

Proper Head Lamp

KES M – D004

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Contents

1. Scope of Application
2. Structure of Lamp
3. Regulation on a PHL and Group Specification
4. Performance
5. Basic Design Step
6. Designing Assembly Drawing
7. Execution of D/R and FMEA
8. Lens Design
9. Body Design
10. Reflector Design
11. Socket Cover Design
12. Design of the Other Parts
13. Writing Assembly Drawing
14. Final Check
15. Evaluation of Design

1. Scope of application

This standard shall be applied to an automotive proper head lamp (Called 'PHL' hereinafter) and describe design procedures and design methods.

Remark : In this standard, all the reference is based on a drawing reference. Design points are expressed by making a standard document. Assembly layout drawing is a prerequisite to design.

2. Structure of design

PHL structure is divided into two types as shown below.

(1) Reflector embedded type

Because a reflector is embedded in a lamp, reflector moves but lens and lamp body does not move during adjustment.

(2) Unit moving type

Because lens and reflector make a unit, a unit moves during adjustment.

In each type, the other function module is united in a body.

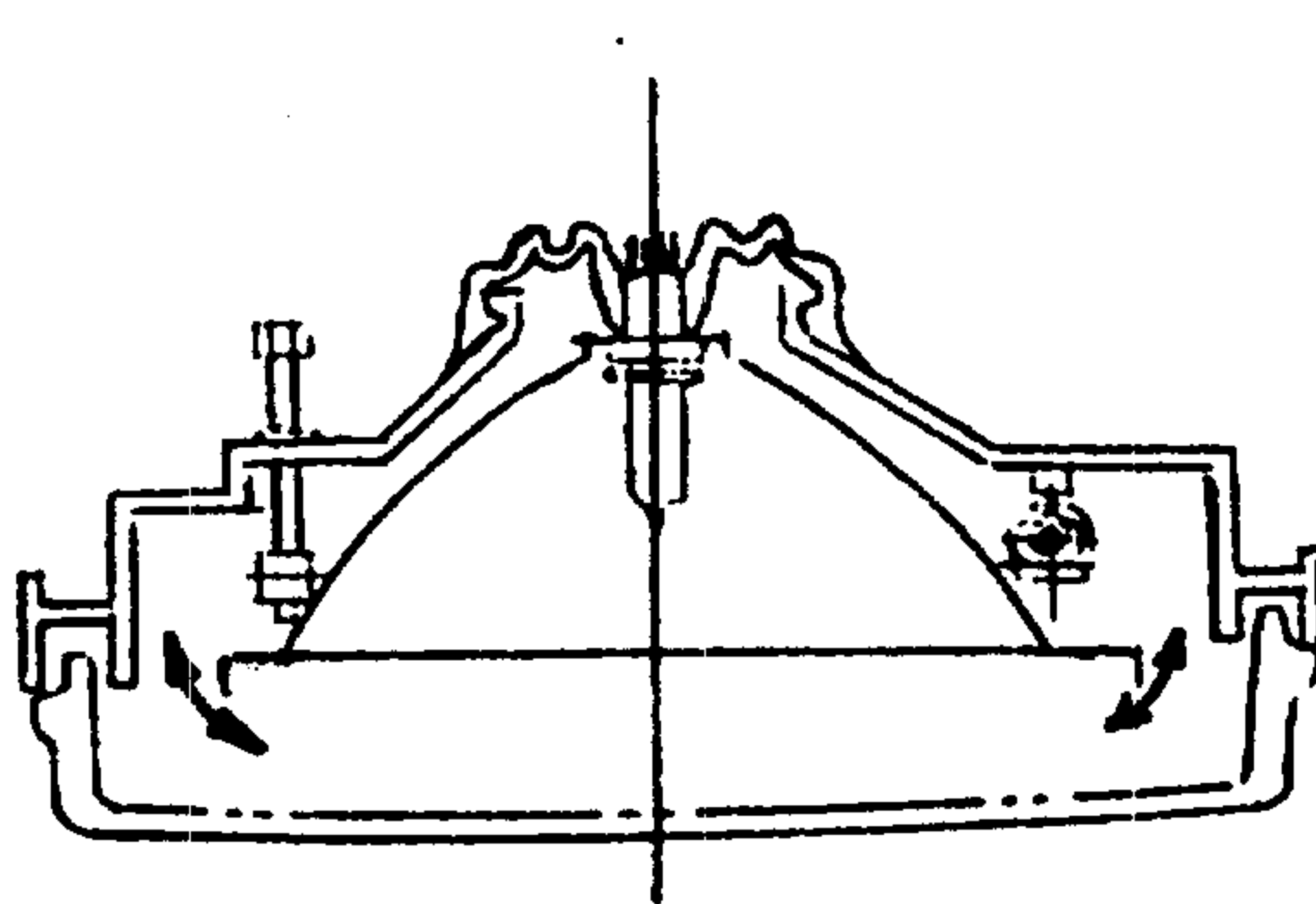


Figure 1

Reflector embedded type

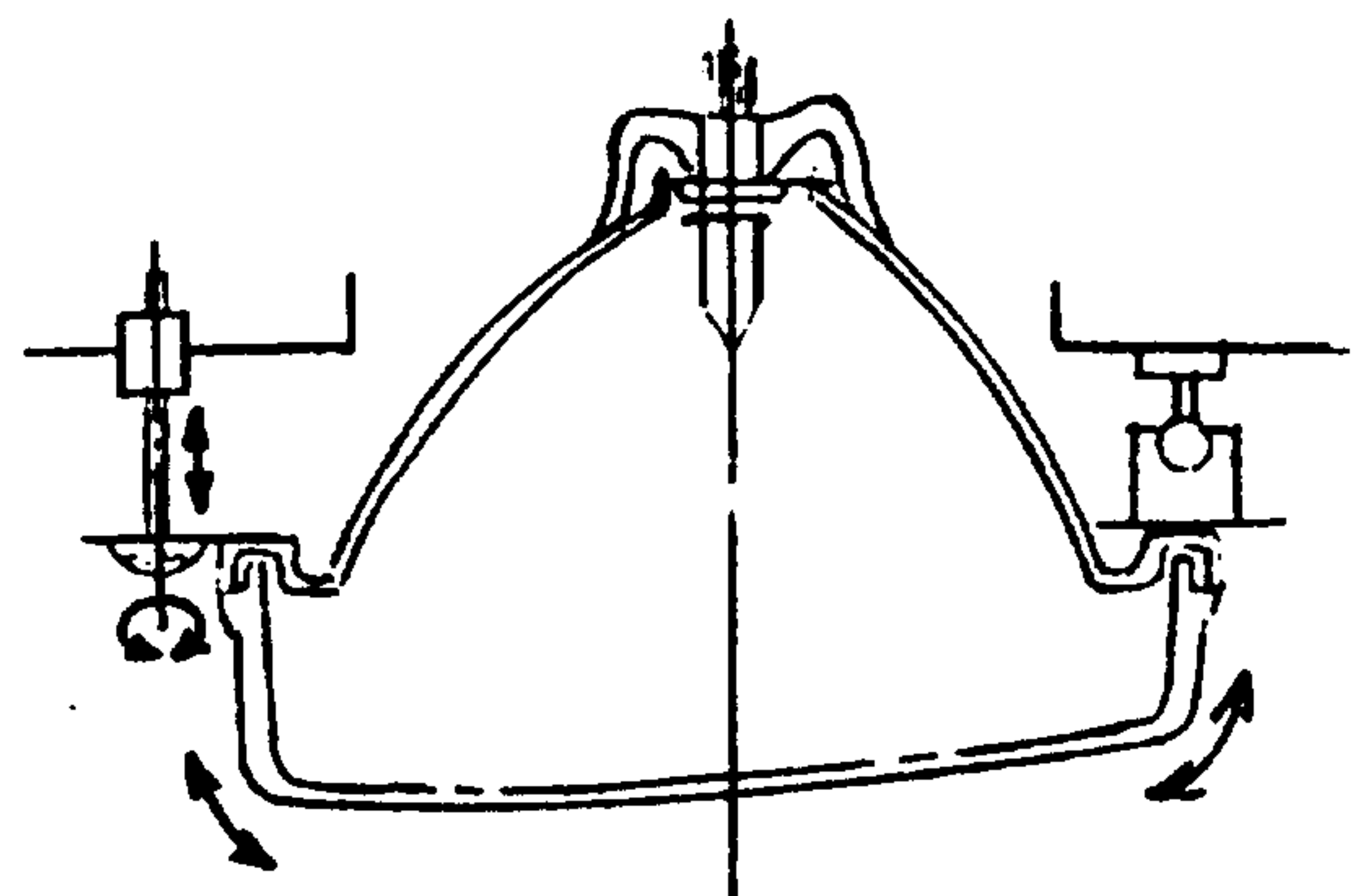


Figure 2

Unit moving type

3. Regulation on a PHL and group specification

There are regulations on a PHL and group specifications as shown below.
(Refer to additional data).

- Domestic
 - ◇Section 34 in automotive safety standard
 - ◇Section 19 in automotive inspection standard
 - ◇KS R 5018 (Automotive lamp)
- Europe
 - ◇ECE Reg. 1, 8, 29, 48
 - ◇ECE 76/761, 76/756
