$  accuracy (within temperature +10 to +70 °C).

### C313N TEMPERATURE AND HUMIDITY CONTROLLED CABINET 535 LITRES CAPACITY

STANDARDS: EN 196-1, EN 1367-1, EN 12390-2, EN 12390-9

Designed for all research and control laboratories to perform: cold and/or hot temperature measurement at controlled humidity conditions, any kind of freezing/thawing tests and accelerated curing tests. Used to cure concrete (EN 12390-2) and cement specimens (EN 196-1) and analyze the behavior to freezing and thawing of aggregates (EN 1367-1) and concrete (EN 12390-9).

Internal and external frame is made of stainless steel AISI 304.

Polyurethane insulation: 60 mm thick.

Internal ventilation.

Door with 180° opening angle, equipped magnetic gasket and integrated heater against freezing.

Shelves can be taken off and adjustable in height; adjustable feet.

Temperature and humidity sensors wall mounted inside cabinet

The cabinet is supplied with a **two stage filter**; mechanic and mixed ionic/cationic resins. It works with demineralized, softened waters, or tap water with hardness rate up to 300 PPM assuring an excellent functioning along the time.

Equipped with microprocessor temperature/humidity controller with integrated cycles multiple segments programmer.

- panel mount 144x130 mm format
- 5" color graphic display
- 50 programs with 100 segments and real time clock
- Logging function with PC interface (optional)

Visual alarm for minimum and maximum temperature

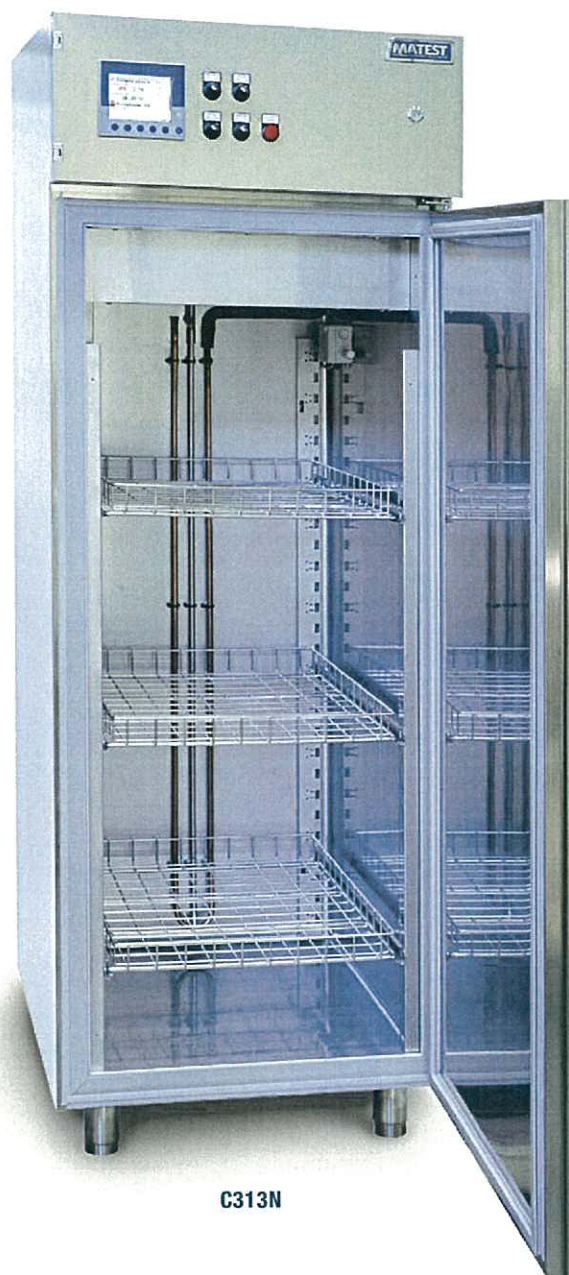
Supplied complete with 3 adjustable shelves suitable to withstand weights up to 40 kg

**Inside dimensions:** 590x670x1360 mm

**Overall dimensions:** 710x820x2080 mm

**Power supply:** 230V 1ph 50-60Hz 2570W

**Weight:** 170 kg approx.



**C313N**

### C313-01N TEMPERATURE AND HUMIDITY CONTROLLED CABINET 1200 LITRES CAPACITY

Same as C313N model, but with an internal capacity of 1 200 liters. Internal ventilation.

Door with 180° opening angle, equipped magnetic gasket and integrated heater against freezing.

Shelves can be taken off and adjustable in height; adjustable feet.

Temperature and humidity sensors wall mounted inside cabinet

Visual alarm for minimum and maximum temperature

Supplied complete with 6 adjustable shelves suitable to withstand weights up to 40 kg.

**Inside dimensions:** 1300x670x1360 mm

**Overall dimensions:** 1500x820x2080 mm

**Power supply:** 230V 1ph 50-60Hz 2900W

**Weight:** 230 kg approx.

**CURING TANKS FOR CONCRETE SPECIMENS**

STANDARDS: EN 12390-2 | ASTM C31, C192 | AASHTO T23

**C302 KIT****CURING TANK 650 LITRES CAPACITY****HEAVY PLASTIC**

Made from extremely robust and stable polyethylene, complete with base rack.

Supplied **without** thermostat heating system, to be ordered separately (see accessories).

**Inside dimensions:** 1040x1040x605 mm

**Weight:** 60 kg approx.

**C302 KIT****C302-10 KIT****CURING TANK, 550 LITRES CAPACITY****HEAVY PLASTIC**

Same to mod C302 KIT but having:

**Water discharge cock incorporated into the tank**

**Inside dimensions:** 1100x710x690 mm

**Overall dimensions:** 1200x80x850 mm

**Weight:** 55 kg approx.

**C302-10 KIT**

Discharge  
cock

**C304****CURING TANK 1000 LITRES CAPACITY**

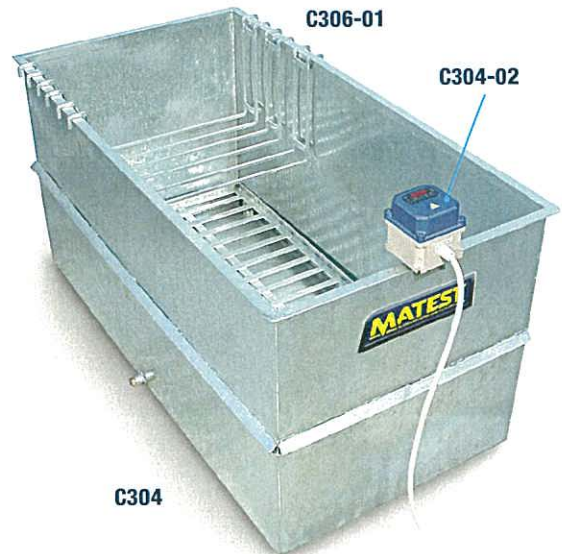
Made from steel sheet, zinc coated to prevent it from corrosion.

Complete with base rack and stopper for an easy water discharge. Supplied **without** thermostat heating system, to be ordered separately (see accessories).

The tank can accommodate up to 64 cubes 150mm side, or up to 48 cubes 200mm side.

