STRUKTURE.
CONCRETE INNOVATIVE SOLUTIONS FOR PHOTOVOLTAIC INSTALLATIONS

STRUKTURE
ARCHITETTURE PER IL FOTOVOLTAICO

WARRANTY · WARRANTY
20 years

VALENCIA
CIUDAD DE LAS ARTES Y LAS CIENCIAS

STRUKTURE
ARCHITETTURE PER IL FOTOVOLTAICO

STRUKTURE – Architecture for photovoltaic installations, springs from the half-century experience that Valente SpA has in manufacturing prestressed reinforced concrete utility poles for agricultural uses as well as their ground anchoring. Wide-range knowhow in the construction of support structures for vineyards and orchards, as well as their protection against wind and hail is a strength in STRUKTURE's market proposal of the first-ever concrete support system for photovoltaic panels. The supports require no anchor or foundation; and the poles are driven directly into the ground. Solar farms, integrated power generation systems for agriculture, modular parking systems, special applications on dismissed areas, STRUKTURE designs and installs systems that are superior in mechanical resistance, absence of corrosion and duration in comparison to traditional steel structures.

20 YEAR WARRANTY - CONCRETE POLES WITH DNV CERTIFICATE

PATENTED STRUCTURES - DISPOSAL OF THE ENTIRE STRUCTURE AT END-OF-LIFE - CERTIFICATION EUROCODICE 1

ZENITH SYSTEM FEATURES:

- NO FOUNDATION OR ANCHOR: the KONCRETO poles are driven into the any type of soil by vibro-percussion (granular, clayey, sandy).
- RELIABILITY in the event of OVERLOAD and STRESS in extreme weather conditions, thanks to its engineering properties of KONCRETO concrete poles.
- REDUCED INSTALLATION TIME thanks to the limited number of components and simplicity of connections.
- NO MAINTENANCE: KONCRETO poles are not subject to corrosion over time even if in acid soil and the cross-members, thanks to the protection teknocover, do not oxidize in contact with photovoltaic panels.

DESIGN AND INSTALLATION

STRUKTURE systems are designed to withstand overloads and stresses even in extreme weather. In particular, the systems are designed in compliance with Eurocode 1, according to the following parameters:

- height of the structure
- tilt angle of the modules
- height above sea level of site
- line distance from sea
- topography class of the site
- region in which system is installed

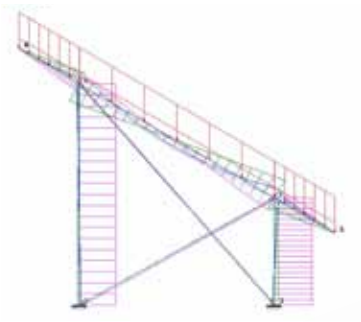
Each system will then be sized to withstand the forces of wind and overload of snow, according to the specific conditions of the site of installation. For each plant, the design department will provide the technical calculations, in compliance with Eurocode 1.

The STRUKTURE design department is able to provide all the advice and assistance necessary to the implementation of the system, through the feasibility study aimed at finding the best technical solution to the needs of both the client and environmental/soil characteristics to maximize the yield of the system over time.

Particular attention is given to the production and installation associated to the system. With aim of minimizing activities on site, specific equipment, assembly procedures and test procedures have been devised. Therefore, support structure installation is performed by our team of specialized installation personnel on the basis of experience and continuous training.

Our team of installers is available for the installation of photovoltaic panels. Upon request, to protect the system installed, we construct barriers with prestressed concrete poles and plastic-coated diamond mesh network.

