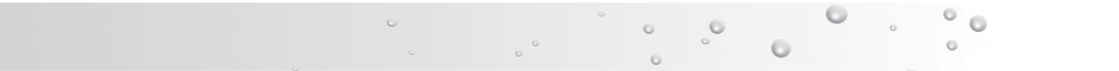


# HANDBOOK ON PRESSURIZED IRRIGATION TECHNIQUES





**HANDBOOK**

**ON**

**PRESSURIZED IRRIGATION TECHNIQUES**

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FAO Consultant

**Second Edition**

FOOD AND AGRICULTURE ORGANIZATION  
OF THE UNITED NATIONS

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## Foreword

Water is essential for all socio-economic development and for maintaining healthy ecosystems. As population increases and development calls for increased allocations of groundwater and surface water for the domestic, agriculture and industrial sectors, the pressure on water resources intensifies, leading to tensions, conflicts among users, and excessive pressure on the environment. The increasing stress on freshwater resources brought about by rising demand and growing pollution worldwide, is of serious concern.

Increasing water productivity holds the key to future water scarcity challenges. Today, agriculture accounts for 70 percent of all water use globally, up to 95 percent in several developing countries. Adding to the pressures on agricultural use is the increased awareness of the instrumental value of water in maintaining environmental services. Increasing the efficiency of water use and enhancing agricultural water productivity at all levels of the production chains are becoming priorities in a growing number of countries.

A comprehensive approach to agricultural water productivity requires actions at all levels, from crops to irrigation schemes, and up to national and international economic systems. In particular, shifting to modern on-farm irrigation practices can contribute to a substantial increase in both water use efficiency and water productivity.

The objective of this handbook is to provide a practical guide on the use of pressurized irrigation techniques to farmers, irrigation technicians, and extension workers in the field. In this second edition, the handbook has been considerably revised, including new chapters on low-cost drip irrigation and pipe distribution systems for smallholders.



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The first edition of the handbook was published in 2001 and was prepared by Andreas Phocaides, irrigation technology consultant, with the assistance of Reto Florin, former Chief of the FAO Water Service and David Casanova, irrigation expert.

For its second edition, the handbook was completely revised, with the addition of several new chapters. The author was assisted in its preparation by Ines Beernaerts and Jean-Marc Faurès (FAO), and Virginie Gillet (IPTRID).

## List of acronyms

ABS	Acrylonitrile butadiene styrene (thermoplastic material)
AMIT	Affordable micro-irrigation technologies
ANSI	American National Standards Institute
ASAE	Society for Engineering in Agriculture, Food, and Biological Systems (former American Society of Agricultural Engineers)
ASTM	American Society for Testing Material
BHP	Break horsepower
BOD	Biochemical oxygen demand
BS	British Standards
CAMS	Computer aided management systems
CEN	European Committee for standardization
CIF	Cost insurance and freight
COD	Chemical oxygen demand
CP	Center pivot
CYS	Cyprus Standards
DIN	Deutsches Institut für Normung (German standards).
DN	Nominal diameter
ECe	Electrical conductivity
ECiw	Electrical conductivity of irrigation water
ECw	Electrical conductivity of water
EN	European Standard
ESP	Exchangeable sodium percentage
ET	Evapotranspiration
ETc	Crop water requirements
ETo	Reference evapotranspiration
FAO	Food and Agriculture Organization of the United Nations
FC	Field capacity
FDS	Family drip system
FOB	Free on board
HDPE	High density polyethylene
IES	Irrigation equipment supply database
IPTRID	International Programme for Technology and Research in Irrigation and Drainage
ISO	International Standards Organization
kc	Crop coefficient
LDPE	Low density polyethylene
LEPA	Low energy precision application

LR	Leaching requirements
NTU	Turbidity
PC	Pressure compensated
PDS	Pipe distribution irrigation system
PE	Polyethylene
PIP	PVC irrigation pipe
PN	Nominal pressure
PP	Polypropylene
PR	Pressure rating
PVC	Polyvinyl chloride
PVC-U	Polyvinyl chloride unplasticised (equivalent to uPVC)
O&M	Operation and maintenance
RSC	Residual sodium carbonate
SDR	Standard dimension ratio
SS	Suspended solids
Sa	Available moisture
SAR	Sodium adsorption ratio
SC	Saturation capacity
TC	Technical Committee
TDR	Time domain reflectometry
TDS	Total dissolved solids
uPVC	Unplasticised polyvinyl chloride
USDA	United States Department of Agriculture
WHO	World Health Organization
WP	Wilting point