**Inside dimensions:** 1500x750x750 mm

**Weight:** 120 kg approx.

**C304****NEEDED ACCESSORY**

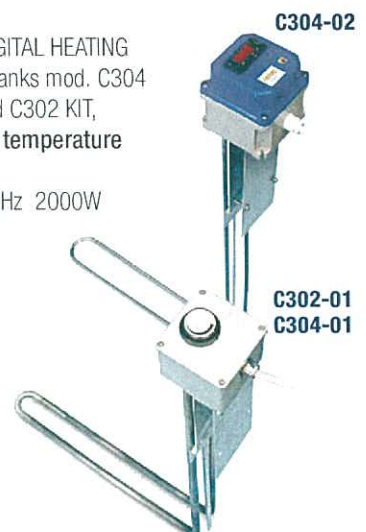
Available in two versions:

**C302-01** THERMOSTAT ANALOGIC HEATING SYSTEM, for the tank mod. C302 KIT  
230V 1ph 50-60Hz 2000W

**C304-01** THERMOSTAT ANALOGIC HEATING SYSTEM, for the tanks mod. C302-10 KIT and C304  
230V 1ph 50-60Hz 2000W

AS AN ALTERNATIVE

**C304-02** THERMOSTAT DIGITAL HEATING SYSTEM for the tanks mod. C304 C302-10 KIT and C302 KIT, ensuring better temperature accuracy  
230V 1ph 50-60Hz 2000W

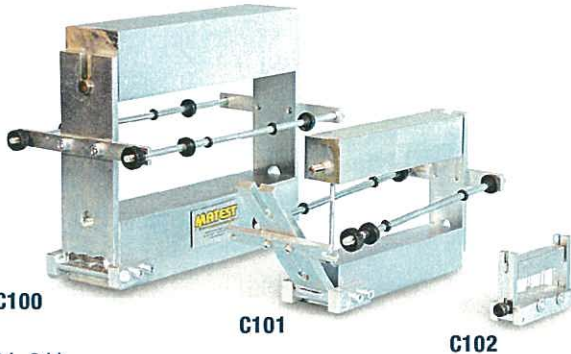
**C304-02 Detail****C302-01  
C304-01**

**ACCESSORIES TO COMPRESSION AND FLEXURAL TESTING MACHINES****SPLITTING TENSILE TEST DEVICES**

For cylindrical specimens.

STANDARDS: EN 12390-6 | ASTM C496 | NF P18-408

Model	Cylinders Ø x height mm	Weight kg	Height mm
C100*	150x300, 160x320, 6"x 12"	20	280
C101*	100x200, 110x220, 4"x 8"	12	220
C102*	40 x 80	1	90

**C100****C101****C102****C101-01\*****SPLITTING TENSILE TEST DEVICE**

For cylindrical specimens from Ø 100x200 mm (4"x8") to Ø 160x320 mm (6"x12").

The base is equipped with flat springs centering and keeping in position the specimen.

Two columns with adjustable height sustain the upper plate by two springs.

This item is an alternative solution to mod. C100 + C101

**Dimensions:** 350x250xh264 mm

**Weight:** 17 kg approx.

**C101-01****C103\*****SPLITTING TENSILE TEST DEVICE**

Used to perform tests on concrete cube specimens 100 and 150 mm and on concrete block pavers.

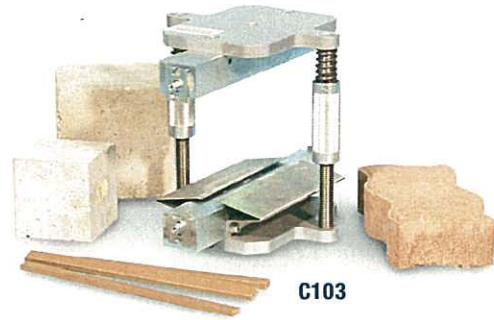
STANDARDS: EN 12390-6, EN 1338

**Dimensions:** 350x250x264 mm

**Weight:** 17 kg approx.

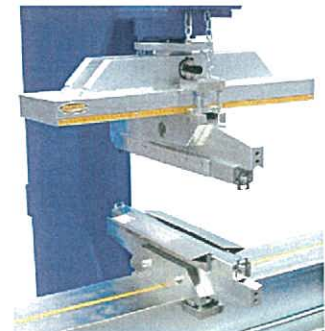


**\*Note:** To perform the test, these devices have to be used with a concrete compression machine equipped with a low capacity measuring range (see dual low range, p. 313), or with a flexural frame.

**C103****C103-01\*****SPLITTING TENSILE TEST DEVICE**

Same as mod. C103 but to perform tests on concrete block pavers having max. dimensions 300 x 500 mm, and for tests on concrete cube specimens 100, 150, 200 mm, and any type of block and prismatic specimens. This splitting device is directly fixed on the compression platens of the block testers having 2000kN or 3000kN capacity.

**Weight:** 10 kg approx.

**C103-01****C103-02****C103-02\*****SPLITTING TENSILE TEST DEVICE**

Same to mod. C103-01, but to be fixed to the flexural frames serie C091-02N (p. 292), C090-06 (p. 294), C095N (p. 296) and C096N (p. 300).

**ACCESSORIES**

- C100-01** STANDARD: EN 12390-6  
PACKING STRIPS, dimensions 4x10x350 mm to be used for splitting tensile tests with mod. C100, C101, C101-01 C103. Pack of 100 pieces.
- C100-02** STANDARDS: EN 1338, EN 12390-6  
PACKING STRIPS, dimensions 4x15x350 mm to be used for splitting tensile tests with mod. C103. Pack of 100 pieces.
- C100-03** STANDARDS: EN 1338, EN 12390-6  
PACKING STRIPS, dimensions 4x15x540 mm, to be used for splitting tensile tests with the device mod. C103-01. Pack of 100 pieces
- C109-12(N)** SOFTWARE UTM2 (Universal Testing Machine 2)  
Licence for TENSILE SPLITTING TESTS on cylinders, cubes and concrete blocks.  
STANDARDS: EN 1338, EN 12390-6

General description and technical details: see UTM2 p. 18

## S199 AUTOMATIC, PROGRAMMABLE PROCTOR | CBR COMPACTOR WITH MICROPROCESSOR HIGH PERFORMANCE

STANDARDS: EN 13286-47 | ASTM D698, D1557, D1883  
 AASHTO T99, T180, T193 | BS 1377:4, 1990, 1994  
 NF P94-093, P94-066 | DIN 18127  
 UNE 7365, 7255, 103-501-94 | CNR UNI 10009  
 CNR N. 29, 69 | DUTCH RAW | AS 1289 and most  
 International Standards.

Designed to compact Proctor and CBR specimens, it ensures an extremely uniform compaction degree, granting reliable and repeatable test results.

The microprocessor software allows to select and perform different compaction cycles in a fully automatic system, by strictly meeting the mentioned International Standards.

The blows are automatically distributed as requested by the selected Standard, with turntable rotation and rammer displacement through photoelectric cell sensors and microprocessor. Top quality components and high accuracy mechanical workings grant very long life also under intensive utilisations.

The digital control panel is separate from the machine and it can be fixed to the wall or mounted on a bench.

The high resolution graphic display (blue negative) 320x240 pixels visualizes selected Standard, total number of blows, effected and remaining ones to end the test, and execution of each layer.

The compactor is easy to use, friendly menu driven, versatile, of simple and practical maintenance.

The user can **select and memorize up to 10 personalized test cycles**, that can be later on modified or replaced by other ones. This is a very important function, because it allows to update the Compactor to new Standards, or any Standard not included in the microprocessor, or for research purposes.