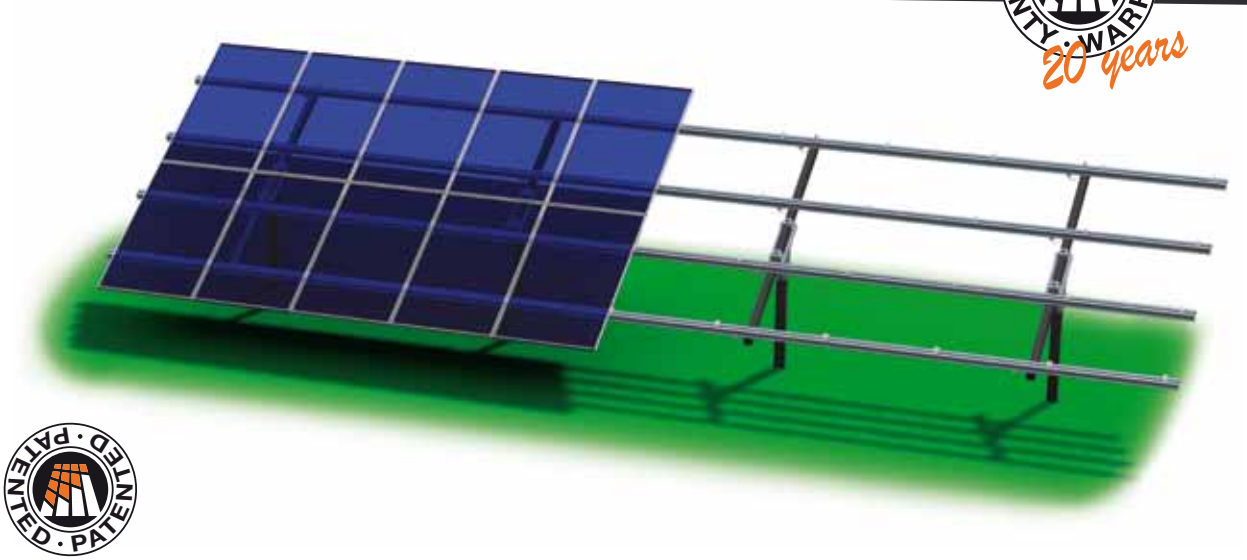
Axial Force
Shear Force
Bending Moment
Torsion
Deflection
Resulting Stress



ZENITH MODEL

Only energy production system with a single support pole.
THE BASE CONFIGURATION INCLUDES:
1 TO 2 MODULES IN VERTICAL ARRANGEMENT
1 TO 3 MODULES IN HORIZONTAL ARRANGEMENT
HMIN max: 700 mm
HMAX max: 2.700 mm

WARRANTY · WARRANTY
20 years



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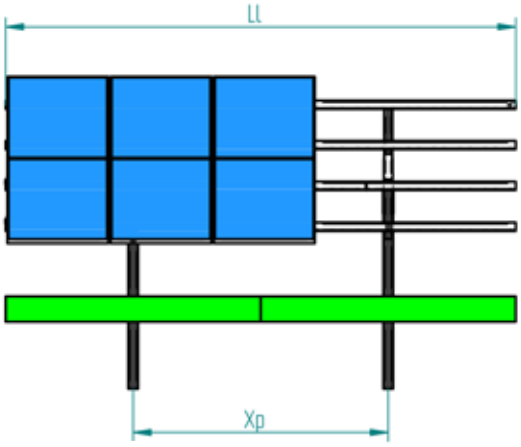
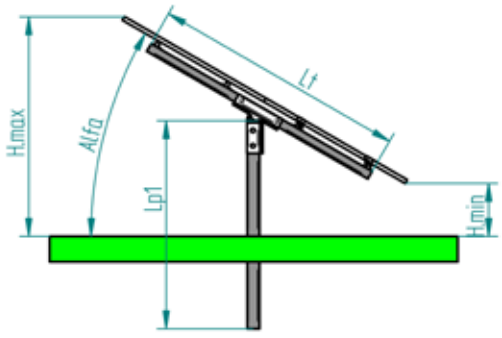




KEY:

Alfa	Module tilt angle to
Lp1	Overall length of sh
Lp2	Overall length of lo
Lt	Overall length of be
Ll	Horizontal beam le
Xp	Horizontal center d
Yp	Vertical center dista
Hmin	Minimum installatio
Hmax	Maximum installatio