 - ◇The other standard in each country
- North America
 - ◇Sub-section 108 in FMVSS
 - ◇Sub-section 108 or 108.1 in FMVSS
- Japan
 - ◇Section 32 in transporting automotive safety standard
 - ◇VInspection standard of new vehicle (TRIAS 22-1983)
 - ◇JIS D 5500 (Automotive lamp)

Remark : Follow the separate regulation and group specification for the other functions except headlamp.

4. Performance

Follow basic product specification for PHL performance.
Determine performance specification of each product according to local (or exporting country) required performance. Before designing products, it is required to understand required performance, product specification, and test standard.

5. Basic design step

Product development generally follows the next procedures.

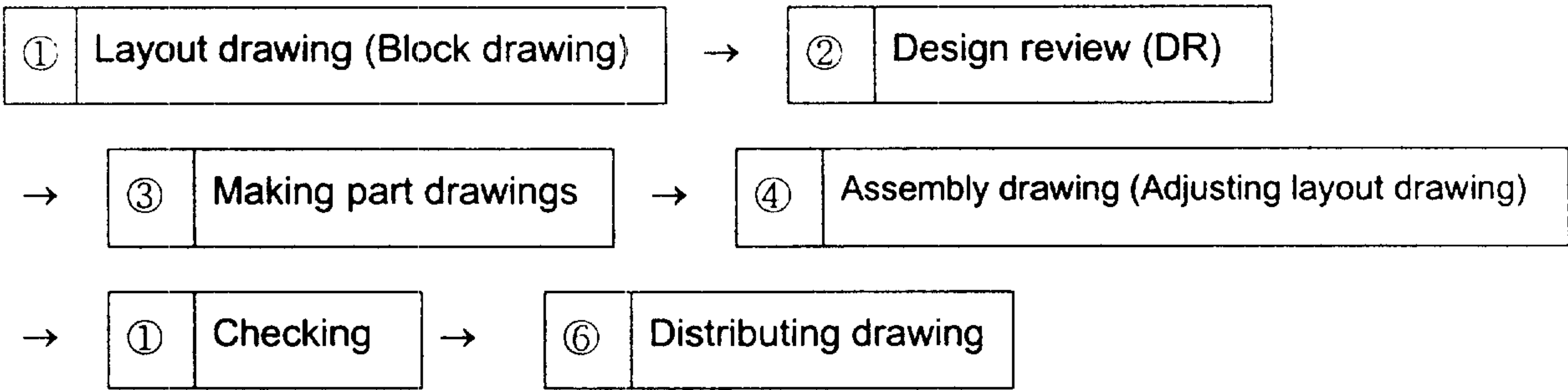
- ① Product selection (Determination of model) ⇒ ② Examine suitability of basic

performance (Model) ⇒ ③ Layout drawing (Block drawing) ⇒ ④ Writing specification
⇒ ⑤ Distributing drawings ⇒ ⑥ Prototyping ⇒ ⑦ Verification of product quality ⇒
⑧ Mass production

In this standard, detail procedure, designing method, and standard documents of

③ Layout drawing (Block drawing) and ④ Writing specification among above procedure
are described.

The following steps are general and efficient during product design.



6. Design of assembly drawing

Design generally proceeds as following procedures. However, collecting information and
acquiring data are prerequisite to design.

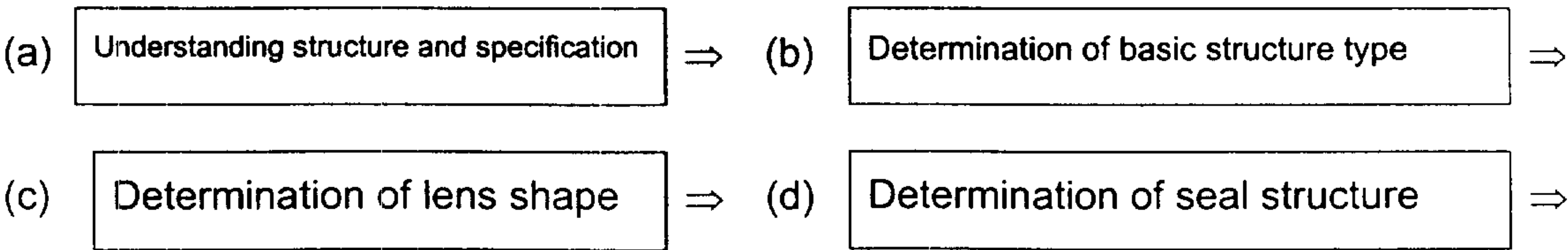
(1) Acquire data required for design such as followings: Circuit diagram of lamp, Circuit
diagram of vehicle, surrounding drawing of vehicle body, parts drawing around lamp,
and design drawing.