The original lift system of the rammer can be selected at 12" or 18", or at 300 or 450 mm, granting a correct and constant fall height. Rammer drop speed: 1 blow each 2 seconds.

The compactor accepts moulds having  $\varnothing$  4" and 6", 100 and 150 mm, both Matest made or from other producers, thanks to its universal mould fixing system.

The machine is supplied **without rammers** to be ordered separately and selected according to the desired Standard (rammers are interchangeable).

Not sellable in CE markets  
 (see accessory: safety guards mod S199-11)

**Power supply:** 230V 1ph 50Hz 500W

**Dimensions:** 610x470xh1710 mm

**Weight:** 200 kg approx.



S199 with mould and rammer

### NEEDED ACCESSORIES

**S199-06** STANDARD RAMMER  $\varnothing$  50  $\pm$  0.2 mm and 2500  $\pm$  10 g weight

**S199-07** MODIFIED RAMMER  $\varnothing$  50  $\pm$  0.2 mm and 4535  $\pm$  5 g weight

Conforming to: EN 13286-47 | BS 1377:4 | DIN 18127  
 UNE 7255, 7365, 103-501-94 Standards.

OR:

**S199-08** STANDARD RAMMER  $\varnothing$  50.8  $\pm$  0.13 mm and 2491,25  $\pm$  1.25 g weight

**S199-09** MODIFIED RAMMER  $\varnothing$  50.8  $\pm$  0.13 mm and 4537  $\pm$  3 g weight

Conforming to: ASTM D558, D559, D698, D1557, D1883  
 NF P94-066/93 | CNR UNI 10009  
 CNR N. 69 | ASHTO T99, T180, T193

OR:

**S199-13** STANDARD RAMMER,  $\varnothing$  50  $\pm$  0.4 mm and 2700  $\pm$  10 g weight

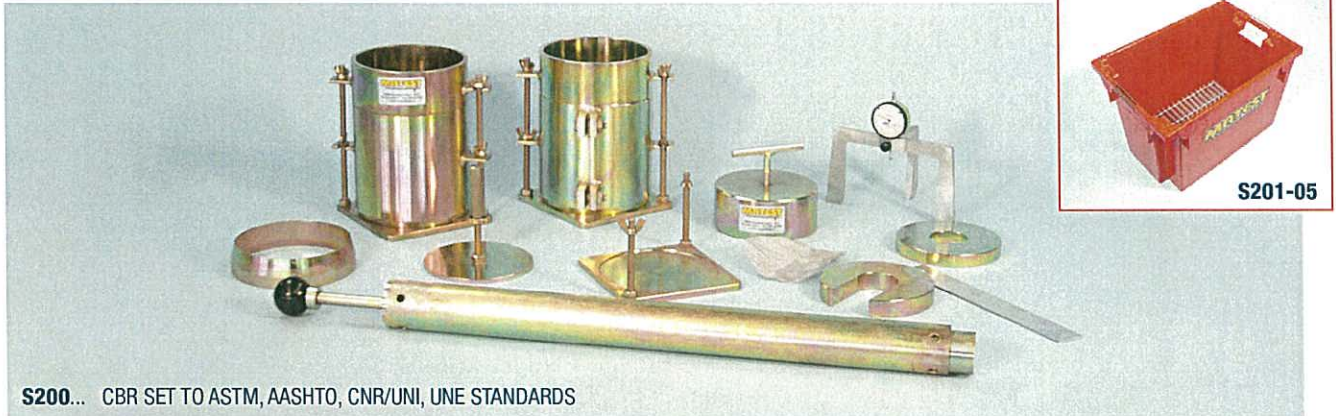
**S199-14** STANDARD RAMMER,  $\varnothing$  50  $\pm$  0.4 mm and 4900  $\pm$  10 g weight

Conforming to: AS 1289 (Australian) Standard.

## CALIFORNIA BEARING RATIO - CBR

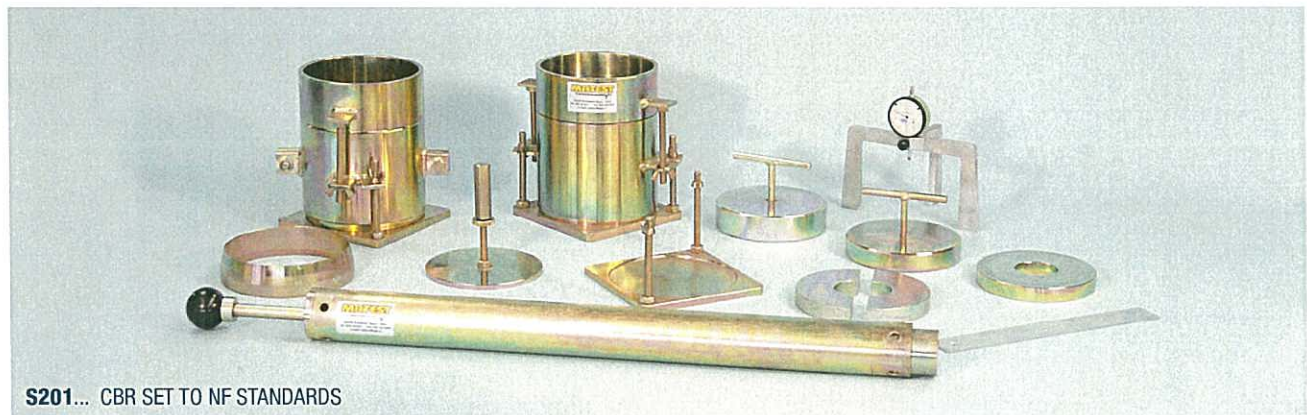
STANDARDS: EN 13286-47 | EN 13286-4 | ASTM D1883 | AASHTO T193 | CNR UNI 10009 | UNE 103-502  
 NF P94-078, P94-093, P98-231-1 | BS 1377:4, 1924:2

This method has been developed by the California State Highway Department, and is now accepted by almost all the International Standards in force. The test is aimed to the evaluation of the bearing capacity of soil for flexible pavement design in road construction. The compaction test can be performed both with the manual rammers and the automatic compactor mod. S199.

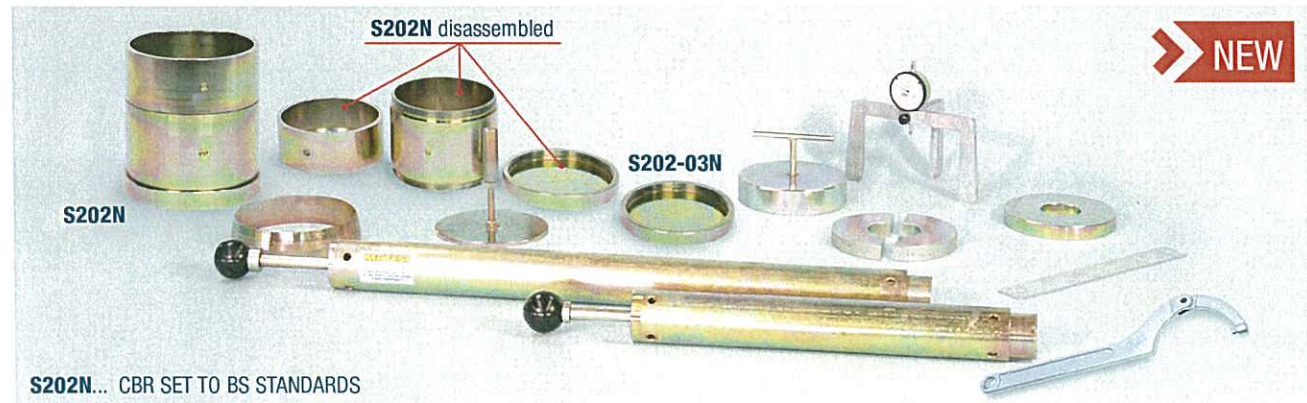


**S200...** CBR SET TO ASTM, AASHTO, CNR/UNI, UNE STANDARDS

**S201-05**



**S201...** CBR SET TO NF STANDARDS



**S202N...** CBR SET TO BS STANDARDS

**NEW**



**S203...** CBR SET TO EN 13286-47 STANDARD

The CBR equipment, steel made and plated against corrosion is available in different versions according to the various Standards in force.

