

QUALIFICATION FILE - Solar-LED Lighting Product

CONTACT DETAILS OF THE BODY SUBMITTING QUALIFICATION FILE

Name and address of submitting body:

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List of documents submitted in support of the Qualifications File

1. Detailed Curriculum (Attached at Annexure I)
2. List of Tools to conduct training (Attached at Annexure II)
3. Trainer qualification (Attached at Annexure III)

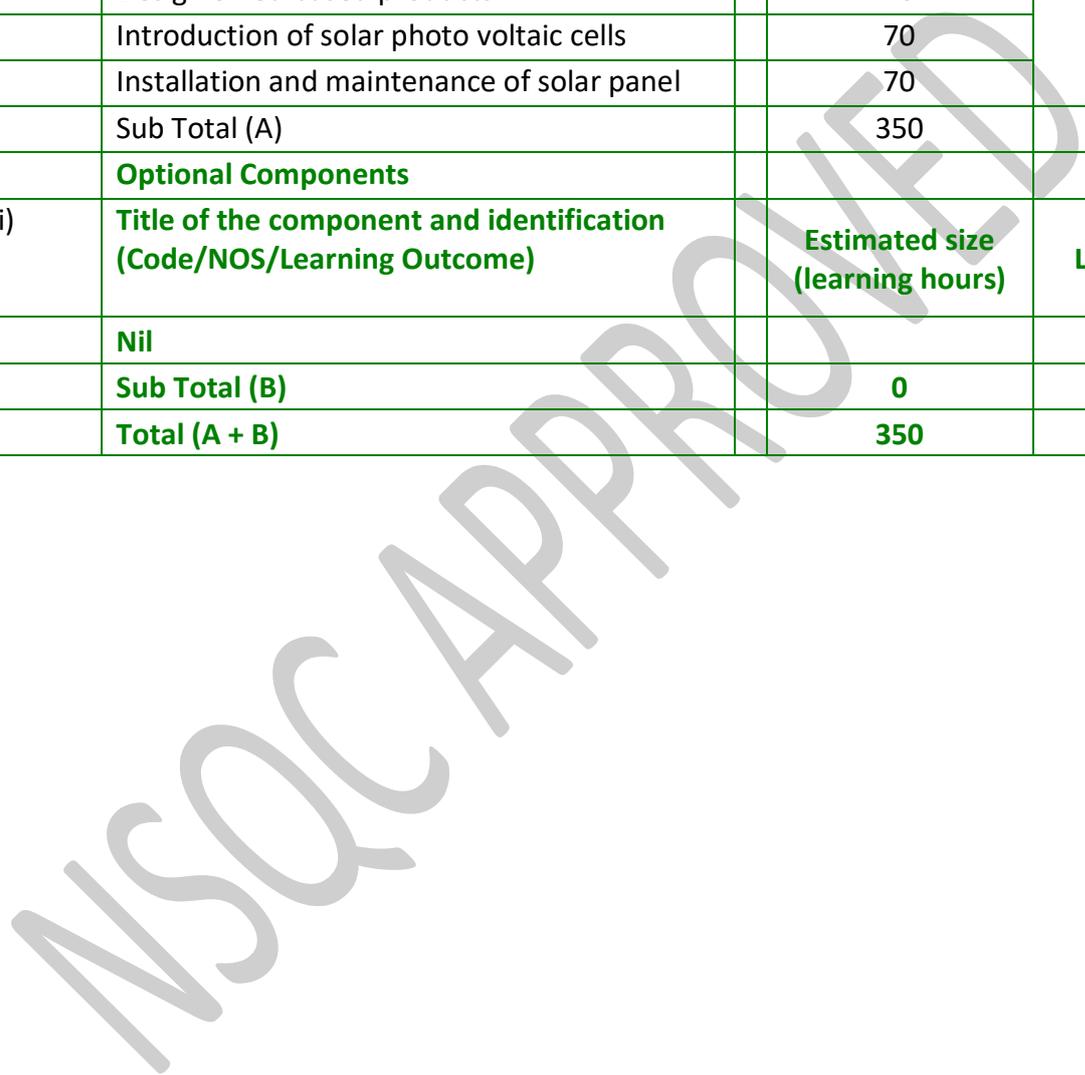
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QUALIFICATION FILE - SUMMARY