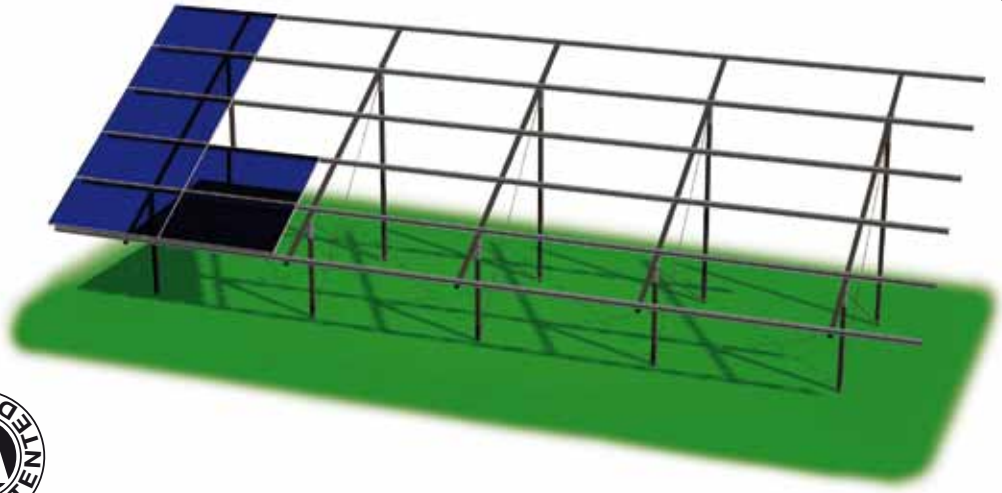
VALUE TABLE FOR ZENITH STANDARD

Module arrangement	Rows	Columns	Alfa °	h.min mm	h.max mm	Lp1 mm	Lt mm	Ll mm	Xp mm	Modules No.	Starting Watts installed
Horizontal	1	4	10÷35	0÷700	300÷2700	1500	1000	6000	4000	4	800÷980
	2	4	10÷35	0÷700	300÷2700	2000	2000	6000	3500	8	1600÷1960
	3	4	10÷35	0÷700	300÷2700	2500	3000	6000	3000	12	2400÷2880
Vertical	1	6	10÷35	0÷700	300÷2700	1500	800	6000	5000	6	1200÷1440
	2	6	10÷35	0÷700	300÷2700	2500	1600	6000	2500	12	2400÷2880

ZENITH PLUS MODEL

Overhead and greenhouse system, with double support pole and wind-bracing.
THE BASE CONFIGURATION INCLUDES:
2 TO 5 MODULES IN VERTICAL ARRANGEMENT
UP TO 8 MODULES IN HORIZONTAL ARRANGEMENT
HMIN max: 2.500 mm
HMAX max: 6.500 mm

WARRANTY · WARRANTY 20 years



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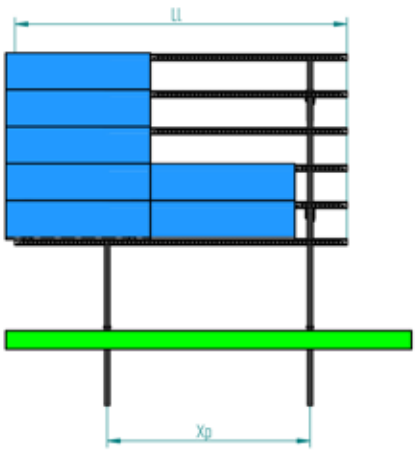
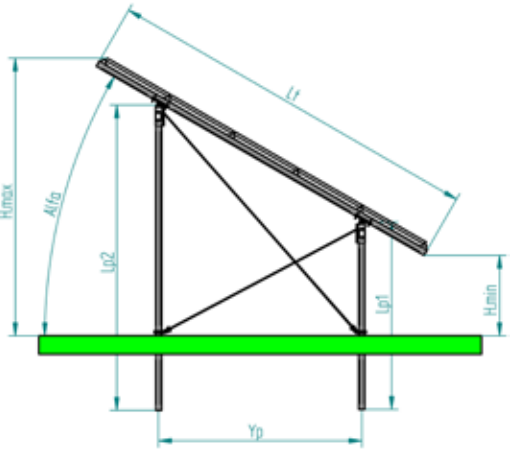