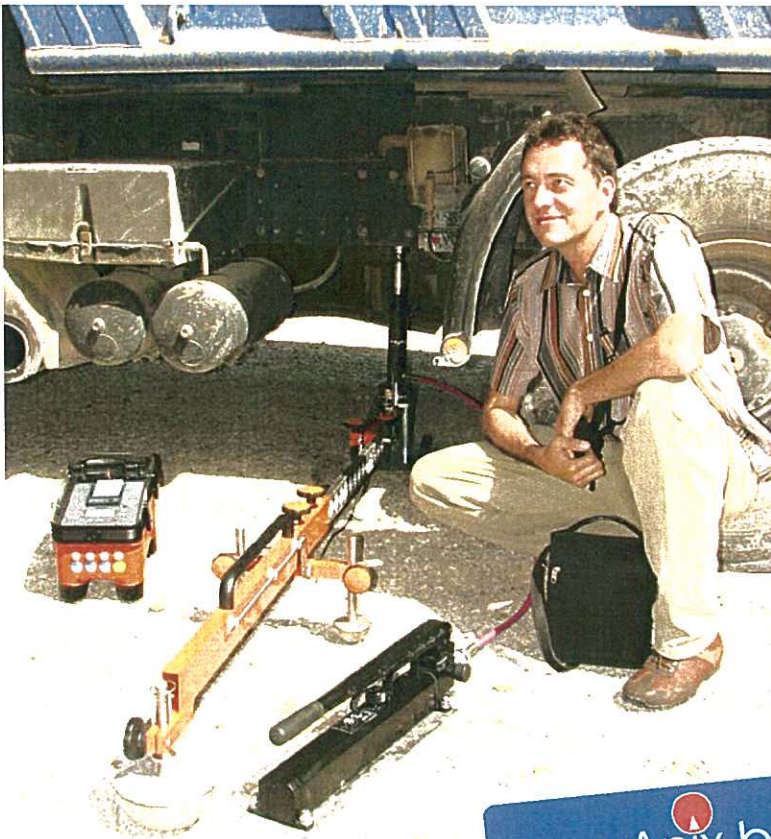


**S114**

# LOT VI

## THE NEW GENERATION AX<sup>®</sup> 01 Plate bearing tester

Electronic evaluation · mini printer · compact design



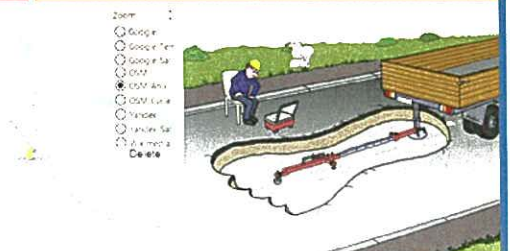
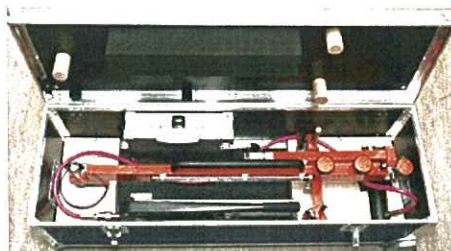
[www.Anix.biz](http://www.Anix.biz)  
Precision Electronic Instruments

Anix GmbH · Hintern Hecken 1 · Germany · 39179 Barleben  
Tel. +49 39202-8792-52 · Fax -57 · [biz@anix.biz](mailto:biz@anix.biz)

- Electronic evaluation
- Immediate printing
- Storage of test results
- Compact design
- Simple 4-button user interface
- Excel<sup>®</sup>- spreadsheets
- Long operation time
- Robust and durable

The static plate bearing test is used for earthworks, foundations and road construction to determine the deformability, strength and bearing capacity of soils and base layers.

- GPS option available



The AX<sup>®</sup> 01 is characterized by a high quality, aluminium and stainless steel chassis. Rugged waterproof industrial sensors are used to ensure accurate results.

  
**Anix GmbH**  
PRECISION ELECTRONIC INSTRUMENTS

# THE NEW GENERATION

## AX<sup>®</sup> 01 Plate bearing tester

Technical specification

The results of the test are calculated and displayed immediately. Additionally the data are stored at the SD card. The thermal printer provides an immediate printout of the results. The measurement data (average compressive strength below the plate and the corresponding deflection of the load plate) are shown in a printed diagram.

The electronic device of AX<sup>®</sup> 01 evaluates the strain moduli  $E_{V1}$ ,  $E_{V2}$  (a figure of the bearing capacity) and the ratio  $E_{V2}/E_{V1}$  (a figure for the compaction level).

Results can be transferred to the PC and are available for further processing in Microsoft Excel<sup>®</sup>.

The compact design of the AX<sup>®</sup>01 allows easy transportation in the trunk of a car.

The equipment can be operated by one person and can be used in the rain also.

### Technical specifications:

Technical data is subject to change without notice. We reserve the right to further developments and technical modifications of our products.

Version: January 2020

#### Electronic device:

- Case made from PET, transparent top cover with scratch-resistant surface
- Thermal printer with 58 mm print width
- SD card for the storage of approximately 200 tests
- Plate diameters are adjustable: 300 mm, 600 mm, 762 mm
- Precision (resolution): Deflection 0,01 mm
  - Normal stress 0,0001 MN/m<sup>2</sup> (printed and stored)
  - 0,001 MN/m<sup>2</sup> (displayed)
- Rechargeable battery, 4.8 V, 4 Ah, fast charger 2 h, about 48 h battery life

#### Test tripod:

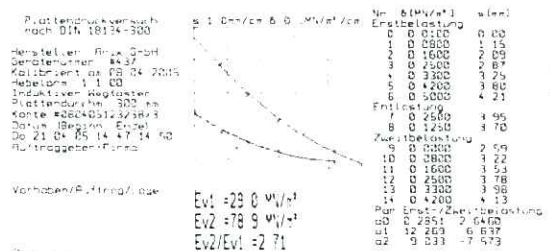
- Direct measurement of the deflection according to DIN 18134 and other standards (displacement measurement with one sensor only)
- Test beam can be folded-out and is extractable
- Hemispherical feet for an optimal placement at rough and soft surfaces
- Short (250 mm) and long (500 mm) fixture for the displacement sensor (for measurements in pits deeper than 0.3 m)
- Displacement sensor is made from stainless steel, stroke of the sensor: 15 mm

#### Loading apparatus:

- Hydraulic jack assembly with jack for 100 kN force, manual hydraulic pump
- Bearing plate made from steel S355JO, stainless surface, diameter 300 mm, tunnel for the displacement sensor
- Force sensor 100 kN, made from stainless steel
- Extension set (2 x 25 mm, 2 x 50 mm, 2 x 100 mm, 2 x 150 mm, complete height 650 mm, complete weight 3,4 kg)
- Upper magnetic ball joint (loadable up to 60kN, weight 0,7 kg)

