

# ZSH 2290

## Pencil Hardness Tester

### Instruction manual





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## **Exclusion of liability**

Illustrations, descriptions as well as the technical specifications conform to the instruction manual on hand at the time of publishing or printing. However, Zehntner GmbH Testing Instruments policy is one of continuous product development. All changes resulting from technical progress, modified construction or similar are reserved without obligation for Zehntner to update.

Some of the images shown in this instruction manual may be of a preproduction model and/or are computer generated; therefore the design / features of the delivered product may differ in various aspects.

The instruction manual has been drafted with the utmost care. Nevertheless, errors cannot be entirely excluded. The manufacturer will not be liable for errors in this instruction manual or for damages resulting from any errors.

The manufacturer will be grateful at any time for suggestions, proposals for improvement and indications of errors.

## **1 Description of device**

The ZSH 2290 is a hardness tester according to Wolff-Wilborn with three test loads for determination of resistance of coatings to mechanical stress by pencils of different hardness.

Application areas:

- For many sectors of industry including paint, furniture and vehicle
- Laboratory testing apparatus for quality control, research and development
- Practically applicable to all flat single- and multi-coat systems

In particular, this instrument has the following features

- Practical pencil height setter for easy insertion of pencils as well as for load release between tests
- Easy to handle
- Reliable results
- No maintenance required

## 2 Safety information

### 2.1 Symbols used



This note comprises instructions needed to follow directions, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.



This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

### 2.2 Safety notes and hints



The ZSH 2290 is exclusively intended for determination of resistance of coatings to mechanical stress by pencils of different hardness according to Wolff-Wilborn. Any other use is considered as being not in accordance with the intentions of the manufacturer and is conducted at the user's own risk. The manufacturer is not liable for any resulting damages.



Avoid any mode of operation that could affect the safe working with the ZSH 2290. Especially the determination of the scratch hardness must take place as described in this instruction manual.



Unauthorized modifications and changes of the ZSH 2290 are not permitted.



Reproduction without permission is not allowed.



**Zehntner GmbH Testing Instruments** refuses all warranty and liability claims for damages caused by usage of the ZSH 2290 in combination with **non-original accessories**, or accessories from 3<sup>rd</sup> party suppliers.



All local safety regulations apply for the operation of the ZSH 2290.

## **3 Delivery of device**

### **3.1 Damages during carriage**

On receipt of the goods, check for any visible damages on the packaging. If they are undamaged you may sign the receipt of the goods. If you do suspect by your visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier service must be held responsible for the damage in writing.

If a hidden damage is discovered while unpacking, you have to inform and hold the courier liable immediately in the following way: "When opening the parcel we had to notice that ... etc." This superficial checking of the goods has to be done within the time limit set by the carrier, which is normally 7 days. However, the period could vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.




If there are any damages also inform your authorized Zehntner agent or **Zehntner GmbH Testing Instruments** immediately.

### **3.2 Shipment**

Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally use filling material in the package to protect the device from any shock during carriage.

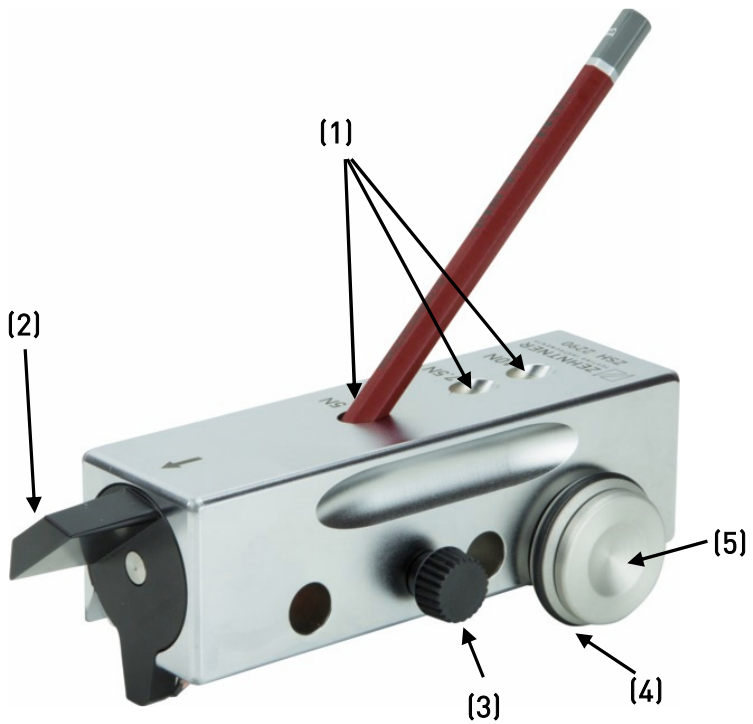
### 3.3 Standard delivery

The following parts are included in the delivery:

1 pencil hardness tester with test load 5 N, 7.5 N and 10 N	
1 set pencils in 17 hardness degrees (6B to 9H)	
1 sharpener for exposing the lead cylindrically	
1 pencil holder	
1 set emery paper (No. 400)	
1 certificate of manufacturer	
1 instruction manual	
1 carrying case	



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- (1) Pencil guides
- (2) Pencil height setter (also load release function)
- (3) Fixing screw (one for each test load)
- (4) Wheel
- (5) Wheel hubs

## 5 Preliminaries

### 5.1 Pencil preparation

- Carefully remove the wooden mantle with the sharpener on a length of approximately 5-6 mm. Make sure not to damage the lead. The remaining wood can be removed by a fingernail.