1.	Qualification Title	Solar-LED Lighting Product (Design and Manufacturing)
2.	Qualification Code if any	NL/M/L4/CO22 , NIELIT/RE/2/89
3.	NCO Code and Occupation	3113.1001, 3113.1002
4.	Nature and purpose of the Qualification File	Technical Diploma The purpose of Qualification File is to provide skills to participants in the Field of Solar Photo Voltaic (SPV) and LED based products
5.	Body/bodies which will award the qualification.	Certification Division, National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No.3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
6.	Body which will accredit providers to offer the qualification.	Accreditation Division, National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No.3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077 Presently, Accreditation is not prescribed, affiliation is one of the models.
7.	Whether accreditation/affiliation norms are already in place or not, if applicable (if YES, attach)	Yes http://www.nielit.gov.in/sites/default/files/headquarter/pdf/Guidelines_1st%20June%202018.pdf
8.	Occupation(s) to which the qualification gives access	Technician or Service Engineer
9.	Job Description of the Occupation	The participant undergoing training will be able to design and develop small LED based products along with installation and maintenance of small SPV system.
10.	Licensing Requirement	No
11.	Statutory and Regularity requirement of the relevant sector (documentary evidences to be provided)	NA
12.	Level of the qualification in the NSQF.	4
13.	Anticipated volume of training/ learning required to complete the qualification	350 hours.
14.	Indicative list of training tools required to deliver this	Basic electronic lab tools and accessories, different type of LEDs, PCB, Solar Panels (SPV)

	qualification	
15.	Entry requirements and /or recommendations and minimum age	10 th / ITI / 12th
16.	Progression from the qualification. (please show professional and academic progressions)	Professional: Technician (in design, supply, installation, Civil work,testing, commissioning of Solar LED Street LightingSystem etc.) ↓ Senior Technician ↓ ServiceEngineer ↓ Designer ↓ Entrepreneur (of low cost LED products for common use like Lanterns, table lamps, etc.)
17.	Arrangements for Recognition of Prior Learning (RPL).	<ul style="list-style-type: none"> • Presently only candidates who undergo training shall be assessed. • It will be incorporated once RPL strategy is finalized
18.	International Comparability where known (research evidence to be provided)	The training is meant for dealers, technicians and even others that require a basic insight in how to design Solar-LED Lighting Product, such as employees of NGOs or saving banks who wish to engage in small affordable solar electrification. The primaryaim is to train a network of technicians that can actually do proper installations in the field, linked to start-up or existing retailers. This way, retailers can guarantee that they do not only sell good solar systems, yet also that these are properly installed and maintained. Sometimes the technicians are employed by the retailers, sometimes they have a more free-lance relation, yet sometimes the technicians are also sales agents forthe retailer. http://macsenpv.iter.es/pub/documentos/documentos Basic Tech Solar Training manual FEF 08 ENG 84e8a4fd.pdf
19.	Date of Planned review of qualification	3 years

20.	Formal structure of the qualification		
	Mandatory Components		
(i)	Title of the component and identification (Code/NOS/Learning Outcome)	Estimated size (learning hours)	Level
	Introduction of light sources and their characteristics	70	4
	Study of led and light sources	70	
	Design of led based products	70	
	Introduction of solar photo voltaic cells	70	
	Installation and maintenance of solar panel	70	
	Sub Total (A)	350	
	Optional Components		
(ii)	Title of the component and identification (Code/NOS/Learning Outcome)	Estimated size (learning hours)	Level
	Nil		
	Sub Total (B)	0	
	Total (A + B)	350	



SECTION 1

ASSESSMENT

21.	<p>Body/Bodies which will carry out Assessment Examination Cell, National Institute of Electronics and Information Technology NIELIT Bhawan , Plot No.3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077</p>																								
22.	<p>How will RPL assessment be managed and who will carry it out? Give details of how RPL assessment for the qualification will be carried out and quality assured. Presently only candidates undergoing training shall be assessed. Later on candidates having experience and knowledge shall be assessed. The information will be provided on finalization of such procedure.</p>																								
23.	<p>Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent and fair and show that these are in line with the requirements of the NSQF:</p> <p>The emphasis is on practical demonstration of skills & knowledge based on the performance criteria. A combined assessment paper comprising assessment of each OUTCOME is will be used to assess candidate. In addition to it, a practical cum Viva Voce of project will be conducted for assessment. Following assessment methodologies are used.</p> <table border="1" data-bbox="300 1115 1382 1951"> <thead> <tr> <th>Assessment Mode</th> <th>No. Of Paper</th> <th>Duration</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Theory (100 questions of 1 marks each) Theory 1 <ul style="list-style-type: none"> • Introduction to Light Sources and their characteristics • Comparative study of LED and other light sources • Design and Assembly of LED based products Theory 2 <ul style="list-style-type: none"> • Introduction of renewable energy & study of characteristics of SPV cells • Installation and Maintenance of Solar Panel </td> <td>2</td> <td>90 min each</td> <td>200</td> </tr> <tr> <td>Practical</td> <td>1</td> <td>180 min</td> <td>90</td> </tr> <tr> <td>Internal Assessment</td> <td></td> <td></td> <td>30</td> </tr> <tr> <td>Project</td> <td></td> <td></td> <td>30</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>350</td> </tr> </tbody> </table> <p>The examination would be conducted in the months of February, April, June, August, October and December every year</p>	Assessment Mode	No. Of Paper	Duration	Marks	Theory (100 questions of 1 marks each) Theory 1 <ul style="list-style-type: none"> • Introduction to Light Sources and their characteristics • Comparative study of LED and other light sources • Design and Assembly of LED based products Theory 2 <ul style="list-style-type: none"> • Introduction of renewable energy & study of characteristics of SPV cells • Installation and Maintenance of Solar Panel 	2	90 min each	200	Practical	1	180 min	90	Internal Assessment			30	Project			30	Total			350
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Practical	1	180 min	90																						
Internal Assessment			30																						
Project			30																						
Total			350																						