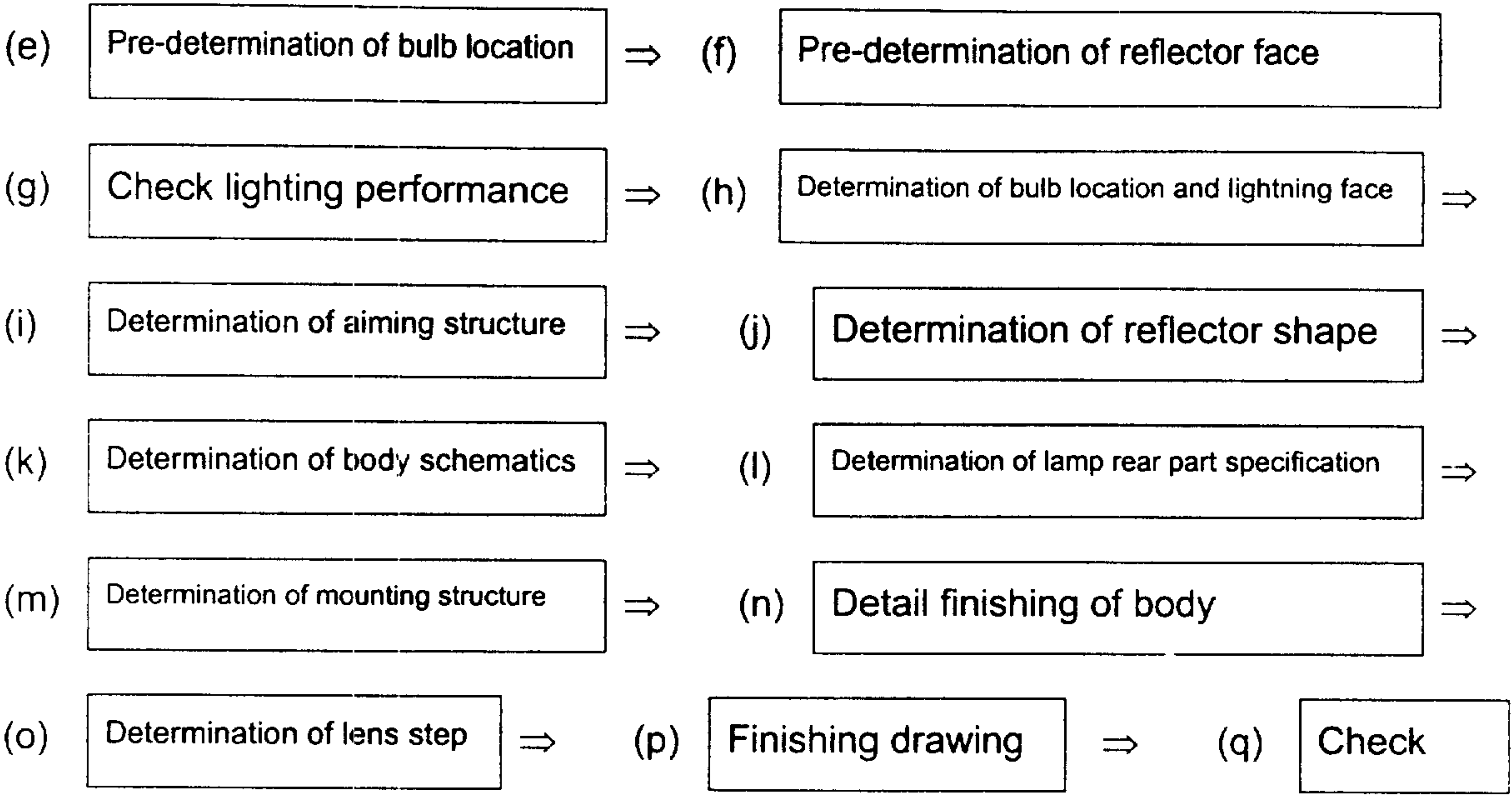
(2) Verify the required performance of product.

*Appearance (Appearance at lightning-up and lighting-off) is one of important
performance.

(3) Check a cost, production region, quantity of product, and so on.

(Design procedure)





Describe design point and standard document for reference according to the following procedures.

