

## WP 400

### Impact test, 25Nm



#### Learning objectives/experiments

- determine the notched-bar impact work
- determine the notched-bar impact strength
- analyse the fracture surface characteristics
- plot a notched-bar impact work-temperature diagram
- influence of notch shape, material and specimen temperature on the notched-bar impact work

#### Description

- **Charpy notched-bar impact test**
- **classic method from destructive materials testing for quality control and analysis of the fracture behaviour of metallic materials**
- **pendulum impact tester based on DIN EN ISO 148-1**

In the field of industrial quality control, the impact test is a widely used test method with which to quickly and easily determine characteristics for a material or component analysis.

The WP 400 experimental unit is a solid-pendulum impact tester based on DIN EN ISO 148-1, designed for the Charpy notched-bar impact test. The clean layout and simple operation mean the experimental sequence can be observed in all details and phases.

In the experiment, the hammer attached to a pendulum arm describes an arc. At the lowest point of the hammer path, the hammer transfers part of its kinetic energy to the notched specimen. The specimen is either destroyed or bent by the impact and pushed between the supports.

The notched-bar impact work required to deform the specimen is read directly off a large scale. By using the WP 400.20 system for data acquisition, the measured values can be transferred to a PC where they can be analysed with the software.

In order to vary the output energy, the mass of the hammer can be changed by adding or removing weights.

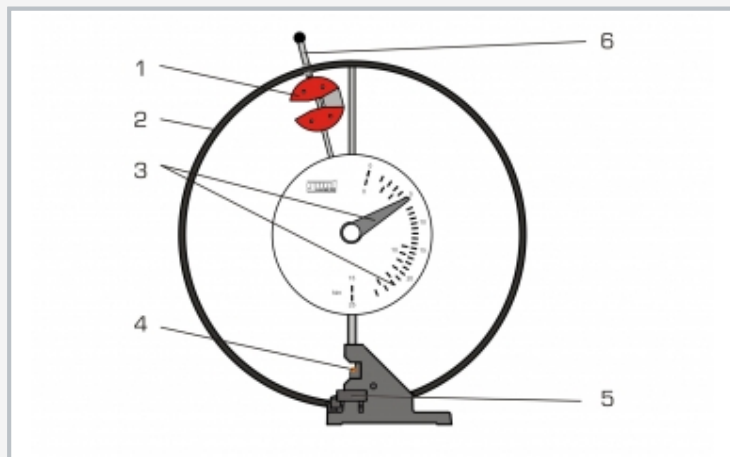
A brake reduces the residual energy of the hammer on each swing until it reaches zero.

A protective ring ensures the experiments can be conducted safely while also fixing the hammer in place. The hammer is triggered with two hands for safer operation. A protective cover for the WP 400.50 operating area is available as an accessory.

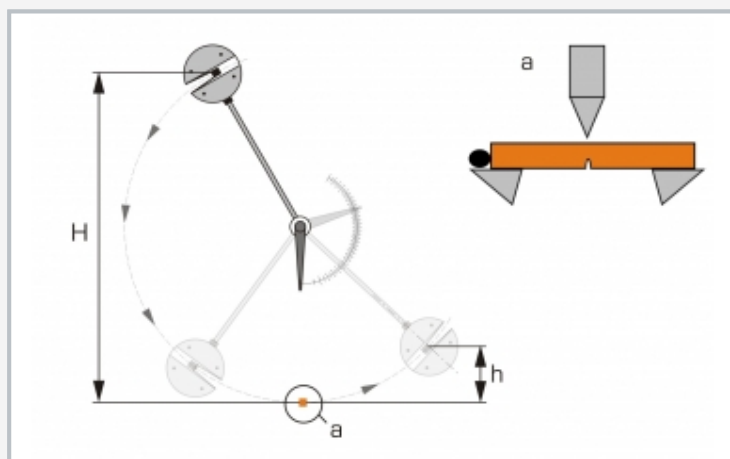
The experimental results allow quality control and an analysis of the fracture behaviour of different metallic materials. Non-metallic specimens can also be used. Specimens with different notch geometries, in different materials and specimen dimensions are included in the scope of delivery.