VALUE TABLE FOR ZENITH-PLUS STANDARD

Module arrangement	Rows	Columns	Alfa °	h.min mm	h.max mm	Lp1 mm	Lp2 mm	Lt mm	Ll mm	Xp mm	Yp mm	Modules No.	Starting Watts installed Watt
Horizontal	4	4	10÷35	0÷2500	300÷6500	2500	4250	4000	6000	3000	1735	16	3200÷3840
	5	4	10÷35	0÷2500	300÷6500	2500	4750	5000	6000	2750	2600	20	4000÷4900
	6	4	10÷35	0÷2500	300÷6500	3500	4750	6000	6000	2500	1735	24	4800÷5760
	7	4	10÷35	0÷2500	300÷6500	3500	5250	7000	6000	2250	2600	28	5600÷6860
	8	4	10÷35	0÷2500	300÷6500	3500	5750	8000	6000	2000	3460	32	6400÷7680
Vertical	2	6	10÷35	0÷2500	300÷6500	2500	3000	1600	6000	4000	500	12	2400÷2880
	3	6	10÷35	0÷2500	300÷6500	3000	3800	2400	6000	2750	700	18	3600÷4410
	4	6	10÷35	0÷2500	300÷6500	3500	4250	3200	6000	2000	950	24	4800÷5760
	5	6	10÷35	0÷2500	300÷6500	4000	4500	4000	6000	1750	1150	30	6000÷7350

COMPRISING PARTS

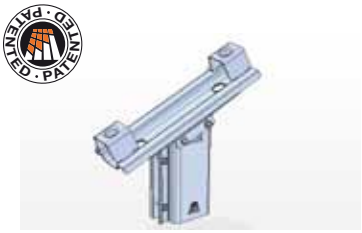
KONCRETO POLES AND BEAMS

KONCRETO poles and beams are made with the technique of prestressing that provides **greater strength** and **durability**, according to the experience of Valente SpA, a market leader in the production of reinforced vibrato and prestressed poles. **The concrete is made up with substances (gravel and sand), deriving from natural materials, which are riddled, weighed and washed.** This material gives the concrete a very strong resistance, much more than inert matter produced from grinding rock. The sand and gravel are mixed with cement that acts as ”glue” that keeps them united and gives a **very high resistance to compression. The steel used is highly resistant (r=1870 N/mm2) and is formed by plaits that adhere perfectly to concrete.**

Characteristics of KONCRETO:

- ***Lack of corrosion over time even if driven in acid soils and in the presence of salt.***
- ***Frost resistance.***
- ***Resistance to stray eddy currents, as the concrete is not electrically conductive.***
- ***Elasticity and flexibility in case of shock and vibration.***
- ***Structural stability due to the high inertia of the product.***

KONCRETO quality is guaranteed through a special certificate from DNV Product Quality, which certifies durability, frost resistance and outstanding mechanical strength.

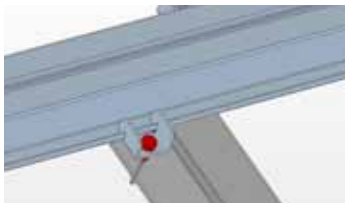


MAIN JUNCTION

The main hub is made of galvanized steel according to the UNI-EN-ISO 1461, with linking screws in galvanized steel. It consists of two main elements that allow the installation and longitudinal adjustment of the KONCRETO support poles and crossbeams. The joint is preset (15 to 30 degrees) and factory pre-assembled for faster installation time. Vertical and angular adjustments may be modified during installation, using high-strength bolts, respect to the horizontal plane.

CROSS-MEMBER

The cross-members are made from profiled stress-resistant steel belts. The profile contains a continuous groove for fastening the modules and a continuous place for cross-member attachment in order to provide maximum flexibility in mounting. The choice of the "omega" open profile is aimed at optimizing load distribution, to avoid the stagnation of rain water and provide support for the passage of the cable sheaths. To solve the problem of oxidation and galvanic corrosion of rails in contact with the photovoltaic panels, the steel surface is protected through the **innovative Teknocover** coating.

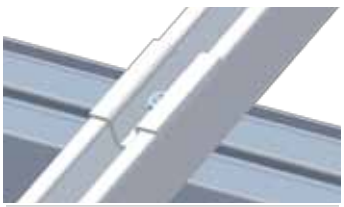


FLEXI

The cross-members are secured to the beams through the universal “Flexi” attachment, patented by Valente SpA.

JOINT PROFILE

The modular structure makes it possible to join continuous sections of strings: the cross-members are joined by linking profiles with a interlocking system that use the same profile of the groove.



