

**PROGRESSIVE COMPOSITE
ENGINEERING**

— ABOUT US

Our reliable, accurate and high-quality products provide uncompromising integrity for our customers, when they need it the most. Dedicated to leaving a legacy of safety in our market, we live by a zero failure philosophy and make sure our engineered composite solutions are tested and proven to work in the harshest of environments, giving you 24/7 confidence and peace of mind.

— OUR VISION

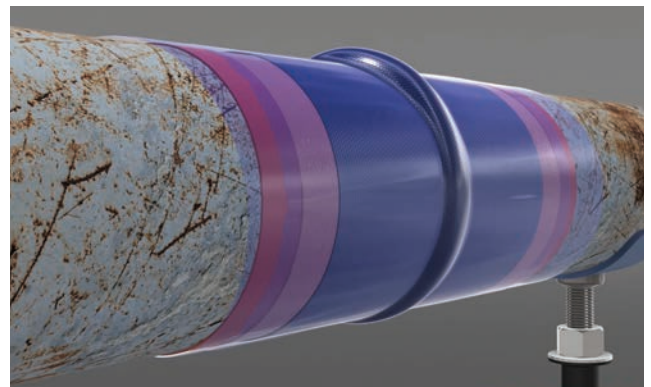
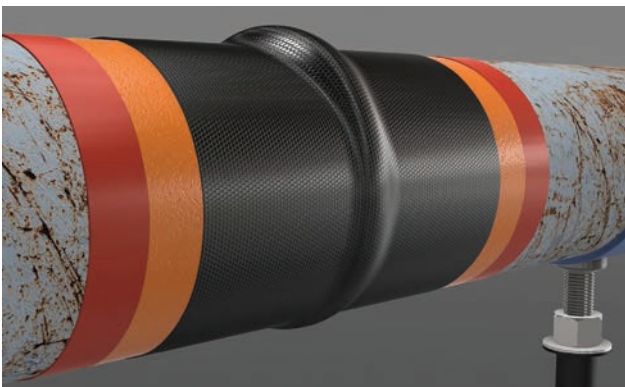
- ✓ Progressive engineering in advanced composite systems
- ✓ Provide dependable, responsible and accurate information regarding our systems and the capability thereof
- ✓ Operate with integrity and dignity
- ✓ Ensure quality excellence throughout the supply chain
- ✓ Create sustainable accessibility to our resources
- ✓ Provide leading-edge support to the industry

REVOWRAP

— PRODUCT INFORMATION

Revowrap provides re-enforcement of the piping in both the axial and hoop directions, and delivers uniform loading throughout the repair. Each repair is engineered using ASME PCC2 or ISO TS 24817 engineering codes. Carbontech engineers have the technology to perform FEA (Finite element analysis) on both the damaged piping systems and the Revowrap composite repair system.

This systems can be applied by hand lamination, filament winding or by infusion methods and may be applied to live piping systems. Revowrap may be applied to any pipe size, most substrates and almost any piping configuration including tanks, vessels, flanges, and other structural assets.



— PRODUCT SPECIFICATIONS

- ✓ Qualified engineered system (Engineered to ASME PCC2 and ISO TS 24817)
- ✓ 24/7 Engineering & technical support by qualified engineers from various locations around the globe
- ✓ Engineered solution with certified compliance and PR Eng. verified design calculations
- ✓ Non-invasive external application without the need to isolate the processes
- ✓ Extend design life of compromised assets and eradicate unforeseen down time
- ✓ Low tech, Quick installation requirements
- ✓ No pressure limitations and may handle complex geometries
- ✓ No Hot-work or heavy equipment required
- ✓ Up to 20 year repair lifetime
- ✓ High corrosion, acids and chemical resistance
- ✓ High strength per \$ invested
- ✓ Negligible creep
- ✓ UV resistant
- ✓ Trained installers in accordance with ASME PCC2 and ISO-TS-24817

— HOW IT WORKS

1

The client will provide Carbontech engineering with the anomaly description in the form of an engineering assessment form.

2

Carbontech engineers provide repair recommendations and design-calculations in accordance with ASME PCC2 and/or ISO-TS-24817 signed off by a Professional engineer.

3

Materials may be supplied in Kit form for specific projects or repairs.

