

TT METHOD (INFRARED THERMOGRAPHIC TESTING)

1. Product sectors

The product sectors applicable to the Infrared Thermographic Testing (TT) method are listed in Table 1.

Table 1

PRODUCT SECTOR	APPLICATION FIELD
Civil (B)	<ul style="list-style-type: none"> - checks of thermal bridges - definition of buried building structure frame - checks of detachment of plaster coat and/or tiles or similar elements - detection of water leaks and infiltrations - check of sealing of window and door frames - rising moisture - condensation - preservation of artistic heritage - energy loss in building envelopes - check of the operation of heating and plumbing systems for domestic use only
Industrial (I)	<ul style="list-style-type: none"> - plant engineering - pressure equipment - heat exchangers - preventive maintenance - process analysis - gas leak detection - detection of operating discontinuities due to inadequate lubrication (friction between mechanical parts moving relatively to one another) - misalignment - wear of components - metallic manufactured and semi-finished products
Electrical (E)	<ul style="list-style-type: none"> - check of overloads on electrical components installed inside electrical switchboards - stators of electrical machines - transformer components - power cables of distribution lines - isolators - connecting terminal blocks - check of operation of photovoltaic cells
Structural Composite Materials (SE/CM)	<ul style="list-style-type: none"> - check of structural discontinuities in composite material laminates, due to both the manufacturing process and the operation (see annex 9)

2. Industrial sectors

The “pre-service and in-service testing” sector, which includes the “Manufacturing” sector, covers all the product sectors listed above (B, I, E) with the exclusion of the SE/CM sector.

3. Minimum requirements for admission to the examination

3.1 Training

The required minimum number of training hours is specified in Table 2.

Table 2

Level 1 (h)	Level 2 (h)	Level 3 (h)
40*	80*	40*
<p>* The sum of the number of hours required for levels 1 and 2 is necessary for direct access to level 2. The sum of the number of hours required for levels 1, 2 and 3 is necessary for direct access to level 3.</p> <p>To gain access to a higher level, the required total number of training hours is equal to the difference between the hours foreseen for the higher level and those already spent for the obtained level, considering that the following reductions may be applied:</p> <ul style="list-style-type: none"> ✓ the expected number of training hours for each level is relating to a multisector qualification (B, I and E); for the extension to other product sectors, 8 training hours are required for each requested sector; ✓ the number of hours stated in Table 2 does not include the necessary training for the structural sector (SE) for which reference should be made to Annex 9; ✓ training includes both theory and practice in the NDT method; ✓ training duration may be reduced up to 50% when the certification sought is limited to a product sector; ✓ a reduction of up to 50% in the total required number of training hours may be accepted for candidates who have graduated from technical college or university (e.g. surveyors, experts, engineers,...) <p>NOTE: irrespective of any reductions, the minimum number of training hours is 40 hours.</p>		

3.2 Work experience

The required minimum work experience in the product sector is specified in Table 3.

Table 3

Level 1 (months)	Level 2 (months)	Level 3 (months)
3*	9*	18*
<p>* The above table contains the minimum work experience (months) to be acquired in the sector for which certification is sought. The total period shown for levels 1 and 2 is required for direct access to level 2. The total period shown for levels 1, 2 and 3 is required for direct access to level 3.</p> <p>The number of months of experience is based on a nominal 40 h week or the legal week of work; if an individual is working in excess of 40 h/week, he/she may be credited by RINA with experience based on the total hours, but he/she shall be required to produce evidence of this experience. Credit for industrial experience may be gained simultaneously in two or more of the NDT methods with the reduction of total required experience as follows:</p> <ul style="list-style-type: none"> - 2 testing methods, reduction of total required time by 25% - 3 testing methods, reduction of total required time by 33% - 4 or more testing methods, reduction of total required time by 50% <p>In all cases the candidate shall be required to show that, for each of the methods for which certification is sought, his/her experience is equal to at least half the required time and never lower than one month.</p>		

4. Examination contents and assessment for levels 1 and 2

The examination is divided into 3 parts:

- a) General examination
- b) Specific examination
- c) Practical examination

The number of multiple-choice questions foreseen for the general and specific examination is shown in Tables 4 and 5.

Table 4: Minimum number of questions for TT Method general examination

Level 1	Level 2
40 multiple-choice questions	40 multiple-choice questions

Table 5: Minimum number of questions for TT Method specific examination

Level 1	Level 2
40 multiple-choice questions (for more than one product sector, the questions must be evenly distributed among the sectors concerned)	40 multiple-choice questions (for more than one product sector, the questions must be evenly distributed among the sectors concerned)

Practical examination

The practical examination shall involve applying the NDT method to prescribed specimens, recording (and, for level 2, also interpreting) the resulting information to the degree required and reporting the results in the required format. The specimens used for training purposes cannot be used for examinations. The requirements concerning the number of specimens and the number of areas or volumes to be tested during practical examinations are set out in appendix B of the UNI EN ISO 9712 standard.

Level 2 candidates shall also draft at least one NDT instruction for level 1 personnel, for a sample selected by the examination board.

5. Advanced thermography techniques

Specific thermography techniques may be required for some product sectors such as:

- Transient Thermography-TTT by Pulsed Thermography
- Modulated Thermography-MTT by “Lock-In” technique

The above advanced thermography techniques foresee an additional training of 8 hours each.

For the requirements concerning certification in the Thermography Techniques in the Structural Composite Materials sector “SE/CM” (duration of the specific training, contents of the training program, examination criteria and assessment criteria), refer to Annex 9.

For what is not expressly specific in this Annex, reference shall be made to the applicable requirements laid down in the ISO 9712:2021 standard.

6. Integration of certification in accordance with ISO 9712 with UNI/PdR 56 and vice versa

A candidate may obtain certification in accordance with the UNI/PdR 56 document for the TT method if he/she already holds a certificate issued in accordance with the ISO 9712 standard for the same method, passing a specific examination structured as follows:

WRITTEN TEST consisting of 30 specific questions relating to the civil sector

PRACTICAL TEST consisting of the examination of a sample relating to the civil sector

If certification is requested for the TT method in accordance with ISO 9712 and UNI/PdR 56, further 30 specific questions will be provided in relation to the civil sector and a total of 5 samples (3 industrial for ISO 9712 and 2 civil for UNI/PdR 56) for the practical test.