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Please attach most relevant and recent documents giving further information about assessment and/or RPL.

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in formal structure of the qualification file in the summary.

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NSQF QUALIFICATION FILE

24. Assessment evidences

Title of Unit/Component:

(Detailed Curriculum attached as Annexure-I)

Assessable Outcomes	Assessment criteria for the outcome	Written	Practical cum Viva Voce Internal Assessment
Theory I			
1. Will be able to connect multiple LEDs.	<ul style="list-style-type: none"> Outline fundamentals of LED & describe types of lighting sources. Measurement of various light units, types, behavior of LEDs. 	35	Practical: 90 Internal Assessment: 30
	<ul style="list-style-type: none"> Connection of Multiple LEDs, wiring of multiple LEDs in series and parallel, white light production from LED. 		
2. Designing of LEDs considering reliability parameters	<ul style="list-style-type: none"> Types of LED and Light sources. 	35	Project: 30
	<ul style="list-style-type: none"> Design of LED by following various reliability parameters like Heating problem, poor electronics, fitting types, environmental factors dimming of LED, space flexibility, enhanced safety, increased productivity, efficacy, illumination, light quality, response timing, dimming, glare, light color and colour rendering. 		
3. Will be able to design LED based products	<ul style="list-style-type: none"> Design of Single transistor constant current driver, with voltage regulation, an alternative to zener diode, LED switching using LDR. 	30	
	<ul style="list-style-type: none"> Use of various tools like temperature meter, resistance thermometer, magnifying glass etc. Benefits of LED assembly, application of LED assembly, LED bulb light, LED spotlight assembly, LED tube light. 		
Theory II			

4. Use & connection of solar photovoltaic cells	<ul style="list-style-type: none"> Advantages of Solar energy as renewable source. Historical Perspective of using solar energy. Concepts of solar photo voltaic cells. 	50	
	<ul style="list-style-type: none"> Working of SPV's, ratings and specifications of SPV peak voltage and voltage/current on load, ratings of PV module, specification of PV module. 		
5. Installation and maintenance of Solar Panel	<ul style="list-style-type: none"> Use of tools involved in installation of systems Follow and maintain procedures to achieve a safe working environment inline with occupational health and safety regulations and requirements and according to site policy Avoid waste and dispose waste as per procedure. Take opportunities to use energy and materials in an environmentally friendly manner. Design and Installation of solar PV system considering sizing, site surveying methods and evaluation parameters, sunlight's and direction assessment. 	50	
	<ul style="list-style-type: none"> Installation of solar plates on holding clamp, wiring multiple PV module, wiring of solar panel to inverter. 		
	<ul style="list-style-type: none"> Maintenance Criteria of solar panel. 		
	Total	200	150
	Grand Total	350	

Table of the component

Means of assessment 1

The assessment pattern is given in Section I above. The assessment criteria is as given under:.

Pass / Fail

To qualify for this qualification file, the candidate must have obtained at least 50% marks in theory, practical and project examinations. The grading scheme is mentioned below :-

Failed (<40)	F
>= 50% &< 55%	D
>=55% &< 65%	C
>=65% &< 75%	B
>= 75%&<85%	A
>=85%	S

General Terms

1. Theory examination would be conducted online and the paper comprises of MCQ and each question will carry 1 marks.
2. Practical examination/Internal Assessment/ Project would be evaluated internally.
3. Candidate may apply for re-examination within the validity of registration.
4. There would be no exemption for any paper/ module for candidates having similar qualification Skills.
5. The examinations would be conducted in English Language only.