#### Dimensions:

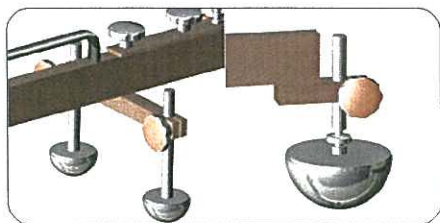
- Test tripod: folded L 1150 x W 340 x H 260 mm, unfolded L 2330 x W 340 x H 310 mm
- Height of the hydraulic jack (retracted): 285 mm, stroke 150 mm
- Weight of the hydraulic jack assembly (jack + pump + hose): 11,9 kg
- Bearing plate with force sensor mounted: diameter 300 mm, height 265 mm,
- Weight complete: (without packaging, without transport box): 56,8 kg



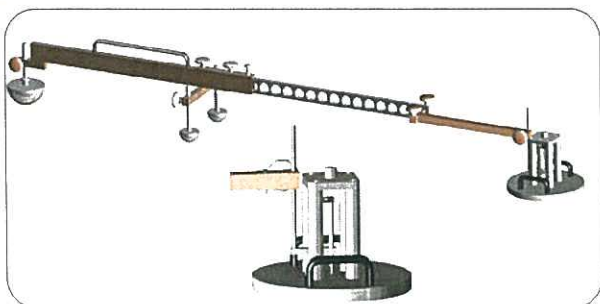
# THE NEW GENERATION

## AX<sup>®</sup> 01 Plate bearing tester

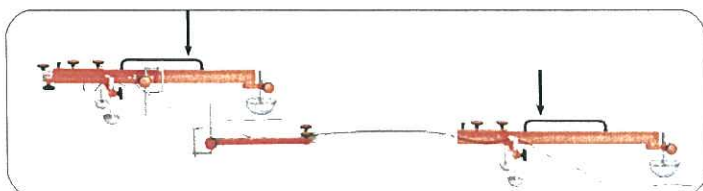
Leveling device



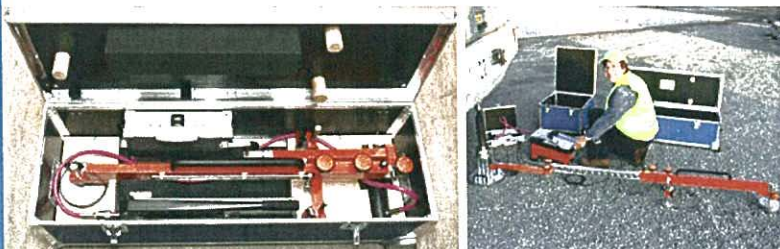
Fast and safe positioning by hemispherical feet.



Measurements in pits deeper than 0.3 m.



The carrying handle allows the transportation of the test tripod when folded or extended.



The hemispherical feet of the AX<sup>®</sup> 01 provide a quick and safe positioning of the system even on rough layers.

The feet are height-adjustable - fine adjustment with a leveling screw at the rear foot.

Big star-grip screws allow to lock the feet and measuring arms with work gloves.

Because of the fixed measuring beam the equipment can be used in pits deeper than 0,3 m (according to DIN 18134).

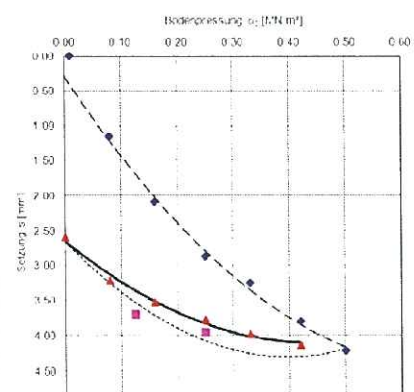


# THE NEW GENERATION

## AX<sup>®</sup> 01 Plate bearing tester

PC-evaluation

Prüf- stufe	Normalsp. n [MN/m <sup>2</sup> ]	Sitzung s [mm]
<b>Erstbelastung</b>		
1	0 0100	0 00
2	0 0200	1 15
3	0 1000	2 09
4	0 2100	2 87
5	0 3100	3 26
6	0 4200	3 68
7	0 5000	4 21
<b>Entlastung</b>		
8	0 2500	3 95
9	0 1250	3 70
<b>Zweitbelastung</b>		
10	0 0000	2 59
11	0 0800	3 22
12	0 1600	3 53
13	0 2500	3 70
14	0 3300	3 90
15	0 4200	4 13

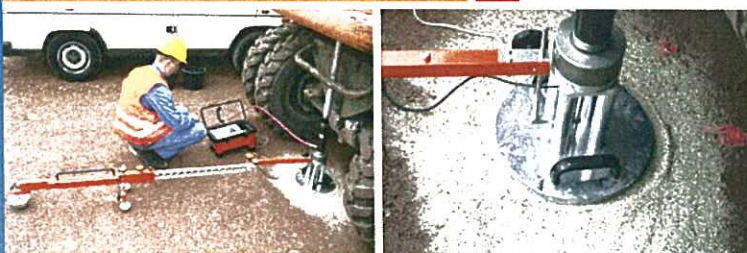


### Storage of measurements

- The AX<sup>®</sup> 01 can store up to 200 measurements on an SD card.
- The USB card reader for the PC is included.
- A data transfer cable is not necessary.

### Data handling

- Data handling is carried out with Microsoft Excel<sup>®</sup> on a Windows PC. You are flexible to create your own test reports with your company logo and your layout.
- The design of the test report can be created without any special software.
- Load map of GPS location into Excel (only with GPS option)



Prüfpunkt Nr.	Messdatum	Messwert	$f_{0.01}$ [MN/m <sup>2</sup> ]	$E_{0.01}$ [MN/m]	$E_{0.02}$ [MN/m]	$E_{0.05}$ [MN/m]	$E_{0.1}$ [MN/m]	Bemerkungen
1	23.09.2012	11.64	0.100	28.0	76.9	0.71		
2	23.09.2012	11.68	0.491	26.4	74.0	0.81		
Kriterium	#230900115428	Arbeitswert Mittelwert	Standardabweichung	Varianz	Qualitätszahl G			
		76.5	3.3	4.3%	9.49	2.76	0.07	
						2.6%	-7.92	
Die Prüfkriterien (Q>0.85) sind						<b>erfüllt</b>	<b>nicht erfüllt</b>	



## The LTL-XL & LTL-X Mark II retroreflectometer features

*The professional choice for measuring the retroreflection of road markings*

### LTL-XL & LTL-X Mark II instruments

LTL-XL and LTL-X Mark II are robust, long lasting and advanced instruments, designed for professionals using the latest developments in light and sensor technology. Using DELTA's gradient index technology and patented optical system, the instruments can measure all types of flat and profiled markings. The sensor response, combining the CIE eye response and the CIE illuminant A, meets both CEN and ASTM requirements for profile capacity and colour.