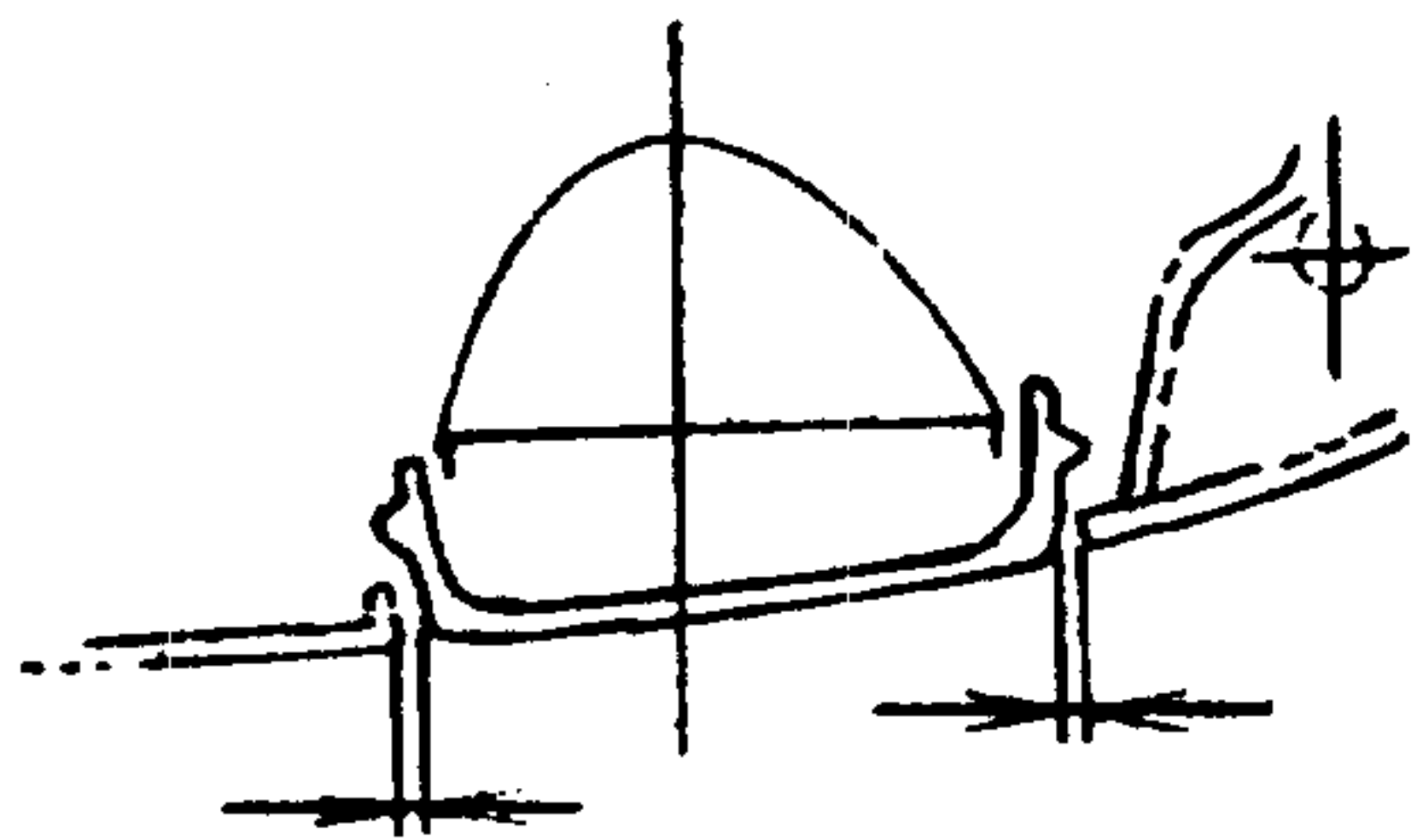
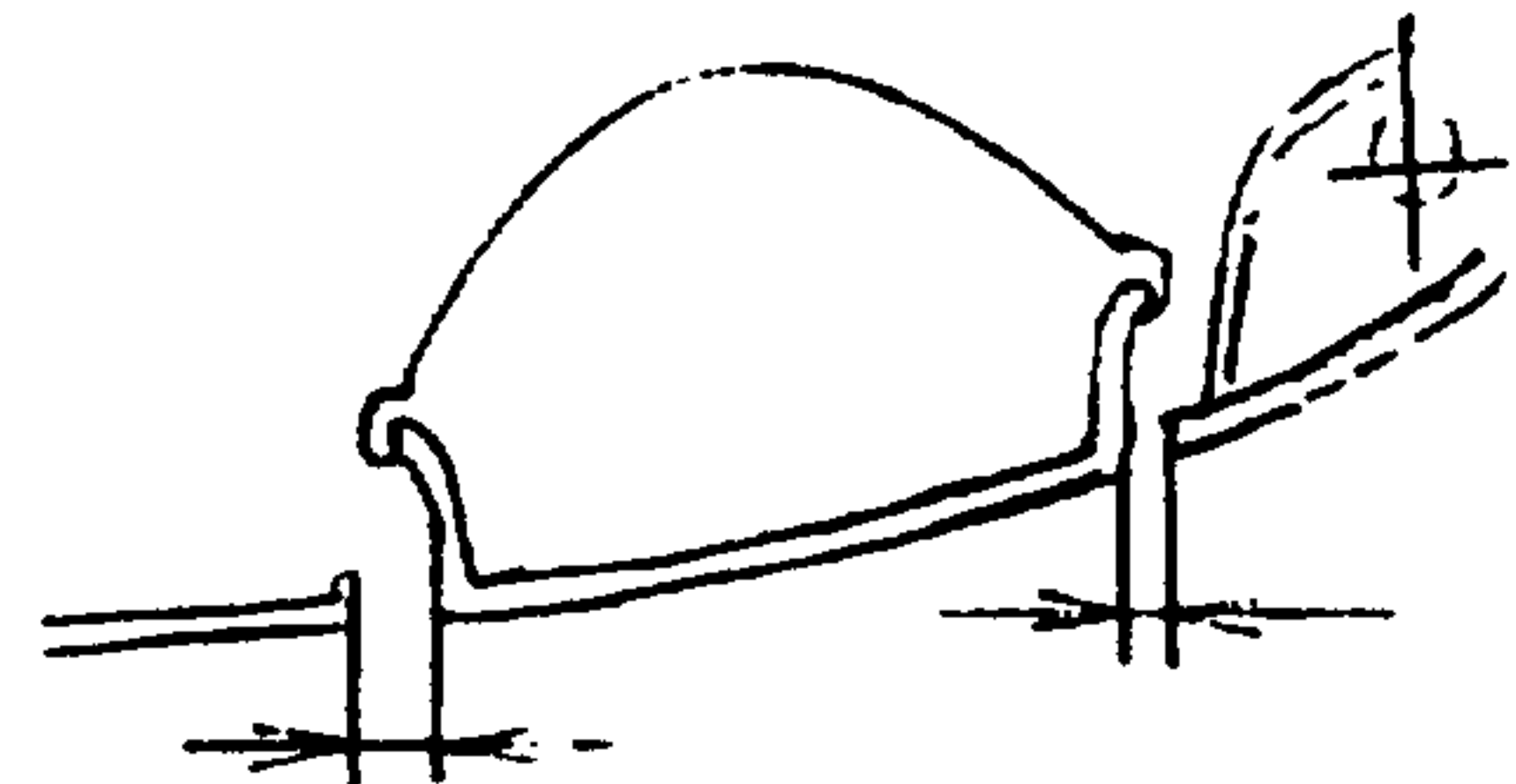
Step 1 Understanding structure and specification

Understand the structure and specification based on the acquired and verified data. In addition, express 2 pieces with bold line among drawings.