4

Installation and quality control are performed by trained distributors, contractors or end-users.

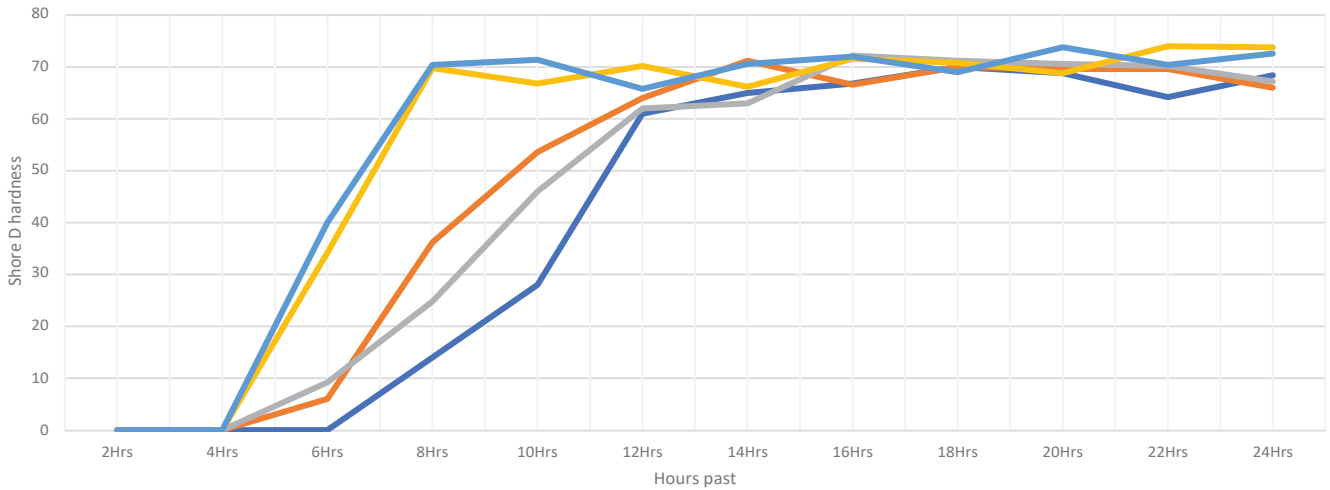
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Quality control documentation is returned to Carbontech engineering for quality assurance and guarantee motivation.

