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Instruction for Use
TPP Tissue Culture Flat Tube 10 cm²
TPP Tissue Culture Tube 20 cm²

The TPP tissue culture flat tube 10 cm² (#91243) is a multifunctional vessel designed for cell cultivation, incubation, microscopic analysis, and centrifugation without sample transfer. Its conical geometry enables efficient pellet recovery, while the activated 10 cm² growth surface provides high optical clarity for reliable imaging with inverted microscopes see Fig. 1. A large opening ensures full access for pipettes and scrapers, and the sloped, flattened upper side minimizes light refraction.

The TPP tissue culture tube 20 cm² (#91106) is designed for manual cell and tissue cultivation. The growth surface extends 70 mm from the tip, providing an effective growth area of approximately 20 cm²; see Fig. 2. The tubes are intended for use on tube roller incubators or comparable systems for adherent cell culture under rolling conditions. A specially formed VENT screw cap with click mechanism prevents unintended rolling. In the unlocked position, the VENT cap ensures continuous aeration even in vertical orientation.

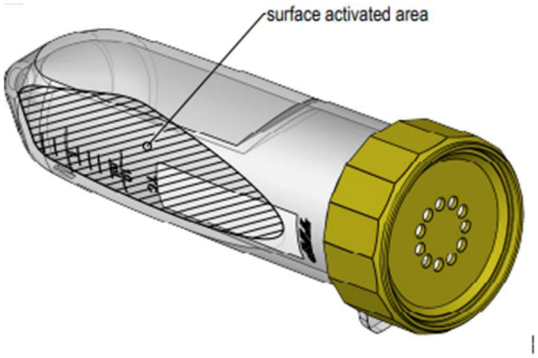

Figure 1: Tissue Culture Flat Tube 10 cm²

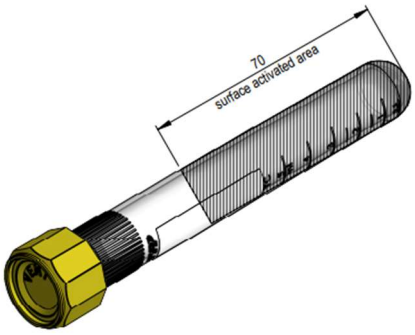

Figure 2: Tissue Culture Tube 20 cm²

Only the growth surface has been opto-mechanically activated to ensure optimal cell adhesion and improved cell growth. This activation promotes the efficient cultivation of adherent cells and thereby supports the performance of accurate and reproducible experiments.

The TPP tissue culture flat tube 10 cm² and tissue culture tube 20 cm² is for single use only. Re-use disclaims all warranties.

Safety instructions

- Handling and Safety
  Handling of biological materials shall be performed in full compliance with all applicable national and international regulations. Activities must conform to the laboratory's assigned biological safety level, the relevant Safety Data Sheets (SDS), and the manufacturer's Instructions for Use (IFU).
  Appropriate personal protective equipment (PPE) should be always worn during handling.
- Risk of Contamination
  All operations shall be conducted in accordance with aseptic techniques and established Good Laboratory Practices (GLP). Packaging shall be opened immediately prior to use. Only products that are visually intact and free from defects shall be utilized. Products exhibiting visible damage, contamination, or any other irregularities shall be disposed of in accordance with applicable regulations.
- Storage
  TPP products shall be stored under the following conditions:
  - Temperature: 10 °C to 30 °C (50 °F to 86 °F).
  - Light exposure: Products shall be protected from direct ultraviolet (UV) radiation.
  - Relative humidity: ≤ 60 %, with a recommended control range of 50 – 60 %.

  Storage conditions shall be monitored and recorded to ensure compliance with these requirements. Any deviations shall be documented, evaluated, and managed in accordance with the applicable quality.

Instruction TPP Tissue Culture Flat Tube 10 cm² #91243

- Check the expiration date (EXP) on the label and packaging. Only use products with a valid EXP date.
- Before use, verify that the packaging is intact, as the consumable is only considered sterile if the packaging is undamaged.
- Open the tissue culture flat tube and fill it with the medium and inoculum according to your laboratory routine. Please refer to the optimal fill volume, see Technical Data.
- Avoid touching the treated bottom with sharp objects.
- Close the filter screw cap with ventilation holes. Continuous gas exchange is provided through the integrated 0.22 µm hydrophobic membrane. Note: If the PTFE membrane becomes wet, gas exchange may be temporarily reduced

Instruction TPP Tissue Culture Tube 20 cm² #91106

- Check the expiration date (EXP) on the label and packaging. Only use products with a valid EXP date.
- Before use, verify that the packaging is intact, as the consumable is only considered sterile if the packaging is undamaged.
- Open the tissue culture flat tube and fill it with the medium and inoculum according to your laboratory routine. Please refer to the optimal fill volume, see Technical Data.

Use of VENT Screw Caps

- To enable controlled gas exchange, turn the VENT screw cap until an audible "click" is heard. This confirms that the cap is locked in the ventilation position.
- To stop gas exchange, turn the cap clockwise beyond the ventilation position by one quarter turn (¼). This creates a hermetic seal and prevents interaction with the atmosphere.
- When transporting the tissue culture tube ensure the cap is firmly tightened in the fully closed (gastight) position to prevent leakage or contamination.