LTL-XL and LTL-X Mark II comply with the following standards: EN 1436, ASTM E 1710, ASTM E 2177, ASTM E 2302, ASTM E 2832

### General features

- Memory capacity for 200.000 measurements
- Multiple language menu
- Easy readable colour LED display
- GPS positioning
- Data presentation on Goggle Earth
- USB interface
- Stray light compensation
- Shows and stores day, time, humidity and temperature
- Facility for entering and storing of road ID, marking type and user ID
- Facility for averaging measurements
- Wet timer to facilitate measuring wet road markings
- Comes with maintenance free LED light
- Single handed operation, user-friendly

LOT VII



### The LTL-XL specific features

- $R_L$  and  $Q_d$  under dry and wet conditions
- Short measurement time of 1-3 seconds
- Measures plain and profiled markings up to 5 mm/0.2 inch



### The LTL-X Mark II specific features

- $R_L$  under dry, wet and continuous wetting
- Short measurement time of less than 1 second
- Measures plain and profiled markings up to 15 mm/0.6 inch

## Performance

LTL-XL and LTL-X Mark II measure all types of road markings at a simulated distance of 30 m with the highest level of accuracy. The instruments operate with a reproducibility of +/- 5 % and a repeatability of +/- 2 %.

LTL-XL and LTL-X Mark II measure, depending on the model chosen,  $R_L$  (nighttime visibility),  $Q_d$  (daytime visibility), visibility under dry, wet and continuous wetting.

LTL-XL and LTL-X Mark II measure white and yellow markings with no adjustment.

LTL-XL and LTL-X Mark II have automatic stray light compensation, so daylight and other outside light sources will not affect the accuracy of the measurements.

The Road Sensor Control (RSC) software supplied with the instrument, combined with the USB interface, makes it easy to download data and generate reports like MS-Excel reports. GPS data can easily be transferred to a GPS program like Goggle Earth for visual overview showing the results and where measurements have been taken.

## Add-ons

LTL-XL and LTL-X Mark II can be fitted with telescopic handle and wheels to make the handling of the instrument ergonomic and easy. The adjustable handle will allow the operator to work in upright position, and the wheels make it easy to move the instrument to a new measurement location. All operations can be carried out single-handed with single-touch securing easy and safe use in traffic.

LTL-XL and LTL-X Mark II can be fitted with built-in precision GPS and printer. GPS makes it possible to determine exactly where any specific measurement has been carried out. The printer can provide you with immediate written proof of a measurement. The internal

memory automatically stores the measurements with relevant support data.

## Calibration standards

LTL-XL and LTL-X Mark II instruments are calibrated at DELTA's DANAK-accredited laboratory and assuring traceability to PTB (Physikalisch-Technische Bundesanstalt, Germany) and NIST (National Institute of Standards and Technology, USA). The recommended daily calibration of the instruments is simple and easy to carry out.

## Contact and further information

For further information about DELTA's LTL-XL and LTL-X Mark II, please contact:



**Kjeld Aabye**  
Market Manager

Phone +45 72 19 46 30  
kaa@delta.dk  
roadsensors.com



Telescopic handle



Wheels



Printer



GPS

## DELTA

Venlighedsvej 4  
2970 Hørsholm  
Denmark  
Tel. +45 72 19 40 00  
roadsensors@delta.dk  
roadsensors.com





## Road Marking Control Kit

The quality and performance of pavement markings have increased in recent years thanks to better paint and thermoplastic materials and higher performing glass beads. In addition, new marking types have improved in particular the performance during wet conditions at nighttime by allowing better run-off of water. In parallel, cost of materials has increased having made road owners interested in checking the quality of road marking during and after application as well as knowing the actual amount of paint or thermoplastic applied. DELTA's Road Marking Control Kit offer the tools needed to inspect these parameters.



Road Marking Control Kit is exclusively designed for quality control of road markings. The Road Marking Control Kit contains the following tools:

- Marking Thickness Gauge
- Wet Film Comb
- Insertion Thermometer
- Thermometer and Hygrometer
- Electronic Weight
- Illuminated Microscope
- Magnifying Glass
- Folding Ruler

**The Marking Thickness Gauge** measures the thickness of markings in dry conditions for verification of the amount of paint or thermoplastic applied.

**The Wet Film Comb** determines the thickness of paint or thermoplastic material during application.

**The Insertion Thermometer** is used for checking the temperature of liquid coatings such as paints and thermoplastic.

**The Thermometer and Hygrometer** is used for checking ambient temperature and relative humidity at the marking installation location to evaluate application conditions.

**The Electronic Weight** is used for control weighting of materials used in connection with the marking installation such as glass beads.

**The Illuminated Microscope** provide 40x magnification for inspection of the marking macrostructure and glass bead spread and embedment.

**The Magnifying Glass** provide an easy and simple 6x magnification for inspection of markings.

**The Folding Ruler** can be used for any length measurement tasks.

For additional information on specifications of the individual items included in the Road Marking Control Kit please contact DELTA or check the Marking Thickness Gauge leaflet.

### Warranty

2 years

### DELTA

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2970 Hørsholm  
Denmark  
Tel. +45 72 19 40 00  
roadsensors@delta.dk  
roadsensors.com

# LOT VIII

HOCHPRÄZISIONS

PRÜFTECHNIK

made  
in  
Germany

## ZORN INSTRUMENTS

# ZFG 3.0 GPS

Light-Weight Deflectometer

www.zorn-instruments.com



load-bearing capacity test  
& soil compaction control



## applications

# determination of load-bearing capacity and compaction quality of soils and aggregates

- ✓ subgrade
- ✓ railway construction
- ✓ trenches and canal construction
- ✓ pipeline construction
- ✓ backfill for bridges
- ✓ fast and safe self-supervision
- ✓ clear data reports for the client

## test standards and regulations

The ZORN ZFG Light-Weight Deflectometer complies with a long list of international standards and regulations; for example:

**North America:** ASTM E2835-11 (2015)  
**United Kingdom:** IAN 73/06, Revision 1 (2009)  
**Germany:** TP BF-StB Part 8.3 (2012) and ZTV E-StB (2009),  
RIL-DB 836 (1999/2013)  
**Austria:** RVS 08.03.04 (March 2008)

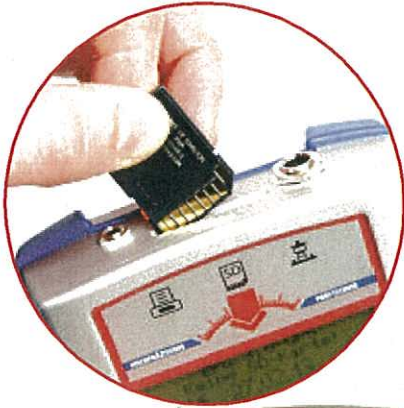
**Switzerland:** KMF (Recycled Cold-mix Foundation Layers,  
Canton of Aargau)  
**Spain:** UNE 103807-2 (2008)  
**Russia:** Госреестр СИ РФ № 52068-12 (Type-Approval, 2012)  
**People's Republic of China:** RIL-DB 836 cn (2009)