# WP 400

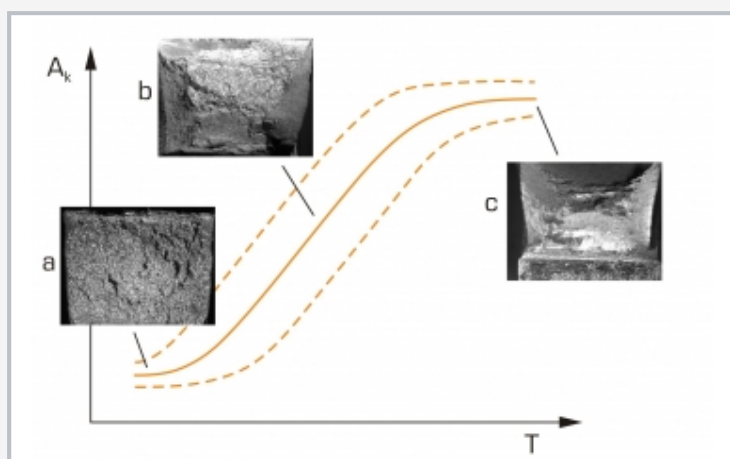
## Impact test, 25Nm



1 hammer with removable additional weights, 2 protective ring, 3 scale with drag pointer, 4 notched bar impact specimen, 5 two-hand trigger and brake, 6 hammer fixing



Principle of operation of the Charpy notched bar impact test: H height of fall, h height of rise, a hammer and specimen, plan view



Notched bar impact work-temperature diagram with typical fracture surfaces: average-value curve with distribution area,  $A_k$  notched bar impact work, T temperature; a depth position with low-deformation fractures, b transition region (steep front) with mixed fractures, c height position with ductile fractures

### Specification

- [1] classic Charpy notched-bar impact test
- [2] pendulum impact tester based on DIN EN ISO 148-1
- [3] hammer mass can be varied by adding or removing weights
- [4] brake to reduce the residual energy
- [5] safe operation thanks to two-hand release of the hammer and protective ring for the operating area
- [6] protective cover WP 400.50 available as an accessory
- [7] scale for displaying the notched-bar impact work
- [8] notched-bar impact specimens according to ISO (U/V notch) and GUNT specimens: aluminium, copper, steel, brass
- [9] system for data acquisition (WP 400.20) available as an option

### Technical data

#### Pendulum impact tester

- work capacity
  - ▶ 15Nm
  - ▶ 25Nm (with extra weights)
- hammer
  - ▶ weight: 2,05kg and 3,42kg (with extra weights)
  - ▶ extra weights: 4x 0,342kg
  - ▶ impact velocity: 3,8m/s
  - ▶ head: 745mm

#### Supports for specimens

- gap: 40mm

#### Notched bar impact specimens

- LxW: 10x5mm, 10x10mm
- cross-section at the notch root: 10x8 and 10x5mm

#### Specimen materials

- automotive steel 9SMn28K
- tempering steel C45k
- structural steel S235JRC+C
- brass CuZn40Pb2

LxWxH: 1000x300x1000mm

Weight: approx. 55kg

### Scope of delivery

- 1 experimental unit
- 1 set of extra weights
- 1 set of notched bar impact specimens (90 pcs.)
- 1 set of instructional material

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#### Optional accessories

020.40020	WP 400.20	Data acquisition system
020.40050	WP 400.50	Safety cage for pendulum impact tester
020.40001	WP 400.01	Set of 10 ISO-V specimens 10x5, construction steel (S235JRC+C)
020.40002	WP 400.02	Set of 10 ISO-V specimens 10x5, CuZn
020.40003	WP 400.03	Set of 10 ISO-V specimens 10x10, CuZn
020.40004	WP 400.04	Set of 10 ISO-U specimens 10x5, free cutting steel (9SMn28)
020.40005	WP 400.05	Set of 10 GUNT-R7 specimens, free cutting steel (9SMn28)
020.40006	WP 400.06	Set of 10 GUNT-R5 specimens, free cutting steel (9SMn28)
020.40007	WP 400.07	Set of 10 GUNT-R7 specimens, heat treatable steel (C45k)
020.40008	WP 400.08	Set of 10 GUNT-R7 specimens, construction steel (S235JRC+C)
020.40009	WP 400.09	Set of 10 GUNT-V specimens, construction steel (S235JRC+C)