Step 2 Determination of basic structure type

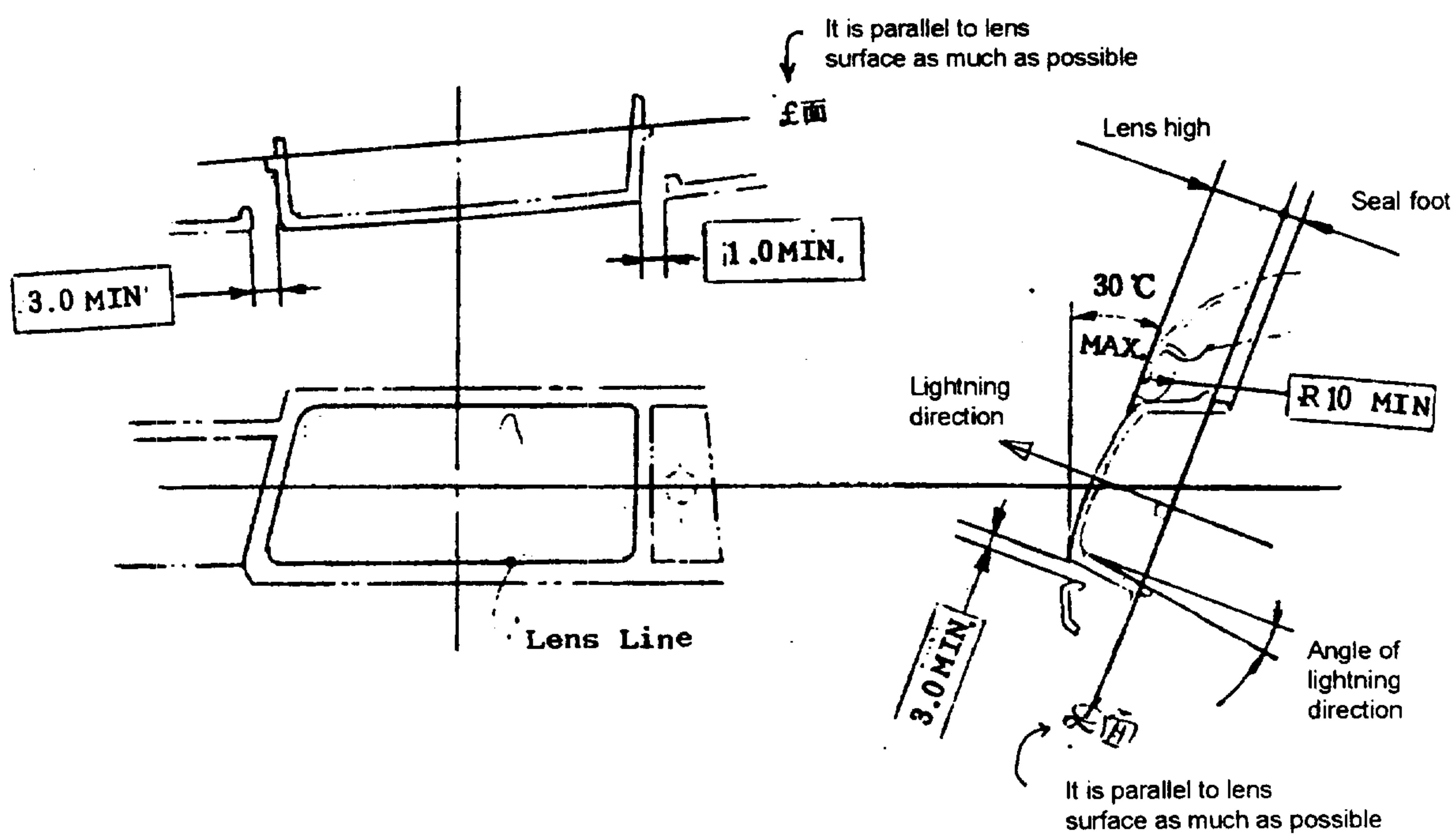
Determine basic structure. However, PHL for North America should be unit-moving type. (Lens and reflector make one body.)

Properties of reflector embedded type	Properties of unit-moving type
① Because lens does not move, the gap between car body and close lens can be minimized. (It can easily be integrated and is easy to be mounted. Lens and body does not move relatively.)	① Because unit (Lens and reflector) moves, the gap for aiming angle and closer lamp should be guaranteed. (Because all lamp moves, it is hard to mount.) ② In case that size of lens face is uniform, reflector (Lightning face) can be enlarged

Properties of reflector embedded type	Properties of unit-moving type
	 compared to that of reflector embedded type. In addition, total size can be minimized.

Step 3 Determination of lens shape

Determine lens shape (Appearance) from the lens drawing.



<Point>

- ① Check bonnet, grille, bumper, and close lamp gap.

(Above drawing shows reflector embedded type.)

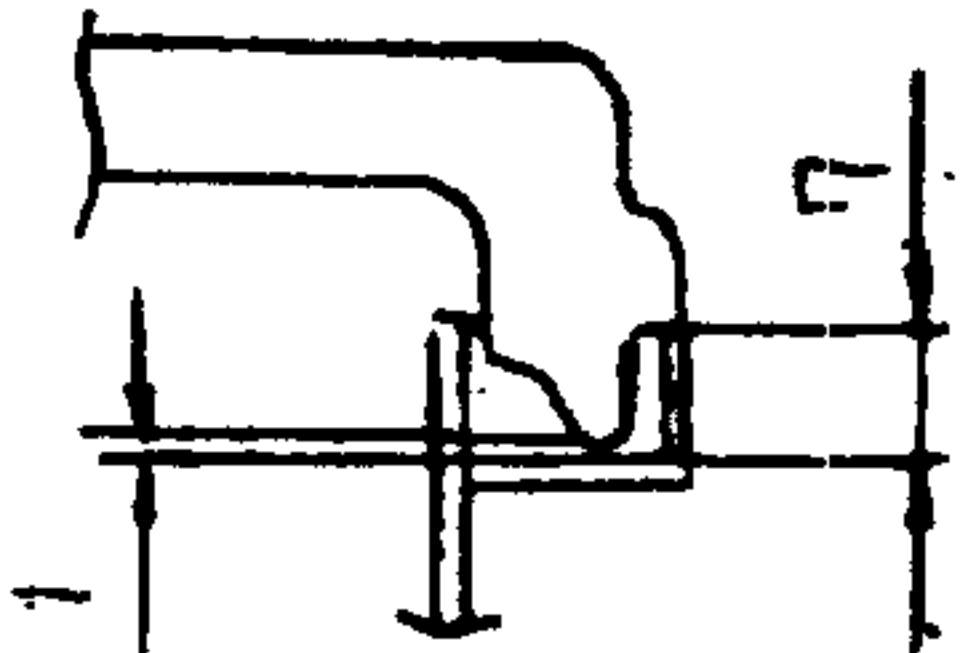
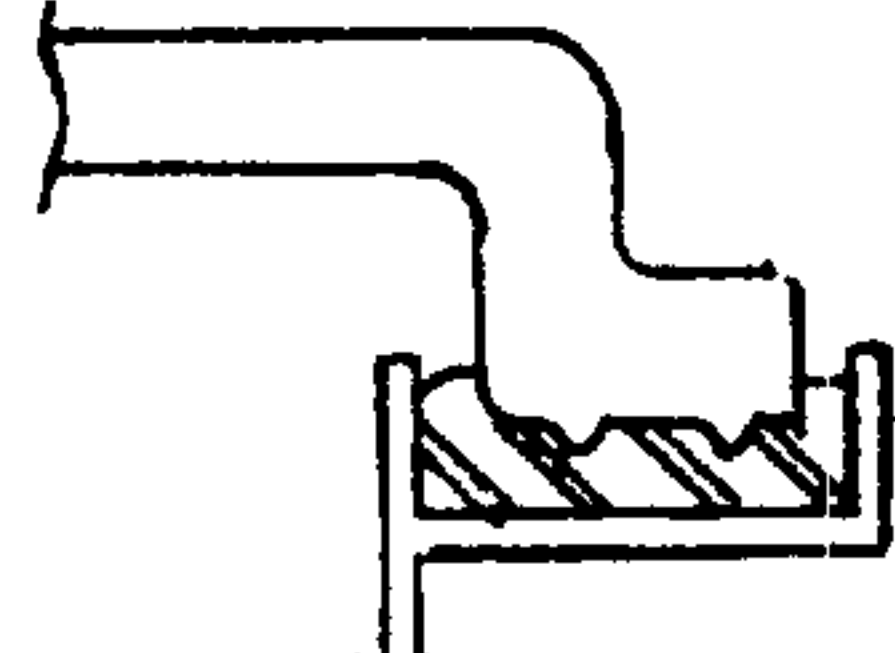
- ② Height of lens : 20 ~ 35 mm
- ③ Cast gradient : More than 8°
- ④ Rib for seal : More than 6mm
- ⑤ Molding ratio of lens : 60%

Step 4 Determination of seal structure

Determine lens and body or reflector and seal structure.