- Always verify that the VENT screw cap is set to the ventilation position prior to incubation.
- Do not tilt the tissue culture tube excessively to avoid contact of the culture medium with the cap or neck.

Optimization of Adherent Cell Growth

To achieve optimal proliferation of adherent cells on the surface, observe the following guidelines:

- Cells must be fully and gently resuspended to obtain a true single-cell suspension. Residual aggregates lead to heterogeneous settling and nonuniform attachment.
- Prevention of foam formation: Foam should be minimized during resuspension and seeding, as protein denaturation and trapped air bubbles can impair cell viability and gas exchange.
- Immediately after seeding, the culture vessel should be gently rocked in an orthogonal (cross-shaped) pattern to ensure homogeneous distribution of cells across the growth surface and to prevent central or peripheral accumulation (“bullseye effect”).
- The seeding density must be selected according to cell line specific recommendations. Excessively high densities accelerate contact inhibition, increase metabolic stress, and promote overcrowding artifacts.
- Incubator shelves must be precisely leveled to ensure uniform medium depth across the growth area. Tilted surfaces promote media pooling and cause heterogeneous attachment.
- Follow the vessel’s specified fill volume. Too little medium increases meniscus effects, leading to cell accumulation at the edges. Adjust medium volume and culture duration according to the specific requirements of the cell line.
  Use 0.2–0.5 mL of medium per cm² of growth surface, corresponding to a medium height of approximately 2–5 mm [1]. Medium height, and therefore total volume, is a key factor for oxygen supply and influences the Oxygen Transfer Rate (OTR) (Gstraunthaler et al., 1999).
- Vibrations in or around the incubator must be avoided, particularly during the initial attachment period, to maintain reproducible attachment patterns.
- Cultures shall be maintained under controlled environmental conditions (temperature, humidity, and CO_2 concentration). Maintenance of high relative humidity is critical to prevent evaporative loss, which induces a detrimental increase in medium osmolarity.

Centrifugation Safety and Performance

To ensure operational safety and optimal performance, strictly adhere to the centrifuge manufacturer’s instructions and use appropriate rotors and adapters.

- Ensure the centrifuge load is correctly balanced. Tubes must be positioned symmetrically relative to the rotational center and axis to maintain a horizontal orientation. Improper loading may result in uneven separation, vibration, or tube damage.
- Several factors influence the structural integrity of the tubes during operation:
  - Tube shape and material composition.
  - Proper fit within the designated adapter.
  - Centrifugation parameters: Temperature, duration, Relative Centrifugal Force (RCF).
  - Sample properties (density and viscosity).
  - Rotor type (fixed-angle vs. swing-out).
- RCF (g-force) ratings are determined at room temperature using water-filled tubes in a horizontal rotor for 5 minutes. Use in fixed-angle rotors or with unsupported tubes may significantly reduce mechanical performance.
- Perform a test run with the specific sample and settings before routine use to verify suitability for the intended application.

Sub-Zero Storage

- The TPP tissue culture flat tube 10 cm^2 and tissue culture tube 20 cm^2 is not intended for sub-zero storage. Polystyrene (PS) exhibits significantly increased brittleness at temperatures below 0 °C (32 °F). Storage of PS products below this temperature shall not be performed, as the material is prone to spontaneous cracking and shattering, which may result in product failure and potential safety hazards.

General Handling and Limitations

- Graduations are for reference only and serve as approximate guidelines for fill volume. For precise measurements, use calibrated pipettes or volumetric instruments.
- Avoid exposing the white labeling area to 90% alcohol in combination with mechanical stress (e.g., rubbing or wiping), as this may cause the ink to dissolve or smear.

Technical Data

Component	Material
Tube	Polystyrene (PS)
Screw cap	Polyethylene (PE)
Membrane	Polytetrafluoroethylene (PTFE), Pore size 22 µm

Measurement	91243	91106
Length mm	120	105
Diameter mm	16	30
Growth area cm^2	10	20
Recom. volume mL	2	1-3
Volume graduation mL	10	5
Max. RCF x g	1‘200	1‘200
Form	Conical	Round
Screw cap	Filter	VENT

Additional Information

Instructions for use, chemical resistance lists, and quality certificates for individual products can be downloaded from the TPP website at www.tpp.ch.

Disclaimer

TPP products are intended for Research Use Only (RUO) and are not approved for clinical, diagnostic, or in vitro fertilization (IVF) applications. The full Terms & Conditions, including limitations of warranty and liability, intended use, and reseller obligations, are available at: https://www.tpp.ch/page/qualitaets_sicherung/index.php

Distributors who purchase and distribute TPP products acknowledge and agree to these Terms & Conditions and the associated disclaimer.

Literature

[1] Amanda Capes-Davis, R. Ian Freshney (2010) Freshney's Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications (8th Ed.) - Wiley (p.180)