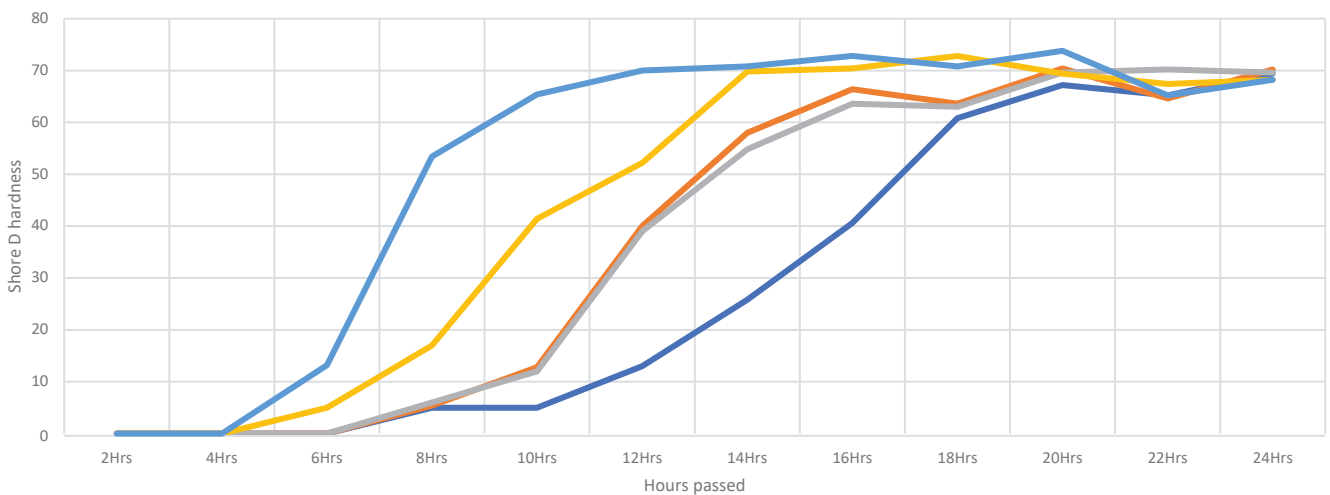
CURE GRAPHS

— 16° C — 18° C — 23° C — 29° C — 32° C

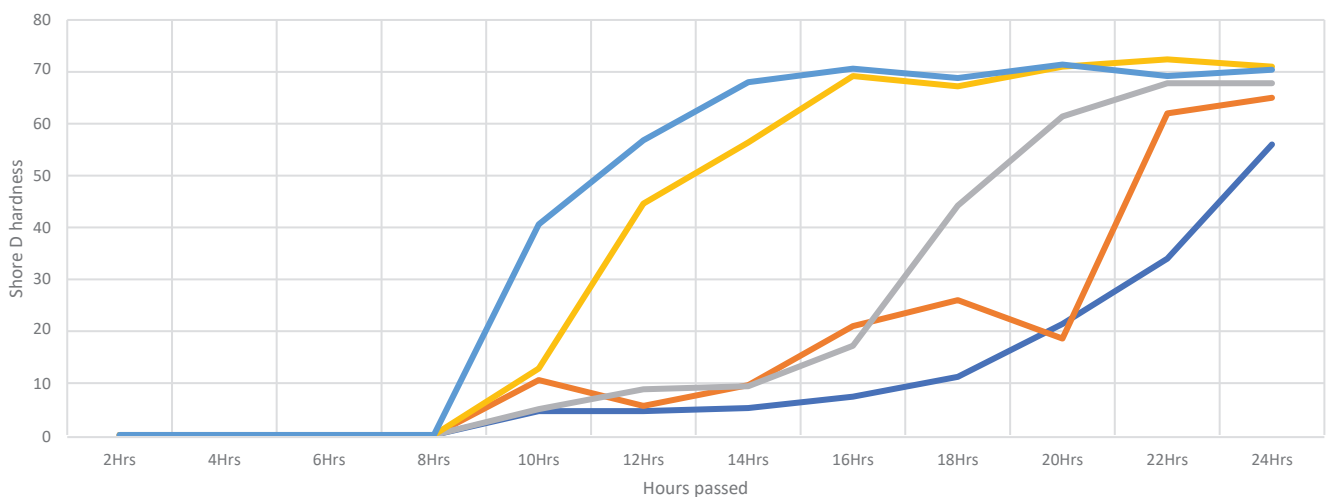
Revowrap 110 cure rates at different temperatures



Revowrap 185 set rates at different temperatures (post cure required)



Revowrap 225 set rates at different temperatures (post cure required)



TECHNICAL INFORMATION

	Revowrap 110	Revowrap 185	Revowrap 225
Primary Epoxy Colour After Mixing	Orange	Blue	Red
Saturation Epoxy Colour After Mixing	Orange	Blue	Red
HDT (Heat Distortion Temperature)	124.08°C	226.8°C	247°C
Maximum Service Temperature Limits For Non-leaking Defects	109°C	211.8°C	233°C
Minimum Application Temperatures	9°C	18°C	23°C
Set time @ 29°C	4 Hours	12 Hours	20 Hours
Cure time @ 29°C	12 Hours	Requires Post Cure	Requires Post Cure
Shelve Life (Renewable under specific conditions)	2 years	1 year	1 year
Maximum Allowable Pressure	No Limits	No Limits	No Limits
Maximum Application Size	No Limits	No Limits	No Limits

ISO TS24817 & ASME PCC2 QUALIFICATION DATA

	Revowrap 110	Revowrap 185	Revowrap 225
Ply Thickness	0.4mm	0.52mm	0.52mm
Tensile Modulus hoop	48.8GPa	37.6GPa	30.7GPa
Tensile Modulus Axial	20.5GPa	19.6GPa	20.5GPa
Tensile Strength	568.2MPa	453.1MPa	454.1MPa
Tensile strain to failure	1.1%	1.3%	1.1%
Shear strength	73.6MPa	82.1MPa	106.8MPa
Poisson's Ratio	0.33	0.37	0.38
Lap Shear Strength to Steel (Sand blasted)	10.04MPa	9.2MPa	9.58MPa
Lap Shear Strength to Steel (Bristle blasted)	7.35MPa	4.8MPa	5.45MPa
Lap Shear Strength to Steel (Hand cleaning)	5.86MPa	4.7MPa	4.2MPa
Minimum Barcol/Shore D Hardness	75	75	75
Thermal Expansion Coefficient	1.45x10 ⁻⁶	1.88x10 ⁻⁶	1.86x10 ⁻⁶
HDT (Heat Distortion Temperature)	124.08°C	226.8°C	247°C



