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 by 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.

The required protective cover for the operating area allows the experiments to be conducted safely and is available as accessory WP 400.50. The hammer is triggered with two hands for safer operation.

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.

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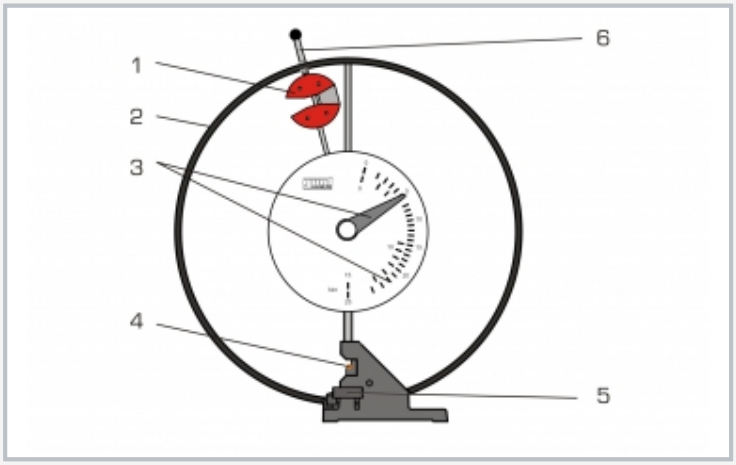
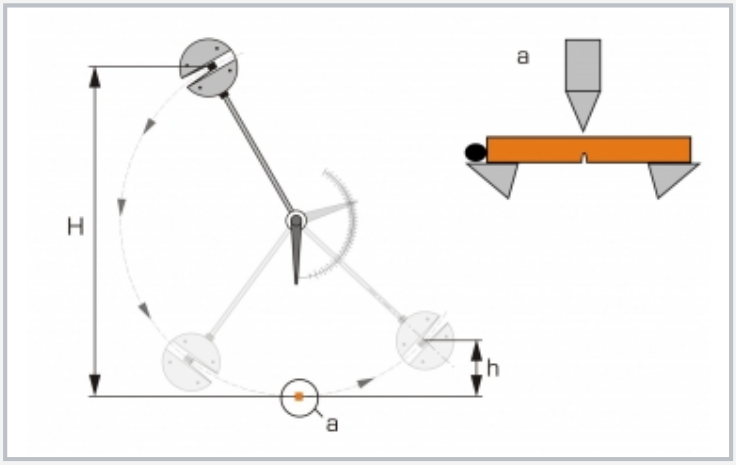
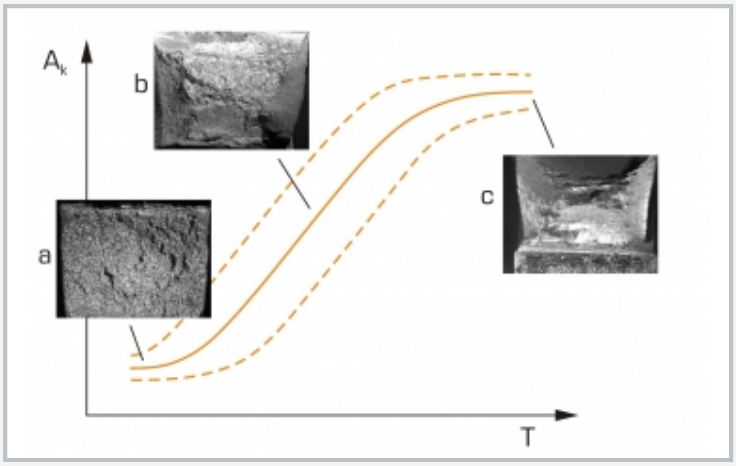


1 hammer with removable additional weights, 2 protective ring, 3 scale with drag pointer, 4 notched bar impact specimen, 5 two-hand trigger and brake, 6 hammer fixing



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
[6] required protective cover for pendulum impact tester vailable as accessory WP 400.50
[7] scale for displaying the notched-bar impact work
[8] notched-bar impact specimens (U/V/R notch): free cutting steel, heat treatable steel, construction 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: 10x7mm, 10x5mm, 10x3mm

Specimen materials
- free cutting steel
- heat treatable steel
- construction steel
- brass

LxWxH: 1000x300x1000mm
Weight: approx. 55kg

Required for operation

protective cover / WP 400.50

Scope of delivery

1 experimental unit
1 set of weights
1 set of specimens (90 pieces)
1 set of instructional material

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Required accessories

020.40050	WP 400.50	Safety cage for pendulum impact tester

Optional accessories

020.40020	WP 400.20	System for data acquisition
020.40001	WP 400.01	Set of 10 V specimens 10x5, construction steel
020.40002	WP 400.02	Set of 10 V specimens 10x5, CuZn
020.40003	WP 400.03	Set of 10 V specimens 10x10, CuZn
020.40004	WP 400.04	Set of 10 U specimens 10x5, free cutting steel
020.40005	WP 400.05	Set of 10 R7 specimens, free cutting steel
020.40006	WP 400.06	Set of 10 R5 specimens, free cutting steel
020.40007	WP 400.07	Set of 10 R7 specimens, heat treatable steel
020.40008	WP 400.08	Set of 10 R7 specimens, construction steel
020.40009	WP 400.09	Set of 10 V specimens, construction steel