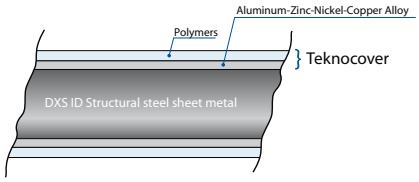
MODULE BRACKETS

The photovoltaic modules are fixed to the frame with brackets made of anodized aluminum, according to current market standards. This solution ensures the fair distribution of the spaces between the modules and allows free thermal expansion without burdening the structures or triggering dangerous residual stress on the modules themselves. It also allows assembly time optimization.

CROSS-BRACING (only in the Zenith Plus model)

To improve the performance of the system support in the event of strong winds and snow overload, each bearing section is stiffened with a cross-bracing system, made of steel wire rope and tensioning system. This solution enables later stress to be discharged directly to the ground thus making the structure very stable without use of additional weights. In addition, there is a significant benefit in the cost of production and installation.

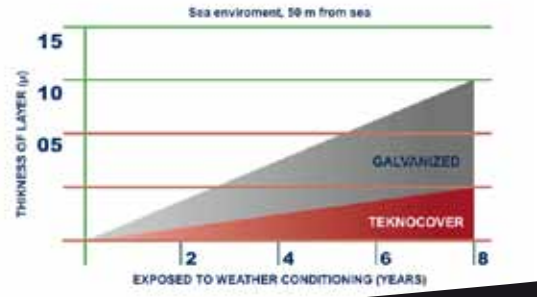
WHAT TEKNOCOVER IS:



Steel has optimal mechanical resistance features, however it has poor resistance to atmospheric agents (air and water) and therefore it requires suitable coating. The most commonly used treatment for protecting steel from oxidation and corrosion is galvanization.

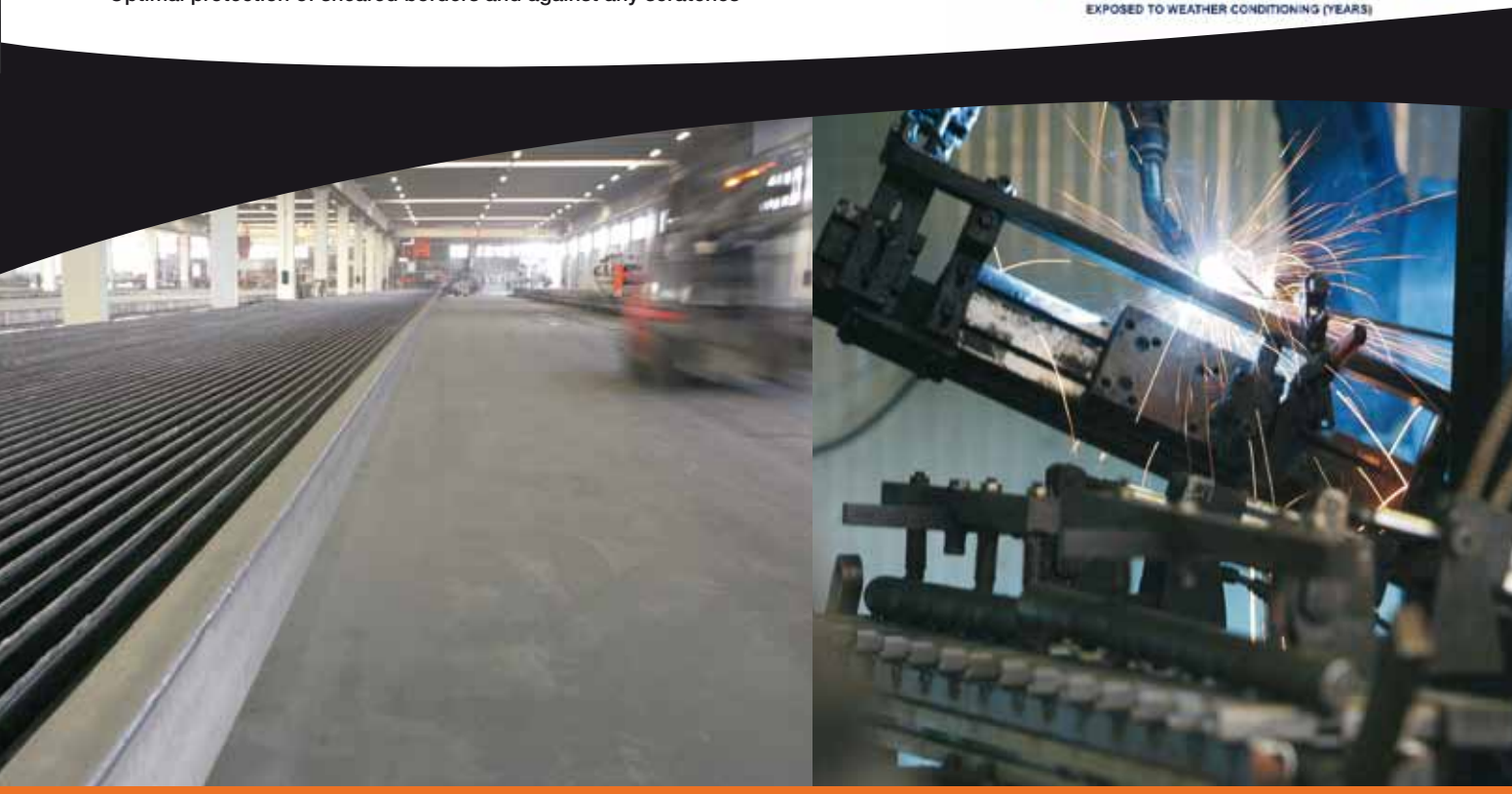
Our products are protected using the innovative **Teknocover** method, an innovative system of automotive derivation that **allows 7 times more resistance to corrosion than ordinary hot-dip zinc coating**, as shown by salt mist testing. This revolutionary continuous hot-coating is composed of an **alloy containing aluminum (55%), nickel (0.8%), copper (0.8%) and zinc (43.4%) alloy and a further polymer covering**, which leaves the steel surface particularly smooth and protected.