Several kinds of seal structures are shown below. Select an appropriate type.

Determine fixing position and number of seal for mechanical connection by considering connecting strength.

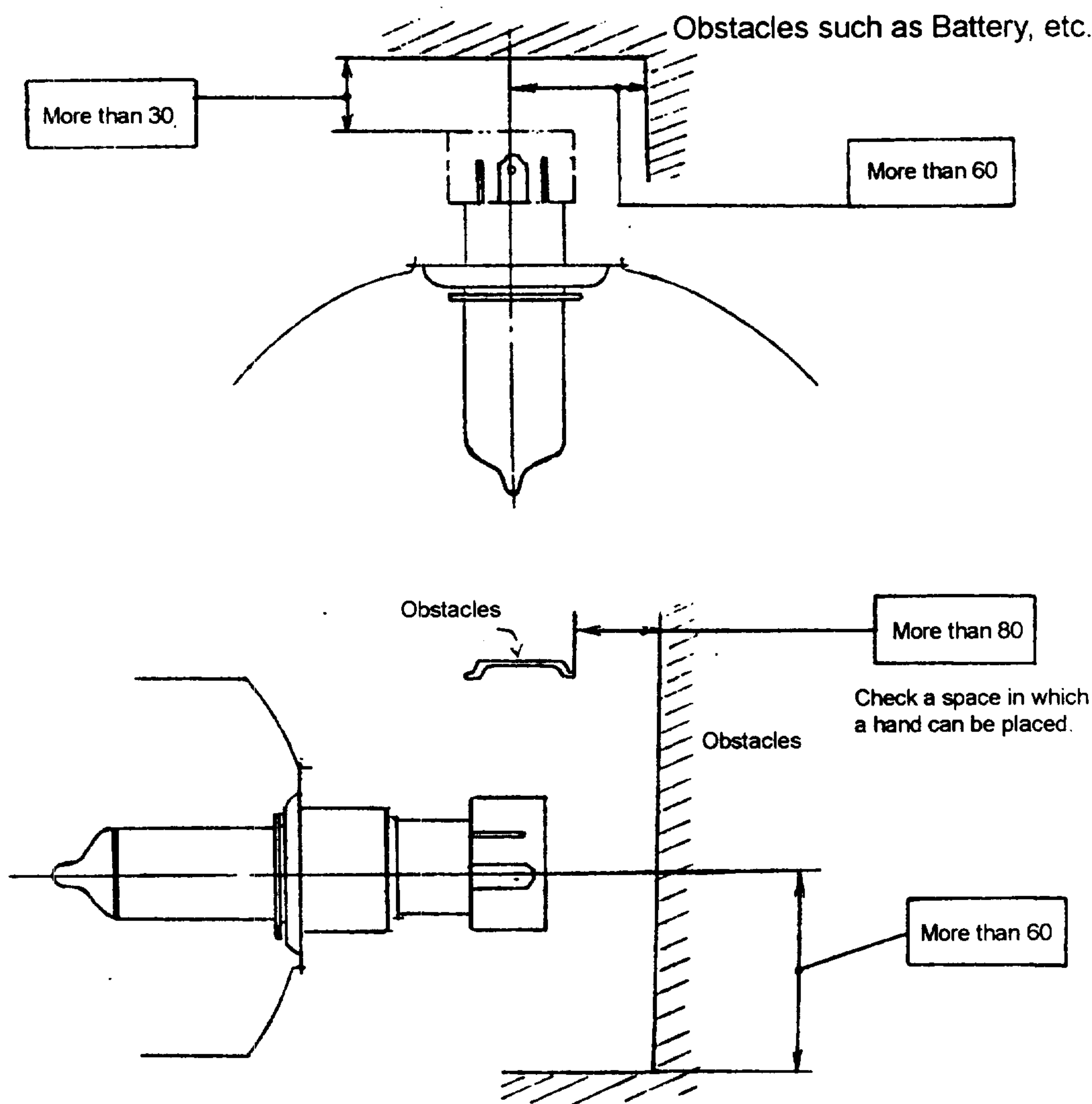
Seal structure	Properties
(Use of sealing material) 	① Generally used. ② This is cheaper than gasket type. ③ In case of lens breakdown, replace lamp assembly.
(Use of gasket) 	① Only lens can be replaced. ② Due to shape of seal rib, outer width is larger than seal material by 10 ~ 15mm. ③ Cost is high.

Step 5 Pre-determination of bulb position

Because reflector size (F value, size of lightening face) and body size change according to bulb position, bulb position should be determined above all.

By considering gap with lamp and approximate size of reflector, pre-determine bulb position. In addition, determine type of bulb at this time.

* Determine final position after step 6 and 7.