— TECHNICAL FEATURES & ADVANTAGES

- ✓ Stronger than steel
- ✓ 24/7 Engineering and technical support by qualified engineers world wide
- ✓ Engineered solution with certified compliance and PR eng. Verified design calculations
- ✓ External application without the need to isolate the processes
- ✓ Extend design life of compromised assets
- ✓ Eradicate unforeseen down time
- ✓ Low tech installation requirements
- ✓ Quick non-invasive installation
- ✓ Can handle Complex piping geometries, bends, Tee's, vessels, tanks etc.
- ✓ No Pressure limitations
- ✓ No Hot work required
- ✓ No heavy equipment required
- ✓ Lightweight (No support systems required)
- ✓ High temperature resistance
- ✓ High corrosion, acids and chemical resistance
- ✓ Low Odour
- ✓ Fast curing systems
- ✓ High tensile strength and modulus
- ✓ High strength per \$ invested
- ✓ Negligible creep
- ✓ Does not mechanically breakdown under UV
- ✓ Trained installers compliant to ASME PCC2 and ISO TS-24817



— TYPICAL INDUSTRIES

- ✓ Offshore Oil Rigs
- ✓ Petrochemical Plants
- ✓ Refineries
- ✓ Fertilizing Companies
- ✓ Chemical Plants
- ✓ Water Supply
- ✓ Paper and Pulp
- ✓ Sugar
- ✓ Mining
- ✓ Energy Plants
- ✓ Transmission pipelines

— TYPICAL USES

- ✓ Internal Corrosion
- ✓ External Corrosion
- ✓ Weld Anomalies
- ✓ Mechanical Damage
- ✓ Support Abrasion on Piping Systems
- ✓ Deteriorated Concrete or Rebar Corrosion
- ✓ Aging Assets
- ✓ Complicated Geometries