HOCHPRÄZISIONS

PRÜFTECHNIK

**ZORN**  
INSTRUMENTS

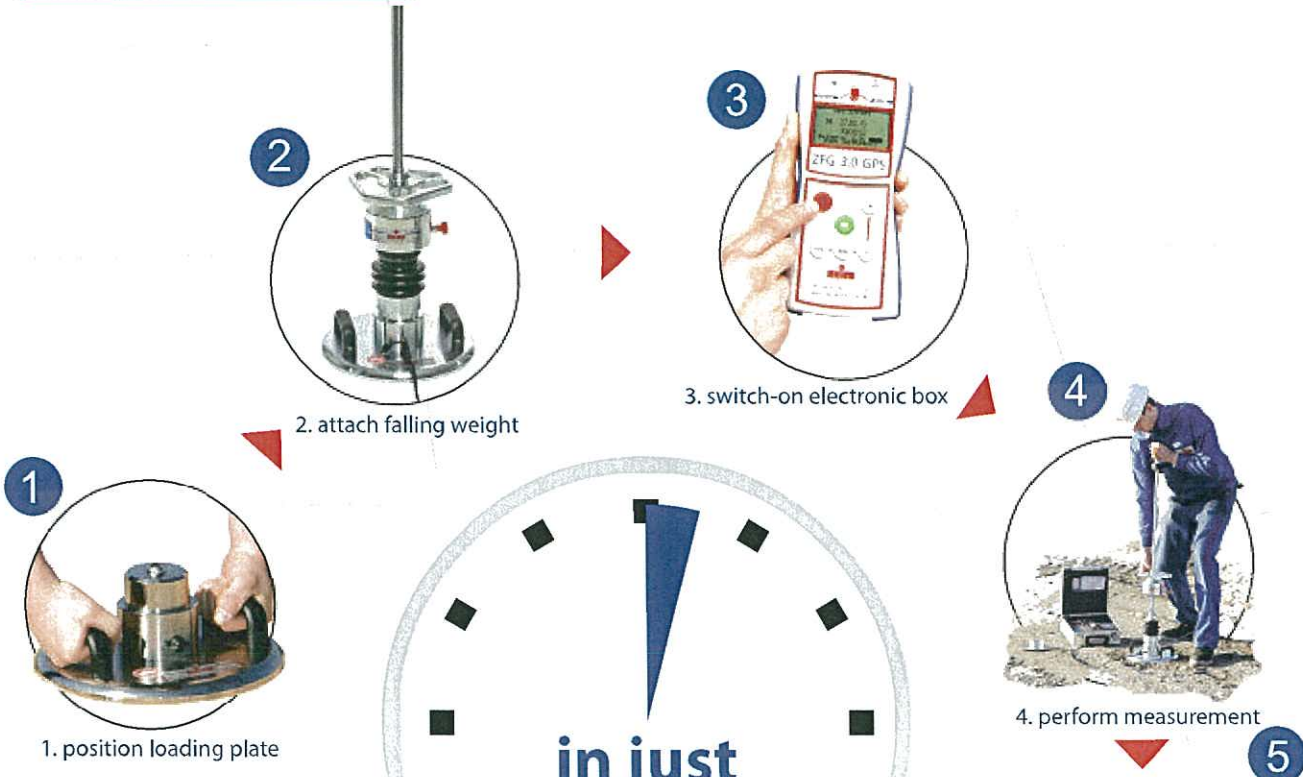
## ZFG 3.0 GPS



- ✓ ergonomic triangular grasp  
(no rolling during transport)
- ✓ integrated calibration reminder
- ✓ battery power supply (AA)
- ✓ easy menu navigation
- ✓ variable text input
- ✓ variable pre-loading pulses
- ✓ plausibility check
- ✓ certified own production
- ✓ GPS coordinates in UTM and Gauss-Krueger format
- ✓ Google-Maps interface
- ✓ including 300 mm loading plate with 10 kg loading device, Evd measuring range 15-70 MN/m<sup>2</sup>

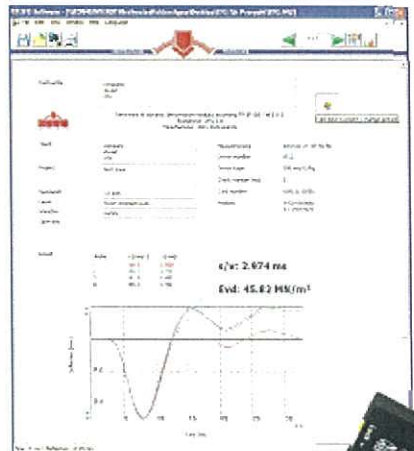


test procedure



**fast  
easy  
reliable**

PC software



SD-data card

- SD drive safely integrated in electronic box
- fast and simple data transmission



5. calculate results / print protocol



ZORN INSTRUMENTS e.K. • Benzstraße 1 • 39576 Stendal (Germany)

Tel.: +49 39 31- 2 52 73 0  
Fax: +49 39 31- 2 52 73 10

www.zorn-instruments.com  
info@zorn-instruments.com



## accessories



**Magnetic base**  
Clean storage of the falling weight between measurements



**Thermal printer**  
in aluminium carrying case



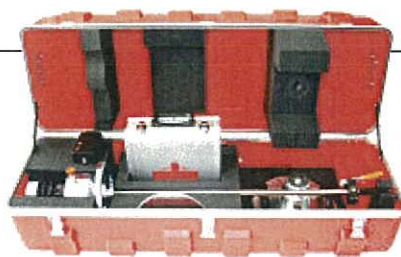
**ZORN software & SD-card reader (USB)**  
for data analysis and editing of test reports  
(for XP, Vista and Win7 / 10)



**foldout trolley**  
for easy ZFG transport between measurement points



**15 kg falling weight** for an extended measuring range  
(Evd 70 - 105 MN/m<sup>2</sup>)



**ZORN Air Cargo Case ACC3**  
for safe transport and storage of ZFG instruments



## TRUST, BUT VERIFY

Continuous quality control has become an essential factor in modern infrastructure construction and maintenance.

Testing the bearing capacity of compacted soil and aggregates is required at the beginning of every project. Whether you are building the foundations for a new motorway or just refurbishing an existing road; the correct compaction criteria provides assurances both the contractor and the client.

With the use of the ZFG Light-Weight Deflectometer from ZORN Instruments instant and on-site compaction control is simple and safe. Models of the latest ZFG generation offer valuable new features and greater ease of use.

Be ahead of the game, test existing soil structures before you start building. The ZFG can be used also to check the bearing capacity of existing grounds in minimum time. Whether this is virgin ground or previously constructed ground. The ZFG range can detect weak sections of the soil instantly and a decision to rectify the problem can be immediate.

Working with the ZFG range is simple. It comes with a comprehensive instruction manual with calibration data. Alternatively, our local agent in your country will provide free instruction and training.

As a precise measuring instrument a ZFG has to be calibrated on a regular basis. Please contact us or your local ZORN partner for advice.

**Note:** The Digital Marshall Tester B043KIT, completed by the specific accessories (listed below) is suitable to perform also the following tests:

## DETERMINATION OF INDIRECT TENSILE STRENGTH

STANDARDS: EN 12697-23, EN 12697-12 | ASTM D6931  
AASHTO T283

### B047-02

TENSILE SPLITTING DEVICE FOR SAMPLE Ø 4" AND 6"  
Used to measure the indirect tensile strength and the radial strain of a Marshall specimen Ø 4" and 6", where a vertical load is applied. Supplied complete with loading strips to test specimens having Ø 4" and 6". Steel manufactured, plated against corrosion.

**Dimensions:** Ø 248x270 mm  
**Weight:** 14 kg approx.

Alternative solution:

**B047-02S** TENSILE SPLITTING DEVICE for samples Ø 4" and 6" complete. Simple model not accepting the device B047-04 for strain measurements.



## ACCESSORIES

**B047-04** SET OF TWO LINEAR RESISTIVITY TRANSDUCERS, stroke 10 mm, accuracy and linearity ± 0.3% to meet CNR N.134. Complete with supports and accessories for strain measurements.