SECTION 2

25. EVIDENCE OF LEVEL

Level of qualification:4

Name/Title of the qualification/component	Solar-LED Lighting Product (Design and Manufacturing)		Level 4
NSQF Domain	Outcome of Qualification/Component	How outcome relates to NSQF level descriptors	Level
Process	After this course candidate will be able for developing a detailed design by analysing and understanding the requirements in terms of product specification. They are responsible for a detailed design of light emitting diode(LED) boards and systems, as per the specifications and architecture given. They work on the optimum design solution and make sure it meets specifications within boundary conditions of cost and timeline. They are also responsible for preparing test samples, test plans, design documents and to maintain test set-up in the development. On a regular basis, they interact with quality teams for validating platform, module or product designs.	Successful candidate Individual who has gone through the process would tend to exhibit Advance Skills in which he is both Conceptually strong and practically sound.	4
Professional Knowledge	After acquiring professional knowledge Solar-LED Lighting Product Design and manufacturing candidate will be able to installation and maintenance cost of the solar panels is on the higher side, these are an absolutely green way to generate electricity -	The professional knowledge gained would eventually help the candidate to enter the industry as an expert and not as a novice. He would not be required to undergo any sort of	4

	<p>free of smoke, gas and chemicals. Higher demand, cheaper materials, lower installation and maintenance costs, better policies and improved standards will surely make solar energy affordable in the near future. Also, initiatives like the Jawaharlal Nehru National Solar Mission (JNNSM) by the government of India, will lead to strengthening of the manufacturing capabilities and technology advancement, creating many more jobs.</p>	<p>training or refresher course in order to run the operations of the concern that he joins or he will be handling all the operations as startup entrepreneur</p>	
Professional Skill	<p>Check the non-functional LED Light in as per standard procedure to find out the fault; dismantle the LED Light; repair the fault and reassemble the light to make it functional and How to Design Solar PV System.</p>	<p>The skill set acquired by the candidate would Encompass Installation, Configuration, designing , implementation of LED based products and SPV systems</p>	4
Core Skill	<p>Designer is expected to understand technical specifications of LEDs and PCBs. Basic understanding of the EMS process, its critical process parameters and ability to deal with external suppliers, particularly PCB/EMS, are some other skills that, if developed, can keep you ahead in the competition and possibly reward you with a great job. Good communication skills are also important for meetings and presentations. A design technician is expected to have strong fundamentals</p>	<p>The candidate must be a good team player so as to have a good co-ordination with other team members</p>	4

	inelectronics as well as good communication skills.		
Responsibilities	The technician is responsible for identifying and repairing faults at preliminary level.	The responsibility levels would be equally important in all the phases of product development.	4

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SECTION 3

26. EVIDENCE OF NEED

Need of the Qualification

LEDs are becoming popular with every passing day. High energy saving, low costs, modular designs & ease of use have made LEDs lighting 1st choice in industrial, commercial and domestic applications. So is Indian lighting market being ready to opt for LED based lighting as a 100% lighting medium, are CFL & traditional bulbs are completely out of industry, are we going to manufacture LED domestically or will be all imported. ED being a scattered industry broken into segments like, LED importers or manufacturers, drivers manufacturers or providers, lighting systems providers and solution providers, the concerns from various perspectives are different on 100% adaption of LEDs. Following are the feedbacks from some of the giants from LED manufacturers & Lighting products & solution providers on our future lightening by LEDs.

Source: <http://electronicsmaker.com/is-india-ready-for-energy-efficient-led-lighting>

What is the estimated uptake of this qualification and what is the basis of this estimate?

The Solar-LED based products has bright further in global perspective as well as in India scenario. As per the estimates of Ms. Parimita Mohanty CTCN Coordinator for Asia-Pacific, UN Environment Program(<https://blogs.adb.org/>) it estimated that *“Indian LED market is expected to grow at a compound annual growth rate of 45-47% until 2015, and by 2021 LED technology will account for 60% of the lighting market in the country.”*

The tender bid released by SAIL for design, supply, installation, Civil work, testing, commissioning of Solar LED Street Lighting System including 05 years comprehensive warranty maintenance in two peripheral villages – Hirtand and Girdhartand of Bokaro Steel Plant, shows that similar initiatives will bring huge manpower demand in these sectors.

Source : https://sailtenders.co.in/STDocs/Tender/Tnd_052483_74210.pdf

27. Recommendation from the concerned line of ministry of the Government/ regularity body. To be supported by documentary evidences

28. What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?

As the understanding and adoption models of QPs evolve in the industry and across its sub-sectors, we foresee consolidation of qualification packs as a natural progression. The Qualification does not exist as per information available in public domain.

29. What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

The Qualification is to be monitored and reviewed every two years.

The following data will be used

1. Results of assessments
2. Employer feedback will be sought post-placement
3. Student feedbacks
4. Workshops and seminar for reviewing the qualifications
5. Industry Requirements
6. Consultation/ Tie-up with Industries or Expert for review of the Curriculum.

Please attach most relevant and recent documents giving further information about any of the topics above.

SECTION 4

EVIDENCE OF RECOGNITION OR PROGRESSION

30. What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

This qualification comprises both theoretical and practical skills and can be linked to any qualification higher than this one, existing or to come. The candidates who complete this course successfully can enrol for diploma courses in solar LED product Design (EPD) as a lateral entry in some of the universities/colleges. The course is also valid in many industries as the verification from companies of countries like USA, CANADA etc.