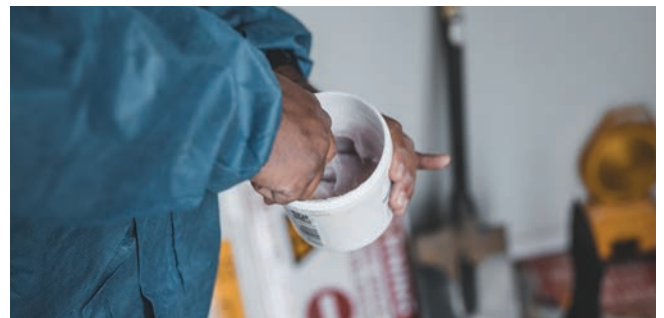


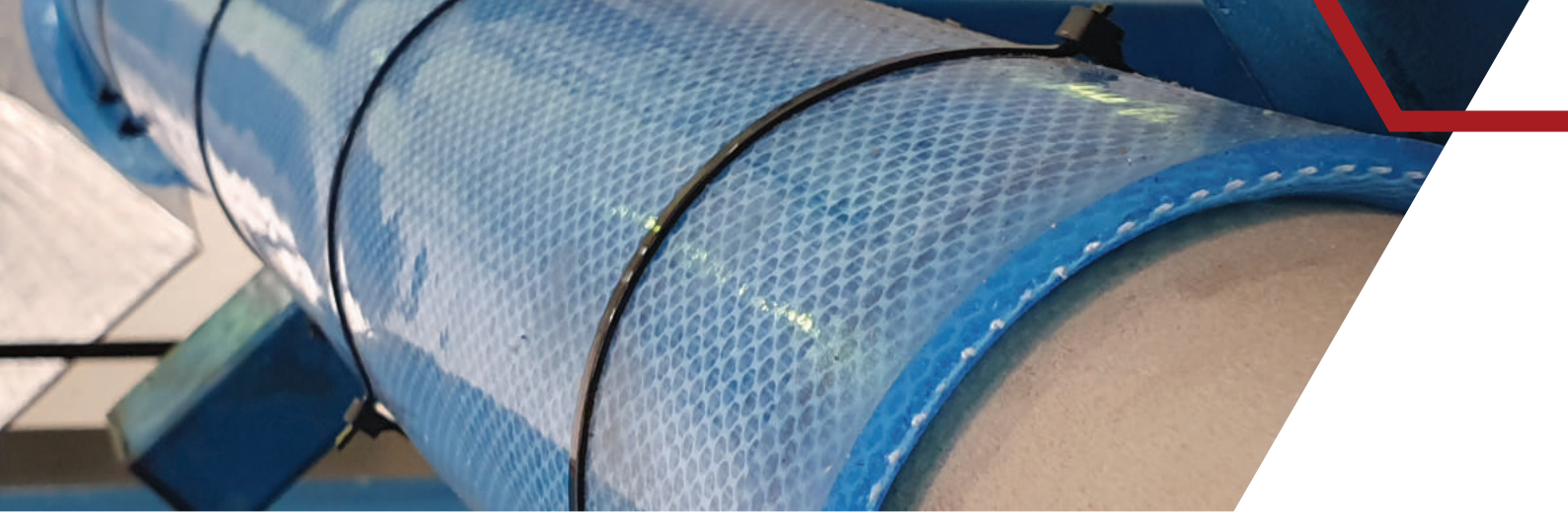
— TRAINING

Carbontech provides training and certification to a variety of installer companies such as, maintenance contractors, leak sealing companies, coating companies, inspection companies and end users.

Training may be provided at any of our facilities, accredited distributors and on-site custom training packages may also be provided. Carbontech products are engineered solutions thus have stringent procedures to ensure successful repairs. Training is required for compliance with relevant engineering codes and regulations.

Training consists of a 2 day course that consists of a 1 day theoretical seminar on composite repairs and one day practical wrap sessions which are pressure tested to compliance. ISO TS-24817 and ASME PCC2 compliant certification is issued upon the successful completion of the training course.





REVOMAT

— AN INTELLIGENT POST CURE SYSTEM FOR COMPOSITE PIPE REPAIRS

The Revomat is a revolutionary system developed by the Carbontech engineers to safely and efficiently provide the correct cure cycles for The Revowrap Range of products.

Most wrap failures occur by either poor surface preparation & installation or inadequate curing of the products.

All high temperature resin systems require very specific cure regimes in order to complete the cross-link phase of the specific epoxy system. This unlocks the best mechanical properties & chemical resistance performance of the laminate.

— INTELLIGENT RECORDING SYSTEM

The controller system is intelligent and monitors its own power input relative to pipe surface temperatures, it will ensure stable temperature even if the pipe temperature fluctuates.

The Systems Records the entire cure cycle and can provide a graph of the temperatures during the cure cycle.



— ADVANCED USER INTERFACE

The User interface is designed in such a manner that a few clicks on the touch screen will start the correct cure cycle for the selected wrap system.



A Memory Card slot stores all the data which contributes to site quality control.

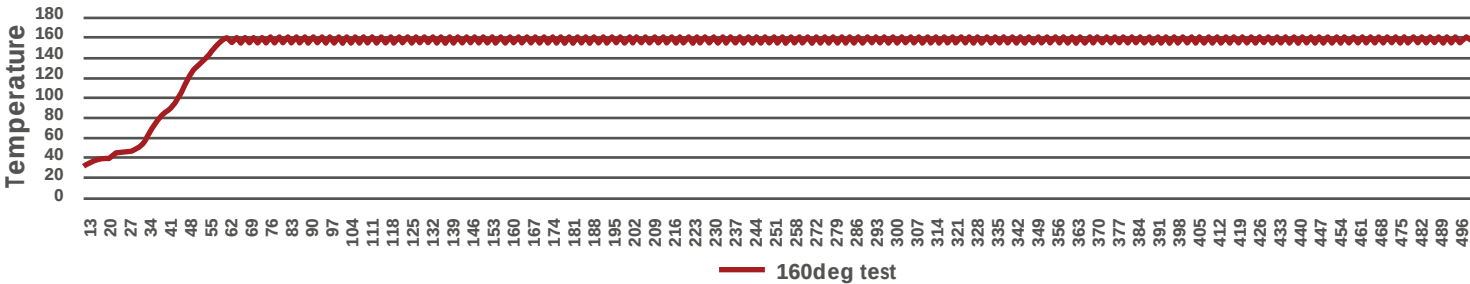
Input Data such as:

- Design Number
- Job Site information
- Date/Time
- Product Name e.g. Revowrap 110
- Technician ID Number
- Quality Control

REVOMAT CONTROLLER	Description	Detail
	Voltage required:	220V 50Hz or 110V 60Hz
	Voltage output:	48V
	Controller waterproof:	IP55
	Controller intrinsically safe:	No
	Controller internal operating temperature:	Between 40°C and 65°C
	Controller dimensions:	H-445mm W-295mm D-225mm
	Controller weight:	15.1Kg
	Wheeled Trolley:	Available
	Number of Mats that can be run off one Unit	One

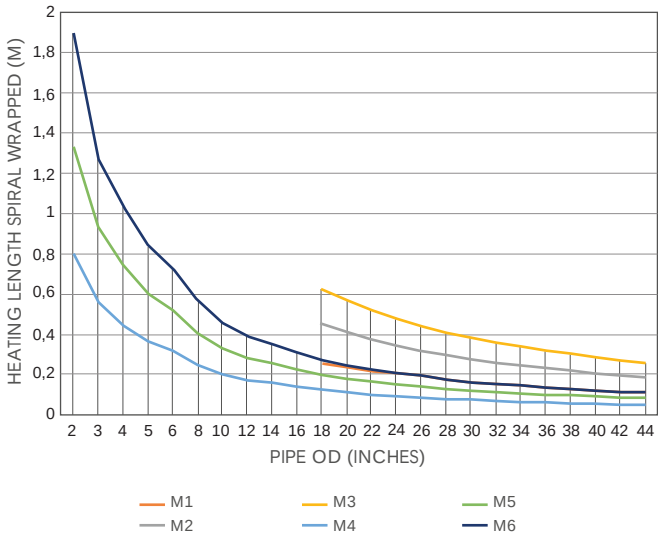


160 DEGREE REVOMAT TEST



REVOMAT SILICONE HEATING MATS	Description		Detail
	Volts:		48V
	Bending radius:		r-25mm
	Maximum Temperature Range:		190°C
	Range of pipes that can be cured		½” to 42”
	Reusable		Yes
	Product usage History		Shell, Chevron, Astron Energy etc
	Geometries that could be cured:		Straight, Elbows, Y’s and T’s
	Mat Code	Dimensions	Weight
	Code M1	1260mm x 350mm	3.5kg
Code M2	2100mm x 350m	6kg	
Code M3	3000mm x 365mm	8.45kg	
Code M4	1260mm x 150mm	1.6kg	
Code M5	2100mm x 150mm	2.9kg	
Code M6	2940mm x 150m	3.5kg	

REVOMAT COVERAGE



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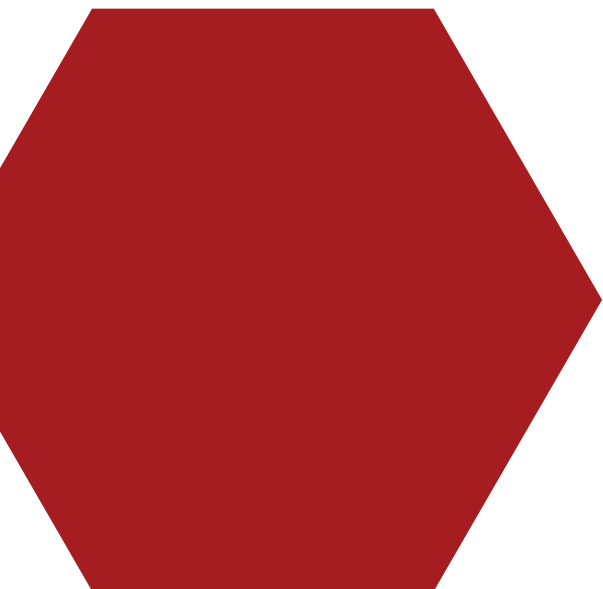
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DISTRIBUTORS



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