**B044-03** DISPLACEMENT TRANSDUCER, **additional**, 50 mm stroke, for a double measurement of the vertical displacement of the specimen during the tensile splitting test. Complete with cable and connector. When used with B043-02N software the average value of the two transducers is given.

**B043-02N** SOFTWARE UTM2 (Universal Testing Machine 2) Licence for INDIRECT TENSILE STRENGTH  
Standards: EN 12697-23, EN 12697-12 | ASTM D6931  
AASHTO T283  
General description and technical details: see UTM2 p. 18

## DIRECT SHEAR (LEUTNER) BETWEEN BITUMINOUS STRATA

STANDARD: ALP A StB T.80

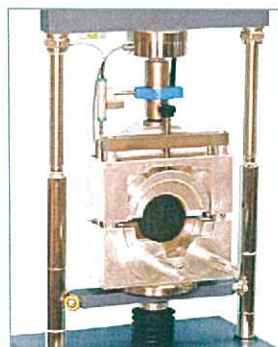
Direct shear test (LEUTNER) on the connection between bituminous strata, carried out on asphalt cylinder specimens diameter 150 mm or 100 mm obtained from road cores or on laboratory made specimens.

## NEEDED ACCESSORIES

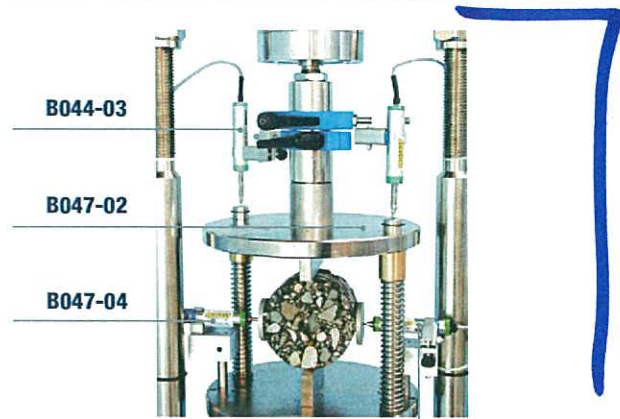
**B047-10**  
LEUTNER testing head for specimens Ø 150 mm

**B047-11**  
SPACERS for Ø 100 mm specimens with Leutner head.

**B043-03N**  
SOFTWARE for Marshall and Leutner tests.



**B047-10 + B047-11**

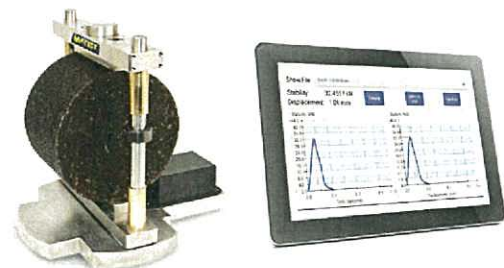


**B047-04**

## DIGITAL UPGRADE FOR ANALOG LOAD FRAME

STANDARDS: AASHTO T283, ASTM D6931 and D4867

- For tensile strength tests performed in the lab
- 100 Hz data collection rate
- Displays exact peak load, reducing potential of operator error
- Eliminates the need for plotters and plotter pens
- Provides digital record for printing, storage or email



## DETERMINATION OF WATER SENSITIVITY OF BITUMINOUS SAMPLES

STANDARD: EN 12697-12

This test determines the effect of saturation and accelerated water conditioning on the indirect tensile strength of bituminous mixtures, by evaluating the effect of moisture with different sample conditions.

Equipment: Digital Marshall tester B043KIT, indirect tensile strength accessories, and also:

### B052-02 WATER BATH, DIGITAL, WITH COOLING DEVICE

Temperature range: +3 to +95 °C, accuracy ± 1 °C.

(EN 12697-12 Standard requires a temperature to be selected in the range of +5 to +25 °C).

Capacity: 45 litres  
Inside dimensions: 635x360x205 mm

The bath can also be used for Marshall tests and general laboratory purposes.  
Technical details: see p. 135



**B052-02**

### S230 KIT ASTM | AASHTO BALLOON DENSITY APPARATUS 1600 ML CAPACITY

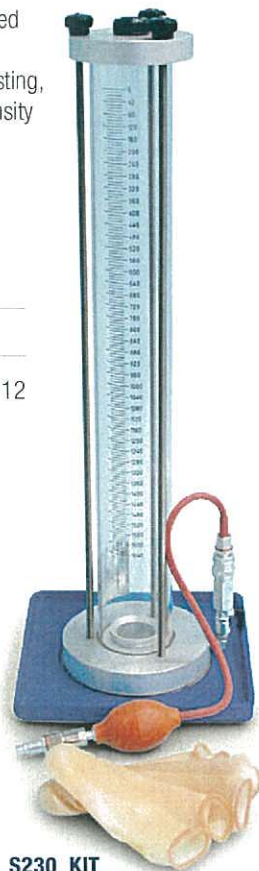
STANDARDS: ASTM D2167 | AASHTO T205 | CNR N° 22

Used to determine the in-situ density of fine graded compacted or bonded soil. The apparatus is placed over the hole excavated in the soil, and water is pumped into a rubber balloon and forced into the hole. The amount of water displaced into the ballon is measured from the graduation of the scale.

The instrument consists of a graduated plexiglass cylinder 1600 ml capacity housed within an aluminium alloy casting, a rubber pump with stop valve, a density plate and 12 rubber balloons.

**Dimensions:** 340x340x700 mm

**Weight:** 6 kg approx.



S230 KIT

#### SPARE

**S230-01** Rubber balloons, pack of 12

LOT X

### S232 KIT NF BALLOON DENSITY APPARATUS

3000 ML CAPACITY

STANDARD: NF P94-061-2

Used to determine the in-situ density of fine graded compacted or bonded soil, this unit has the same test system of mod. S230 KIT, but with a capacity of 3000 ml as requested by French Specification. A hand-driven piston forces the water into the rubber membrane. A dial gauge measures the water pressure so to execute all the test at the same pressure.

An index engraved on the stem of the piston measures the volume of water filling the hole.

The unit is supplied complete with 6 reinforced rubber membranes, 4 locking clamps, base plate, accessories.

**Dimensions:** 360x360x700 mm

**Weight:** 10 kg approx.

#### SPARE

**S232-01** Reinforced rubber membrane, pack of 6



S232 KIT

S233 KIT

### S233 KIT NF BALLOON DENSITY APPARATUS 6000 ML CAPACITY

Identical to mod. S232 KIT, but with capacity of 6 litres.

**Weight:** 15 kg approx.

#### SPARE

**S233-01** Reinforced rubber membrane, pack of 6

#### ACCESSORIES

Used for levelling, digging, collecting and maintaining the soil samples:

<b>S240-01</b> SCRAPER to level the ground	<b>V198</b> CHISEL 300 mm long x 25 mm wide
<b>S240-02</b> METAL DIBBER TOOL	<b>V186</b> DENSITY SPOON, big sized
<b>S240-05</b> METAL POINTED ROD	<b>V188</b> TROWEL, 100x200 mm
<b>V195</b> RUBBER MALLET Ø 50 mm	<b>V183</b> ALUMINIUM SCOOP 325 cc
<b>V193</b> STEEL HAMMER 300 g	<b>V125-03</b> TINNED CAN 5 litre cap.
<b>V194</b> STEEL HAMMER 2 kg	
<b>V199</b> DENSITY PICK	



S240-01...V199