

Actual information about enez

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Background at start of development:

Wassing enez has been developed in collaboration with the ITTF to check whether a table tennis racket releases organic substances to the air.

The basic situation in the “world of table tennis” had been the repeated massive treatment on the backside of the rubber sponge with special glues (known by table tennis players under the fantasy name “speed glue”).

The term “glue” normally means sticky substances that are used to attach two items (here rubber and blade) on each other. But in the case of the “speed glues” the stickiness is of only minor importance. The “speed glues” mainly consisted of very volatile organic substances. At massive application on the backside of the sponge those substances enter into the rubber and distribute throughout the sponge and the upper pimped sheet. The entering of these substances changes the playing properties in a way that can be felt by the player as well as it can be objectively measured. The racket gets “faster”.

Because of the high volatility the substances tend to escape from the racket. This makes it necessary to apply the procedure repeatedly to always receive the aimed effect.

The measurement effect used for detection by enez:

The volatility of the used substances is the starting point for the measurement principle of the enez device. The measurement box contains a measurement unit that analysis during the measurement duration whether the air in the box is contaminating with solvent vapours.

If a racket has been systematically treated with “speed glues” the racket permanently releases such solvents, which results in a contamination of the air. If during the measurement a certain level (“red-light-level”) is reached the device shows at the end of the measurement “red”.

Original task of the test:

Originally the device has been designed for the time after the ban of volatile organic compounds (VOCs) by the ITTF has become effective to test rackets in tournaments whether they have been prepared with VOCs systematically. The expected scenario has been that the big majority of the players will accept and follow the ITTF ban. Thus it has been presumed that for only a very short percentage of tests the enez device will be in contact with solvent vapours. The device has not been developed e.g. to do experiments with open volatile liquids. The intended use of the device was and is exclusively the test of complete playable table tennis rackets. The manual to the device mentions this fact several times.

Going blind of the device:

For some of the devices that had been sold it turned out that the users did not follow the advice of intended use but tested open liquid substances. At such tests contaminations can occur that are thousand times higher as a “speed glued” racket could cause. Such an overload can be compared to a load of a tons weight on a milligram balance. Further it turned out, that the device is not stable for such overload for long term. Such overload could damage the sensor permanently. This can be described with the picture word of “going blind”. The result is a sensor that is much less sensitive. A device with a lot blinded sensor will then always show green light.

Further development of enez:

To reach a higher long-term stability and a better save against misuse a further phase of basic research and development on the base of new technologies has been started. A complete re-development of the device has been executed. This included some small enhancements such as a label containing the most important user hints and changes in the user handling (see below: “gas alert”). But on the other hand a new technology has been implanted to make the sensor more resistive against overload and subtle step by step going blind.

The most important hints for the use of enez:

As before the use of enez still is very simple, but the following hints have to be considered during use:

1. enez is strictly only for testing playable table tennis rackets
2. Use enez only in well-ventilated surrounding
3. Before and after test put enez open in upright position for airing
4. Keep enez away from solvents and solvent vapours (use and storage)
5. Follow the instructions on the display (and in the manual)
6. Always attend enez during measurement
7. Remove racket immediately after the end of the test
8. After test session remove batteries

Series production, delay of market entrance

In the sum the changes for enhancement of the device have been very extensive and had to be executed in a very short time. Finally from the start of this year the new enez is in operation and has been sold to national associations in all continents. For all of the old not as stable devices of the previous version – that have been out from last year – we exchanged the measurement unit. Thus they have been upgraded to the latest state of the art.

„gas alert“: alert warning at very strong contamination:

From now on the user has to follow the whole process of the measurement. If already during measurement a contamination is detected that is much higher than the “red-light-level”, the display shows the message: „Racket failed, gas alert“ and all lights are flashing. This can occur already after some seconds. In such a case the racket failed already, the box should be opened and the racket has to be removed immediately.

Controls at ITTF Junior Circuit Events:

During controls of rackets at ITTF Junior Circuit tournaments in different countries some experiences have been collected on international junior level.

There the ITTF offers to the players before the start of the tournament to test their rackets on voluntary basis. The players often take profit of this offer. All the tests are always done in a special racket control room that is provided by the tournament organiser.

In the tournament itself some players are randomly selected (from quarterfinal on: each player) for before-match racket test. Some minutes before the match the players have to present their racket at the racket control room. If a racket fails, the players can present a spare racket for the test. The rackets that have been tested as “OK” are then passed from the racket control room to the umpire. And the umpire gives the racket to the player right before the match at the table. Beside release of organic compounds of the racket among other things also the gloss, the evenness and the thickness of the rubbers is tested.

