

Technical Code DVS 2216-5

Ultrasonic joining of moulded components made from thermoplastics in series production - sonotrode ultrasonic tool

DVS, Technical Committee, Working Group "Joining of Plastics"

This publication has been drawn up by a group of experienced specialists working in an honorary capacity and its consideration as an important source of information is recommended. The user should always check to what extent the contents are applicable to his particular case and whether the version on hand is still valid. No liability can be accepted by the Deutscher Verband für Schweißen und verwandte Verfahren e.V., and those participating in the drawing up of the document

Content:

1. **Scope**
2. **Fundamental principles**
 - 2.1. Function of the sonotrode
 - 2.2. Ultrasound system
3. **Sonotrode forms**
 - 3.1. Standard sonotrodes without slots
 - 3.2. Sonotrodes with slots
 - 3.3. Cylindrical sonotrode, with constriction of less than $\lambda/4$
 - 3.4. Basic sonotrode with screw-in sonotrodes
4. **Sonotrode materials**
5. **Quality characteristics of the sonotrode**
 - 5.1. Variables/metrology
 - 5.1.1. Natural frequency
 - 5.1.2. Resonance frequency
 - 5.1.3. Mechanical impedance/idle power
 - 5.1.4. Amplitude
 - 5.1.5. Amplitude transformation
 - 5.1.6. Material characteristics
 - 5.1.7. Coupling surfaces
 - 5.1.8. Tightening torques for the sonotrodes
6. **Reworking sonotrodes**
7. **Design of simple sonotrodes**
 - 7.1. Sonotrode parameters
 - 7.2. Determining the length of rotationally symmetrical sonotrodes (transverse dimensions smaller than $\lambda/4$)
 - 7.2.1. Rotationally-symmetrical stepped sonotrode
 - 7.2.2. Tapered sonotrode with cylindrical end pieces
 - 7.3. Adjusting the sonotrode
8. **Using a computation program to calculate sonotrodes**
9. **Further reading**
10. **Keywords**