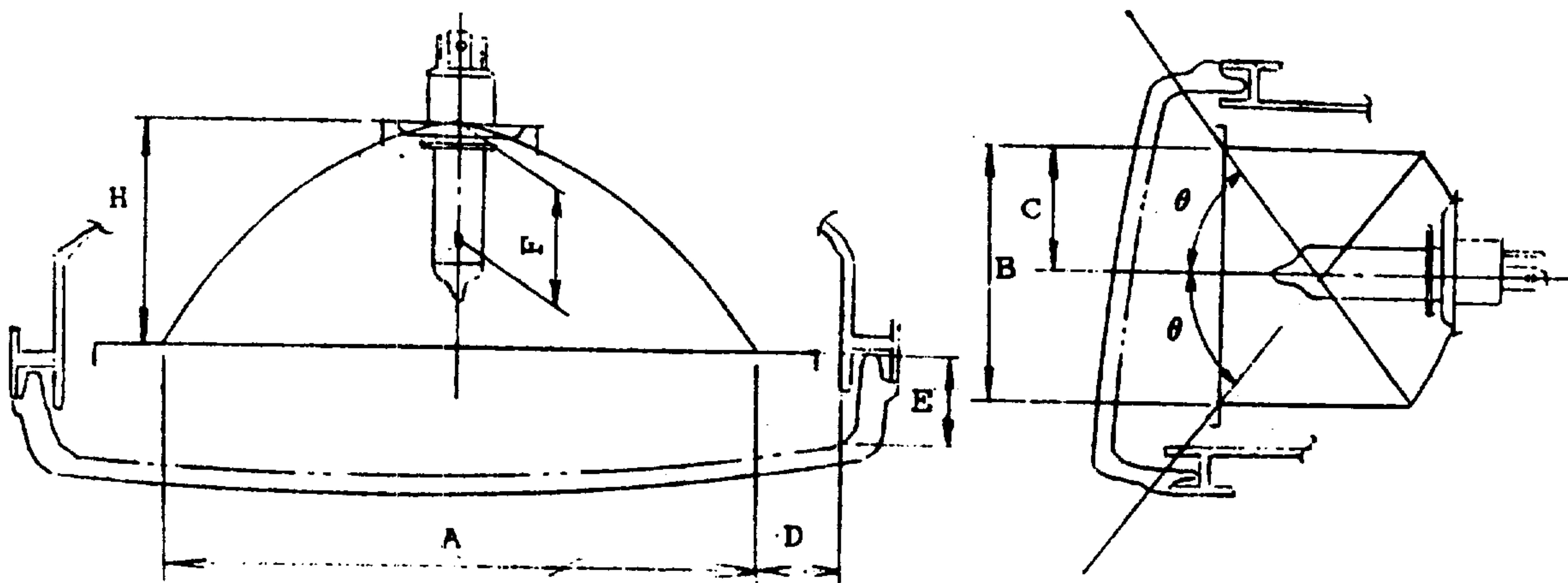


Step 6 Pre-determination of lightning face in reflector

After determining lens size, outer wall of body, and bulb position, pre-determine F value and size of lighting face in reflector.

* Use an existing lightning face if possible.

⇒ Reduce cost and developing period.



* Refer to below table for dimension of A, B and C for lightning performance.

	A	B	C
F = 30	More than 210	More than 100	More than 56
F = 25	More than 174	More than 118	More than 59

* By considering mounting equipment, $\theta > 50^\circ$

However, ① Design D and E value by considering load due to flange and aiming.

** Check the worst cross section **

② Reflector made of steel plate has $H < 1.3B$ constraints
(Constraints due to press forming).

Step 7 Verification of lightning performance

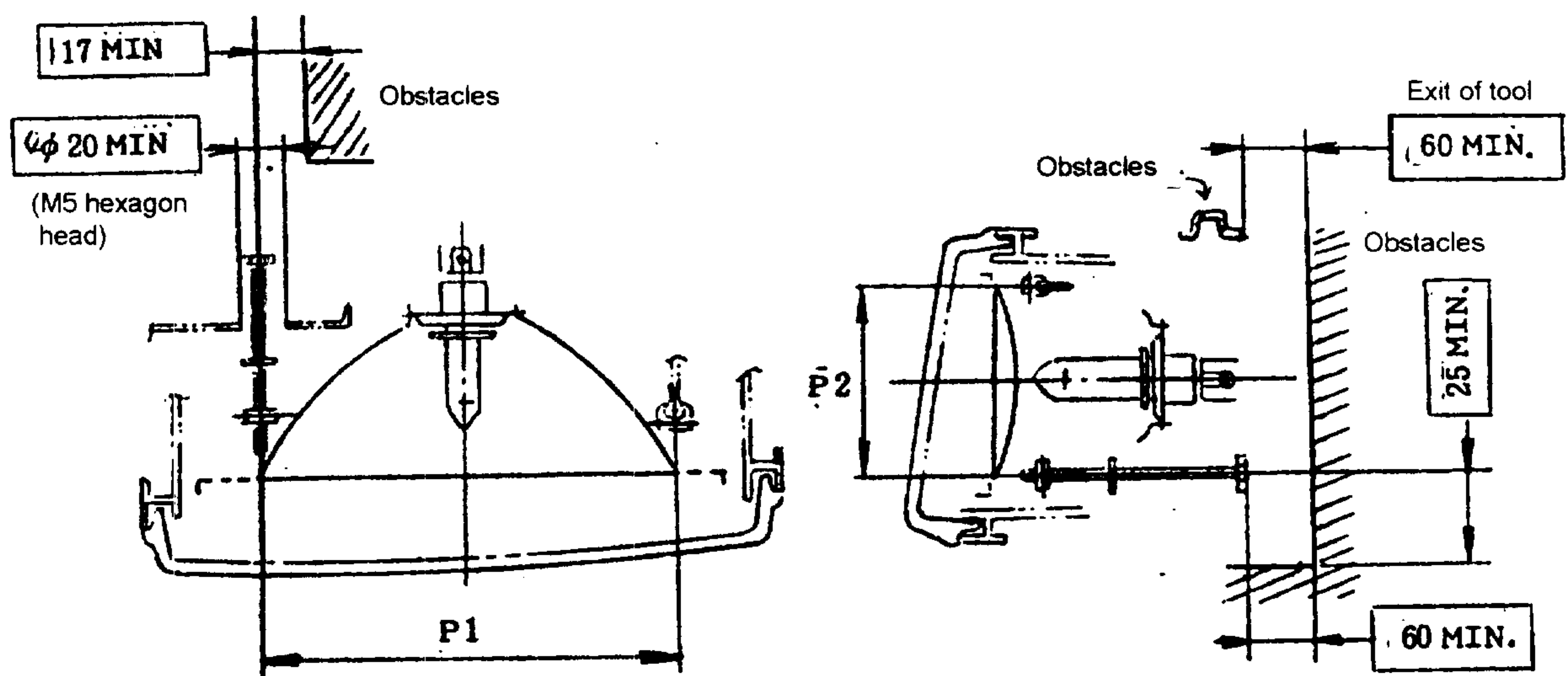
- ◇ Test lightning performance with draft shape of reflector.
- ◇ Repeat step 5, 6, and 7 to check the performance.

Step 8 Determination of bulb position and lightning face

While testing lightning performance in step 7, determine F-number and size of lightning face in reflector.

Step 9 Determination of aiming structure

Determine aiming method, aiming position, and operating point. Fully understand the vehicle body structure and select the structure for easy aiming work. There are several aiming methods: aiming before lamp (Unit moving type), aiming after lamp (Reflector embedded type), and aiming above vehicle body (Using mechanical gear).