Experiences from the above controls:

Surprisingly often rackets have been found that fail the test procedure. This concerned on the one hand the release of organic substances. After each test with a “red-light-result” in enez a backup test with the much more expensive RAE device has been executed. All results with this counter-check have been consistent: If enez showed abnormal release of substances always the RAE device confirmed this result.

On the other hand even more often – than for abnormal release – rackets have been objected where rubbers had higher thickness as the allowed limit of 4.0 mm. Often thicknesses have been found of more than 4.5 mm which was a lot more than known from the former “speed glue” time.

What can be the reason for a red light?

At the used tests, both with enez and RAE during the measurement duration the contamination of the air is observed. If the level of “abnormal” contamination is passed during test the racket has failed. In such a case a single source can cause the problem, but it is also possible that the result is a sum of effects of different sources. Probably some of these partly sources might not cause a “red” result. So far the following probable sources have been found:

Not well aired material: The components of a racket (blade and rubbers) might contain solvents residuals from the production process. The ITTF recommends since a long time to take new rubbers out of the packaging and to air them for at least 72 hours before putting them on the blade and to expose them to clean air.

Effect of rubber cleaners: If rackets are cleaned with cleaners based upon VOCs, this might cause for some time that the racket releases substances.

Storage of the racket together with VOC-sources: If the racket is stored together with things containing VOCs (e.g. new rubbers together with the racket in the racket case) it might happen that the racket absorbs solvents, which might be released later.

Residuals from “speed glue” applications in the past: Such residuals might be absorbed in the blade, as well as in the rubbers but also in the racket case.

Usage of glues that are mainly consisting of VOCs: This does not only mean “speed-glues” but also old fashioned sticky glue that is used in a small dose only to attach the rubber on the blade. This alone maybe causes only for one or two days a “red light”, but even later this might cause an additional air contamination.

Use of intermediate substances: Since some months some organic substances are on the market as direct replacement of “speed-glues”. Compared to “speed-glue” these substances might have a lot reduced volatility, but still they tend to escape to the air. If an advert for a substance explains that the speed-enhancing effect will disappear after some time (e.g. 1 week or 4 weeks) this might indicate that with the disappearance of the “speed-effect also the substance itself disappears. And if the substance disappears permanently (probably with a small rate) from the racket also this will lead to an air contamination in the enez box during the test.

Each of the above mentioned sources might lead in extreme cases (e.g. intensive application of intermediate substances) to a “red” light. If the diverse sources occur in small intensity probably only the combination causes a red light result.

Additional information about intermediate (borderline) substances

There are different – more or less restrictive – governmental and official definitions of the VOC classification of substances (e.g. published by the World Health Organisation WHO, divers EC-Community regulations or the Swiss department of the environment). If it is the matter to classify a substance as **not** being a VOC some of the new substances on the market seem to fulfil all definitions, some other substances fulfil only some few definitions. But it also seems that some of the new substances fulfil none of the definitions to be classified as **being** a VOC. The health risk of the new substances is not verified. The aspect of a substance to be very little volatile does not allow to conclude on any other health risk related to a substance (e.g. at skin contact or if swallowed).

Sometimes red, sometimes green: Fortune or where does it come from?

For thousands of executed tests so far – where all the components have been known – every result had a logical explanation, even if some of the results might seem strange for people with limited background.

For example a complicated case is possible that a racket is prepared with a borderline substance in a way that the contamination of the air in the enez box during test is close to the “red-light-limit”. Then it might happen that the same racket gives on two following measurements a “red” or a “green” result. If e.g. the racket after the first test (red) is moved a lot in fresh air, in short term the rate of release of solvents might be decreased. But on the other hand if a racket with contamination right under the limit (green) is put in a tight case, then a lot of solvents can arrive at the surface which can not disappear from the racket due to the tightness of the case. If then the racket is taken out of the bag right before the measurement the rate of released solvents will be increased in short term.

All this does not cause for grin, anyhow the racket releases solvents that the racket should not release. The application of borderline substances resemble at a balancing act. If a player receives a “green light result” in such a case, then he had luck at the balancing act. But this might not always work.

Is it difficult to have a racket only producing “green light result”?

A “speed-glued” racket produces during test an air contamination in the box by orders higher than the “red light limit”. Such rackets mostly will produce a “gas alert”.

And a racket with well aired material where only the rubber is just attached to the blade glued e.g. with a PSA without using additional substances shows an air contamination by orders under the “red light limit”. As older the racket gets the fewer the rate of air contamination gets and the more far away the rate gets from the red light limit. But for this it is presumed that no further more or less volatile substances are applied to the racket.

A clear motto can be formulated: Airing, Airing, Airing. This is of sense for the rubbers, the blade as well as for the complete racket.