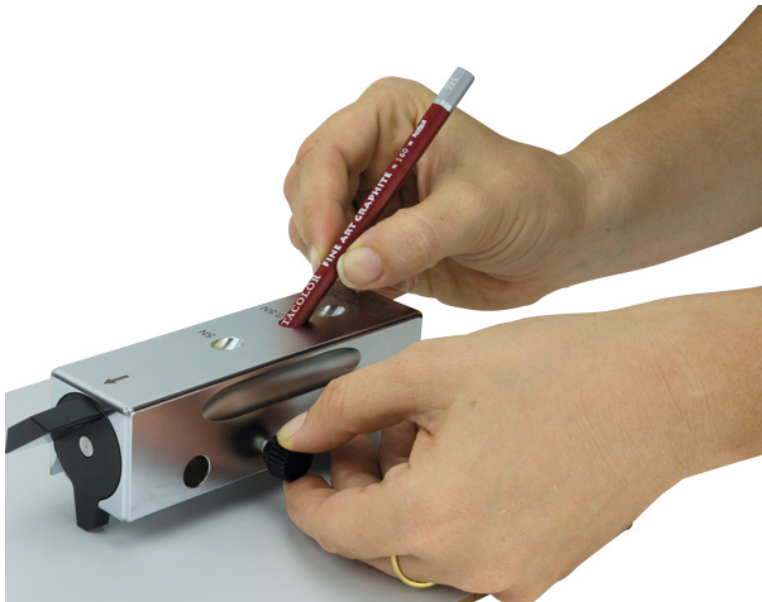
- Rub the lead against the emery paper (No. 400) maintaining an exact angle of  $90^\circ$  to the paper until a flat circular surface is obtained at the tip of the lead.
  - Repeat this procedure after each test.
- ! Always sharpen the pencils and trim the leads as specified in the standards you use.

## 5.2 Inserting the pencils

- Place the ZSH 2290 on a flat surface.
- Put the pencil height setter into load release position.



- Insert the selected pencil into the pencil guide of the desired load (5N, 7.5 N or 10 N) of the ZSH 2290, until the lead touches the surface.
- Tighten it with the respective fixing screw.



## 6 Handling



The test needs to be carried out under laboratory conditions.



Always carry out the test as described in the required standard.

- Determine the pencil hardness under laboratory conditions (temperature, humidity)
- Sharpen the pencils and trim the leads as described in chapter 5.1 "Pencil preparation" on page 10.
- Place the ZSH 2290 on a flat surface and insert the pencil as described in chapter 5.2 "Inserting the pencils" on page 11.
- Place the hardness tester on the coating under test.
- Put the pencil height setter into test position.



- Hold the ZSH 2290 at the wheel hubs (5) and move it forward at uniform speed for a sufficient length (at least 3 mm – see the standards).  
Hint: In order to obtain evaluable results it is recommended to move the tester forward for a sufficient length.



- Inspect the test surface with the naked eye for indentation or scratching.
- Repeat the test using pencils of increasing hardness until the lead of the pencil penetrates into the coating and a marking occurs over a distance of at least 3 mm.
- The degree of hardness of this pencil is the pencil hardness (Wolff-Wilborn hardness) of the coating.

The following degrees of hardness are available:



- For further details see the standards.
- Put the pencil height setter into load release position when not in use.

## 7 Cleaning and storage

- For cleaning of the unit use a clean, soft cloth. Only use mild cleaning agents.
- Store the ZSH 2290 and any accessories in its carrying case in order to avoid damages.



Do not use strong acids or alkaline liquids for cleaning.

## 8 Technical specifications

Test load:	5 N, 7.5 N and 10 N
Material hardness tester:	steel
Material pencils:	wood and graphite
Dimensions (LxWxH):	150 mm x 61 mm x 49 mm (5.91" x 2.40" x 1.93")
Weight:	1.4 kg (3.09 lbs)
Standards:	ASTM D3363, DIN SPEC 91064, ECCA-T 4, EN 13523-4, ISO 15184, MIL C 27 227, NEN 5350, SIS 184187, SNV 37113 (withdrawn 2006)
Warranty:	2 years

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