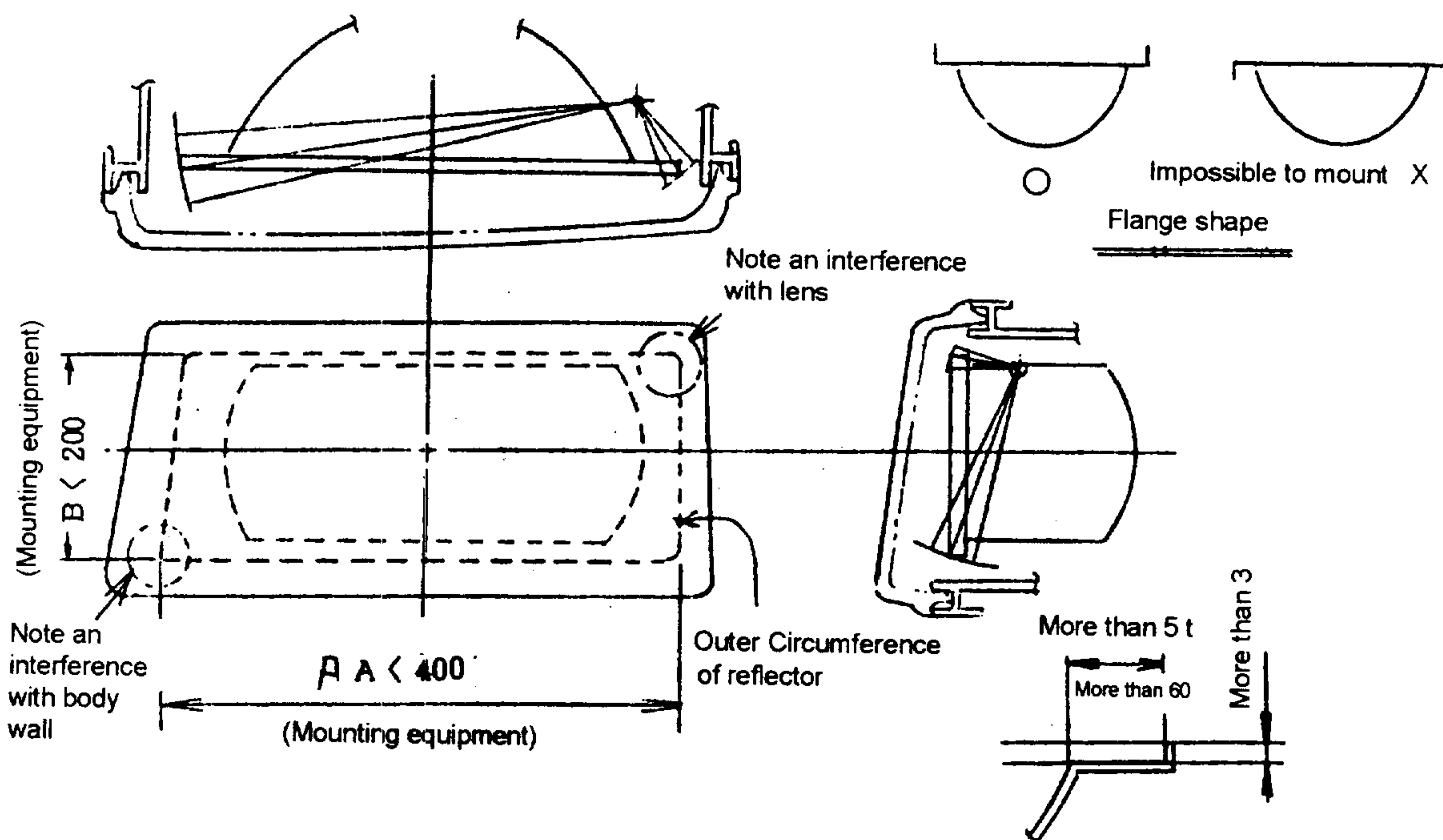
(In case of using an existing reflector – $F = 30$, $A = 210$, $B = 112$ in step 6 – above pitch is as followings. $P1 = 184$, $P2 = 104$)

* As to aiming angle, moving angle of lightning pattern or real moving angle of reflector (Mechanical aiming angle) is not generally coincident with that of lightning pattern. It changes into mechanical angle.

Step 10 Determination of outer shape of reflector (Flange part)

When aiming structure is determined, try moving reflector in the range of determined aiming angle. (Draw working track of reflector in the drawing.)

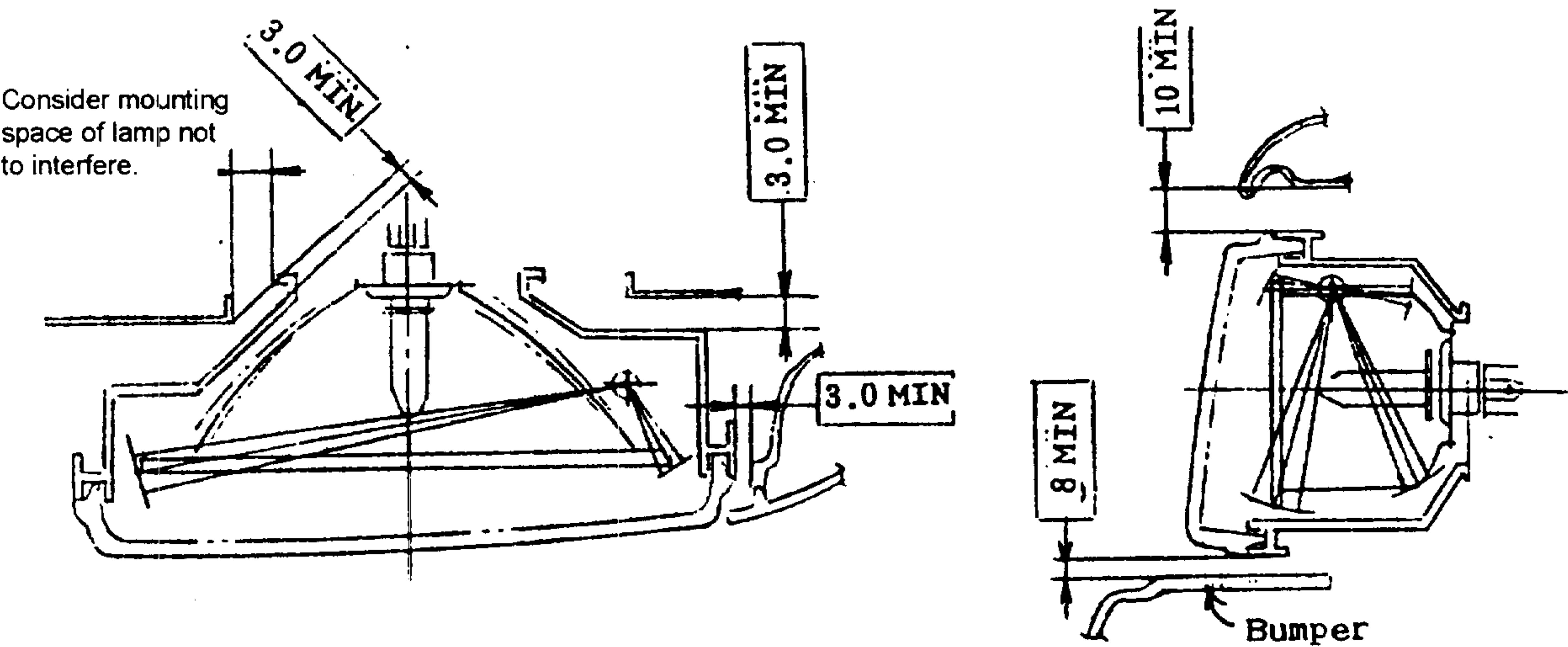
Check no interference with body wall and determine outer shape of reflector.



Step 11 Pre-determination of body shape

Pre-determine draft shape of body including moving range of reflector.

Consider gap with vehicle body, hole after lamp and size at this time.



Step 12 Determination of lamp rear specification

Determine a water-resisting structure of lamp rear part. Socket cover water-resisting structure is general, but back cover type can be used, too.

* Consider both water-resistibility and easiness of replacing operation.

Socket cover type	Back cover type