In addition, **Teknocover's surface aesthetics remain unaltered in the long-run,** as well as providing self-protection for sheared edges and scratches. Teknocover coating provides the steel sheet with a double protection against corrosion. In the first place the sheet is protected because the coating forms a barrier against general corrosion. The second protection mechanism is connected to the formation of a galvanised element that occurs once the material is exposed to humidity (electrolyte). The zinc ions migrate towards the naked steel correspondingly with the scratches and edges of cuts, thus protecting these areas from corrosion.



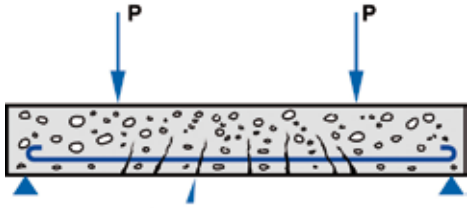
The new **Teknocover Valente** coating guarantees:

- **Resistance to corrosion that is 3 to 7 times greater than traditional hot galvanized sheet metal,** as demonstrated by the salty spray fog test
- **The surface aesthetics remain unaltered over time**
- **Optimal protection of sheared borders and against any scratches**



WHAT PRESTRESSED REINFORCED CONCRETE IS:

As already noted **concrete has an optimum resistance to compression but a poor resistance to traction** which, in reinforced concrete, is absorbed by a metal framework. Under the effect of traction the metal bars stretch and, seeing that steel and concrete are perfectly adherent, if one of the two stretches then so does the other. **In the presence of strong stresses, traditionally when concrete is stretched it risks being cracked.** Cracks may not compromise the stability of the structure, but they do cause deformation and reduce the protection of the metal framework, which is then subjected to oxidation, with the consequent reduction of resistant sections.



SLITS IN THE TENSE AREA

Prestressing allows the manufacture of poles capable of supporting greater stress loads than any structural element forged of simple reinforced concrete. **This method pre-stresses the poles so that they are able to balance the traction determined by its own weight and the loads**; metal framework is stretched by applying a traction force on the edges, the traction is shifted to the mix as compression, applying it so it complies with the pretensioning technique. When a load is applied, **the bending traction in the tight part progressively removes the pre-established compression**. This is why structures can be sized in a way so that the mix is always compressed at each point. The metal frameworks are stressed to the maximum of their capacity, correspondingly with the limit for mix cracking.

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